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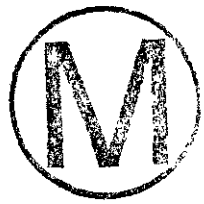


Croff, A.B. 1980. A User's Manual for the ORIGEN2 Code. ORNL/TM-7175, Oak Ridge National Laboratory, July 1980.

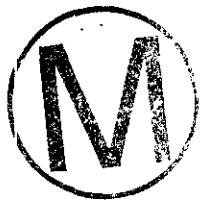
NOTE: The above listed document was not available for inclusion in the Reference Expansion as of the printing date. Page changes will be provided as the above document becomes available for inclusion.

DOE (U.S. Department of Energy). 1988. Radioactive Waste Management, Order 5820.2A, Washington, D.C.

1. PURPOSE, p. 1;
" To establish policies, guidelines, and minimum requirements by which the Department of Energy (DOE) manages its radioactive and mixed waste and contaminated facilities."

Attachment 2, Page 1, #6;
" Contact-Handled Transuranic Waste. Packaged transuranic waste whose external surface dose rate does not exceed 200 mrem per hour."

Page 4, #31;
" Remote-Handled Transuranic Waste. Packaged transuranic waste whose external surface dose rate exceeds 200 mrem per hour. Test specimens of fissionable material irradiated for research and development purposes only and not for the production of power or plutonium may be classified as remote-handled transuranic waste."



DOE (U.S. Department of Energy). 1995a. Performance Demonstration Program Plan for Nondestructive Assay for the TRU Waste Characterization Program, Appendix A, Determining the Number of Containers to Visually Examine Using the Hypergeometric Distribution. DOE/CAO-94-1045, Revision 0, March 1995. Carlsbad, NM.

INTRODUCTION, General, p. 1;

" The Performance Demonstration Program (PDP) for Nondestructive Assay (NDA) will consist of a series of tests conducted on a regular frequency to evaluate the capability for nondestructive assay of transuranic (TRU) waste throughout the Department of Energy (DOE) complex. Each test is termed a PDP cycle. These evaluation cycles will provide an objective measure of the reliability of measurements performed with TRU waste characterization systems.

Measurement facility performance will be demonstrated by the successful analysis of blind audit samples according to the criteria set by this Program Plan. Intercomparison between measurement groups of the DOE complex will be achieved by comparing the results of measurements on similar or identical blind samples reported by the different measurement facilities. Blind audit samples (hereinafter referred to as PDP samples) will be used as an independent means to assess the performance of measurement groups regarding compliance with the established Quality Assurance Objectives (QAOs). As defined for this program, a PDP sample consists of a 55-gallon standard drum emplaced with standards and fabricated matrix inserts. These PDP sample components, once manufactured, will be secured and stored at each participating measurement facility under secure conditions to protect them from loss, tampering, or accidental damage."

INTRODUCTION, Purpose, p. 1;

" The Performance Demonstration Programs (PDPs) are designed to help ensure compliance with the QAOs identified in the TRU Waste Characterization Quality Assurance Program Plan (QAPP) for the Waste Isolation Pilot Plant (WIPP)(DOE,1994). The PDPs are intended for use by the Carlsbad Area Office)CAO) as part of the assessment and approval process for the measurement facilities supplying services for the characterization of WIPP TRU waste. . . ."

DOE (U.S. Department of Energy). 1995b. Transuranic Waste Characterization Quality Assurance Program Plan. DOE/CAO-94-1010, Revision 0, April 30, 1995. Carlsbad, NM.

1.0 PROGRAM MANAGEMENT, p 1;

" This Quality Assurance Program Plan (QAPP) identifies the quality of data necessary, and techniques designed to attain and ensure the required quality, to meet the specific Data Quality Objectives (DQOs) associated with the Department of Energy (DOE) Waste Isolation Pilot Plant (WIPP) Transuranic (TRU) Waste Characterization Program (the Program). Waste characterization data will be collected to support regulatory compliance programs associated with the WIPP facility. These regulatory compliance programs include an assessment and certification of the WIPP repository performance, the preparation of permit applications and a variance petition, and an evaluation of existing TRU waste transportation restrictions. Although this QAPP specifies waste testing, sampling, and analytical methods, it also allows for the introduction, consideration, and development of innovative techniques for TRU waste characterization. Prior to implementation of new waste characterization techniques for use in Program activities, the proposed techniques must be submitted to the Carlsbad Area Office (CAO) for review and approval. This QAPP will be reviewed annually, and revised as necessary, to incorporate lessons learned during waste characterization activities.

The CAO *Quality Assurance Program Description* (QAPD) [DOE 1994b] is the quality management document which identifies federal, state, and industry quality requirements applicable to the CAO quality assurance (QA) program. The QAPD establishes the minimum requirements for the development of QA programs by WIPP program and National TRU Program participants. Requirements contained in the QAPD are based on the QA requirements and criteria contained in 10 CFR Part 830, 'Nuclear Safety Management,' and other programmatic requirements. The QAPD also is consistent with applicable Environmental Protection Agency (EPA) QA requirements. This QAPP addresses the applicable requirements outlined in the QAPD, as appropriate.

This QAPP follows the guidelines recommended by EPA in QA/R-5, *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (EPA 1994a). This QAPP satisfies all applicable requirements of 10 CFR § 830.120, which governs the conduct of the DOE management and operating (M&O) contractors and other persons at DOE nuclear facilities. Because DOE facilities are managing nuclear materials contained in TRU waste, all applicable quality elements in the American Society of Mechanical Engineers (ASME), *Quality Assurance Program Requirements for Nuclear Facilities* (ASME NQA-1) (ASME 1994) are addressed.

This QAPP addresses all of the basic requirements, and their supplements, of ASME NQA-1. However, nothing in this document relieves any Program participant from the responsibility of complying with any existing requirement. All exceptions to the basic requirements of NQA-1 such as applicable federal, state, and local regulation; DOE Orders; permits and interagency agreements; or any site-specific controls on operations, shall be documented in quality assurance project plans (QAPjPs) (Section 1.2.2) which must be prepared by each participating DOE generator/storage site (site). The CAO manager shall be notified

immediately of any conflicts between this QAPP and any existing requirements.

Because the American National Standards Institute/ American Society for Quality Control (ANSI/ASQC) E4-1993, *Quality Systems Requirements for Environmental Programs* (ANSI/ASQC 1993), incorporates the QA requirements of applicable EPA, DOE, and ASME documents, the requirements stated in the ANSI/ASQC E4-1993 document were considered in developing this QAPP. A cross reference of the content of this QAPP; the EPA QA/R-5 elements; the analogous CAO QAPD and 10 CFR § 830.120 criteria; and ASME NQA-1 basic requirements is provided in Table 1-1."

DEFINITIONS;

" NEWLY GENERATED WASTE - Waste that is generated after the development and implementation of a TRU waste characterization program that meets the requirements outlined in this QAPP."

" RETRIEVABLY STORED WASTE - Waste that has been generated before the development and implementation of a TRU waste characterization program that meets the requirements outlined in this QAPP."

APPENDIX A, Determining the Number of Containers to Visually Examine Using the Hypergeometric Distribution, p. 1, para. 1:

" For the hypergeometric approach to determining the number of containers to be visually examined, the acceptable level of uncertainty in the estimate of the proportion miscertified (along with the information on the previous percentage miscertified) determines the number of containers that must be examined. The rationale and details of this methodology are discussed below.

In a population of size N, there are M miscertified containers, so the true proportions of the miscertified containers in the population is $M/N=p_{true}$. Since p_{true} (or M) is not known, we wish to estimate it by randomly sampling some of the containers. If in a sample of n containers, x are found to be miscertified, the sample estimate of the true population proportion p_{true} is

$$\hat{p} = \frac{x}{n} \qquad \text{(A-1)}$$

This value is only an estimate, and such has some uncertainty associated with it. This uncertainty is quantified by calculating the upper one-sided (1-α) percent confidence limit for p, call it p_{ucl}. This confidence limit gives the largest value the true proportion could take on and still have a "reasonable" chance (e.g., an $\alpha=.10$ probability) of producing x miscertified containers in a sample of n out of N. This upper confidence limit is calculated as

$$p_{UCL} = M_{UCL}/N \qquad \text{(A-2)}$$

Where M_{ucl} is the largest value of M such that the probability of observing x or fewer miscertified containers in a sample of size n is less than or equal to α. That is, it is the largest value of M such that the following inequality is true

$$\sum_{k=0}^{x} \frac{\binom{M}{k}\binom{N-M}{n-k}}{\binom{N}{n}} \leq \alpha. \qquad \text{(A-3)}$$

Where each term in parentheses has the usual combinatorial interpretation. For example

$$\binom{M}{k} = \frac{M!}{k!\ (M - k)\ !} \qquad \text{(A-4)}$$

Each term in the sum in Equation (A-3) is the hypergeometric probability of observing k miscertified containers in a sample of size n from a population of size N in which there are M miscertified containers (and hence the population proportion of miscertified containers is $p=M/N$). The value M_{ucl} is obtained by substituting different values for M into Equation (A-3) until the largest value satisfying the inequality is found.

Note that in Equation (A-3), the upper confidence limit is dependent on x, the number of miscertifications observed in the sample, as well as on n, the sample size. So, to obtain the required sample size, the values of x that are likely to be seen also need to be considered. Sample size is thus determined by setting a desired upper confidence limit value and then manipulating x and n in Equation (A-3). The detailed steps are given in the following algorithm, along with an example application to clarify the steps involved:"

DOE (U.S. Department of Energy), 1995c. Transuranic Waste Characterization Sampling and Analysis Methods Manual. DOE/WIPP-91-043, Revision 1, April 1996. Carlsbad, NM.

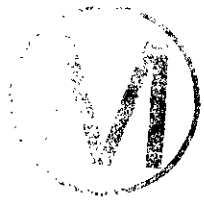
Procedure 310.2, PHYSICAL WASTE FORM CHARACTERIZATION USING VISUAL EXAMINATION, p. 310.2-1;

" 1.0 Scope and Application

1.1 This procedure for the visual examination of the contents of a waste container is designed to provide data on the type and amount of material in each of the waste containers included in the TRU Waste Characterization Program (the Program). This procedure is used as a quality control check for "Physical Waste Form Characterization Using Radiography" (Procedure 310.1 of this Methods Manual). IN addition, sites may choose to perform visual examination of waste packages instead of radiography. Therefore, this procedure may be used either to confirm the matrix parameter category and waste material parameter weights as determined by radiography, or to determine the matrix parameter category and waste material parameters for waste that has not undergone radiography. This procedure must be implemented with a site-specific standard operating procedure (SOP). SOPs must include all of the elements found in this procedure.

The waste material parameters of interest for performance assessment are listed in Table 1. The estimated or measured weight of waste within these waste material parameters are determined using this procedure.

1.2 If used to verify the results of radiography, the results of visual examination will be included in the testing batch data reports for radiography. For the purposes of the TRU Waste Characterization Program, waste containers are to be characterized by radiography in testing batches. A testing batch is defined as suite of waste containers undergoing radiography suing the same equipment. A testing batch can be up to 20 waste containers or the number of waste containers that can be examined in one day without regard to waste matrix. If used in place of radiography, the results of visual examination will be in a separate visual examination report. In this case, waste containers are also visually examined in testing batches."



DOE (U.S. Department of Energy). 1995d. Waste Isolation Pilot Plant Safety Analysis Report. DOE/WIPP-95-2065, Revision 0, November 1995. Carlsbad, NM.

Facility Background and Mission, p. 1-4;

" The United States Department of Energy (DOE) was authorized by Public Law 96-164[1] to provide a research and development facility for demonstrating the safe permanent disposal of transuranic (TRU) wastes from national defense activities and programs of the United States exempted from regulations by the U.S. Nuclear Regulatory Commission (NRC). The Waste Isolation Pilot Plant (WIPP), located in southeastern New Mexico near Carlsbad, was constructed to determine the efficacy of an underground repository for disposal of TRU wastes.

In accordance with the 1981 and 1990 Records of Decision (ROD),[2,3] the development of the WIPP was to proceed with a phased approach. Development of the WIPP began with a siting phase, during which several sites were evaluated and the present site selected based on extensive geotechnical research, supplemented by testing.

The site and preliminary design validation (SPDV) followed the siting phase, during which two shafts were constructed, an underground testing area was excavated, and various geologic, hydrologic, and other geotechnical features were investigated. The construction phase followed the SPDV phase during which surface structures for receiving waste were built and underground excavations were completed for waste emplacement. . . ."

p. 1-5, para 1;

" This Safety Analysis Report (SAR) documents the safety analyses that develop and evaluate the adequacy of the WIPP CH TRU safety bases necessary to ensure the safety of workers, the public, and the environment from the hazards posed by WIPP waste handling and emplacement operations during the disposal phase and hazards associated with the decommissioning and decontamination phase.

The analyses of the hazards associated with the long-term (10,000 year) disposal of TRU and TRU mixed waste, and demonstration of compliance with the requirements of 40 CFR 191, Subpart B[4] and 40 CFR 268.6[6] will be addresses in detail in the WIPP Final Certification Application scheduled for submittal in October 1996 (40 CFR 191) and the No-Migration Variance Petition (40 CFR 268.6) scheduled for submittal in June 1996. Section 5.4, Long-Term Waste Isolation Assessment summarizes the current status of the assessment. Section 5.4 will be updated upon completion of the long-term assessment demonstration (currently scheduled for the FY-97 Annual Update)."

ATTACHMENT 1, DOE/WIPP-95-2125, Rev. 0, *Technical Safety Requirements*, p. 5-6, Section 5.8.12 Waste Characteristics;

" A Waste Characterization Program shall ensure that only wastes that are compatible with the design, operation and long-term performance of the WIPP facility are shipped to WIPP and that any exceptions are weighed against all applicable baseline douments prior to their authorization for shipment.

Procedures shall be established, implemented, and maintained to ensure that the following

WIPP WAC[3] requirements apply to all WASTE that is to be shipped to the WIPP are implemented:

- The WASTE accepted for placement in the WIPP facility must conform with the WIPP WAC[3] unless an exception to the WAC has been approved as a result of examination in relation to the SAR.[2] Specific criteria used in the development of the safety analysis are as follows:
  - Waste Containers
    1. Containers shall be noncombustible and meet DOT Type A packaging requirements.
    2. Limit acceptable containers to 55-gallon drums and standard waste boxes (SWBs).
  - Liquids
    1. Only residual liquids; as a guideline, residual liquid in well-drained internal containers to be restricted to approximately 1 volume % of the internal container; aggregate amount of residual liquid $<$ 1 volume % of external container.
  - Pyrophoric Materials
    1. No non-radionuclide pyrophorics permitted. Radionuclides in pyrophoric form are limited to $<1\%$ by weight in each waste package."

DOE (U.S. Department of Energy). 1995e. WWIS Software Quality Assurance Plan. CAO-95-1108, Version 0, May 1995, Carlsbad, NM.

1. INTRODUCTION, 1.1 Purpose, p. 1;

" The purpose of this Software Quality Assurance Plan (SQAP) is to identify and define the standards and methodologies required to ensure conformance to accepted quality standards during the development and maintenance of the WIPP Waste Information System (WWIS). In addition, the standards and methodologies provide adequate confidence that the products conform to established technical requirements. This document will be developed in the concept phase to be used throughout the WWIS software life cycle as depicted in Figure 1."

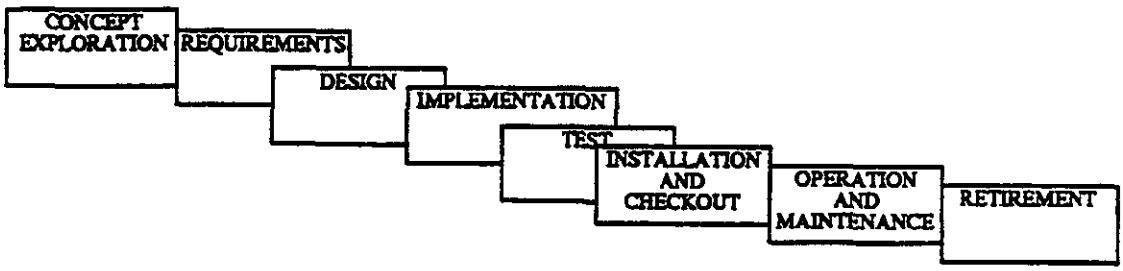


Figure 1 Software Life Cycle

DOE (U.S. Department of Energy). 1995f. DOE Waste Treatability Group Guidance. DOE/LLW-217, Revision 0, January 1995. Washington, D.C.

p. 5-1, para. 1;
"5. MATRIX PARAMETER This section presents the matrix parameter categories (MPCs) and definitions. This parameter is common to treatability group assignments for all four primary, and associated secondary, waste types. The MPC describes the overall, composite physical/chemical form (i.e., matrix) of the waste. The matrix can affect all facets of management.

5.1 OVERVIEW OF MATRIX CATEGORIES
Figure B-1 of Appendix B provides a foldout chart depicting all of the MPCs currently defined in this guidance. Figures 5-1 through 5-7 of this section highlight different portions of the foldout chart to facilitate discussion of the MPC definitions. As indicated in Figure B-1 and Figures 5-1 through 5-7, each MPC is identified by a title and a single-character alpha or five-character alphanumeric code. Furthermore, each is designated as being either a "summary," "specific-detailed," or "unknown/other-detailed" MPC.

The array of MPCs is arranged in a logical hierarchy beginning with four broad, summary categories and one associated unknown/other-detailed category. The summary categories are Liquids (S), Solids (S), Specific Waste Forms (X), and Final Waste Forms (Z), while the unknown/other-detailed category is Unknown/Other matrix (U9999). Each of the initial four summary MPCs is followed by levels of successively more definitive, or waste form specific, categories. The first successive level includes the MPCs for which the last non-zero digit in the numeric portion of their codes is in the 1000s. These are referred to as the "Level 1000" MPCs. Each of the Level 1000 MPCs that is a summary category is, in turn, followed by yet more definitive Level 100 MPCs. This logic continues until reaching a final level that consists of only detailed MPCs. The associated MPCs at any given level include one unknown/other-detailed category. Inherent within the logical hierarchy of the complete array is the ability to perform aggregates by rolling the more definitive MPCs up to their associated, less definitive summary MPCs (i.e., Level 1⇒ Level 10⇒ Level 100⇒ Level 1000).

Definitions for the MPCs are provided in Sections 5.3 through 5.7. Defining the MPCs, particularly for the Solids (S) categories, required the establishment of physical/chemical form "concentration" criteria. As indicated in the opening remarks of Section 5, the MPC is intended to describe the overall, composite matrix of the waste. Containerized, solid waste often does not consist of a single physical/chemical form. This is perhaps most true for debris. This waste frequently contains multiple debris materials that are organic (e.g., plastic, rags) and inorganic (e.g., metal, glass, ceramic materials). Because of this, definitions for the Debris (S5000s) and other more definitive Solids (S) MPCs include criteria specifying how much of the physical/chemical form described by the category must be contained in the waste for assignment to the category. For example, the specific-detailed Organic Debris (S5100s) and Inorganic

Debris (S5300s) categories specify that for a waste to be categorized as such, it must contain 80% or more of the subject debris materials. These physical/chemical form concentration criteria are volume based. In the interest of performing technical waste management studies, it might be preferred that these criteria be mass based. However, more often than not, the available waste information more readily supports MPC assignment per these volume-based criteria.

5.2 MATRIX CATEGORY SELECTION GUIDELINES

Matrix category selection essentially involves a process of successive evaluations whereby the characteristic information on the waste matrix is compared with the definitions of the appropriate summary and specific-detailed MPCs. As implied in Figures B-1 and 5-1, the process begins with evaluating the waste per the criteria of the initial Liquids (L), Solids (S), Specific Waste Forms (X), and Final Waste Forms (Z) summary MPCs. If the waste is insufficiently characterized to enable this evaluation or does not meet the criteria specified for any of the four summary categories, it is assigned to the Unknown/Other Matrix (U9999) detailed category. If the waste is determined to meet the criteria for one of the initial summary categories, the evaluation process proceeds to the more definitive Level 1000 MPCs associated with that initial summary level category. For example, if the waste was determined to be a liquid, it would be evaluated per the criteria of the Aqueous Liquids/Slurries (L1000) and Organic Liquids (L2000) summary categories.

Repetition of the evaluation process per the criteria of the summary and specific-detailed categories, as applicable, in the successively more definitive levels (i.e., Level 1000 ⇒ Level 100 ⇒ Level 10 ⇒ Level 1) leads to eventual selection of the MPC. The appropriate MPC is selected when on of the following situations arises:

- A level is reached where the waste meets the criteria of a specific-detailed category. In this situation, that specific-detailed category is selected.
- A level is reached where either (a) it cannot be determined whether the waste meets the criteria for any of the summary or specific-detailed categories, or (b) the waste does not meet the criteria for nay of the summary or specific-detailed categories. The former case would typically arise because of a lack of characteristic information on the waste. The latter case would arise if the waste is of a physical/chemical form not within the criteria specified for the summary or specific-detailed categories. In either case, the associated unknown/other-detailed category is selected.

Actual selection of the MPCs is not as laborious as might be impled by the above discussion. While the process of successive evaluations is inherently part of MPC selection, once a user is familiar with the categories and definitions, selecting the appropriate MPC is relatively straightforward, depending on the availability and quality of documentation on the matrix characteristics of the waste.

The two key guidelines implicit in the above discussion are that (a) the MPC should be selected from the most definitive, or lowest, applicable category level that can be supported by available characteristic data on the waste matrix, and (b) waste should not be assigned the summary MPCs. The time and effort involved to assign the MPCs, or any of the treatability group parameter, is primarily expended in evaluating the available, applicable data on the waste. Once the data are reviewed and the MPCs are assigned, aggregation to less definitive, upper-level summary categories is easily performed given the logic in the MPC codes. However, separation to more definitive, lower-level categories would require revisiting the available data on the waste and reassigning the MPC. Aggregates to the summary categories can be misconstrued if waste is actually assigned to those MPCs.

Sections 5.3 through 5.6 present the definitions for the four initial summary MPCs and their associated, more definitive categories. Section 5.7 presents the definition for the Unknown/Other Matrix (U9999) MPC.

5.3 DEFINITIONS-LIQUIDS AND ASSOCIATED CATEGORIES

The initial Liquids (L) summary category addresses wastes that are liquids, including slurries. Slurries are defined as liquids with a total suspended/settled solids (TSS) content of $\geq 1\%$ and $\leq 30\%$. Waste with a TSS content $> 30\%$ is defined as sludges (see Section 5.4). Only liquids and slurries packaged in bulk, free form (e.g., drum, tank) are included in this category. Liquids and slurries packaged as lab packs are assigned to other MPCs (see Section 5.5).

As shown in Figure 5-2, liquids are initially evaluated per the criteria of the Aqueous Liquids/Slurries (L1000) and Organic Liquids (L2000) summary categories. Liquids that are insufficiently characterized to enable this evaluation are assigned to the Unknown/Other Liquid (L9000) detailed category.

5.3.1 L1000 AQUEOUS LIQUIDS/SLURRIES

This summary category includes liquids and slurries containing less than 1% total organic carbon (TOC). This waste is further evaluated per the criteria of the Wastewaters (L1100) and Aqueous Slurries (L1200) summary categories.

L1100 Wastewaters

This summary category includes aqueous liquids and slurries that meet the EPA LDR criteria for wastewaters ($< 1\%$ TSS). The appropriate detailed MPCs for this waste are selected from the following categories.

L1110 Acidic Wastewaters

This specific-detailed category includes wastewaters with a pH $\leq$ 2.0.

L1120 Basic Wastewaters

This specific-detailed category includes wastewaters with a pH $\geq$ 12.5. Basic

wastewaters that contain cyanides at or above applicable LDR treatment standard levels are assigned to category L1140.

L1130 Neutral Wastewaters
This specific-detailed category includes wastewaters with 2.0 < pH < 12.5. Neutral wastewaters that contain cyanides at or above applicable LDR treatment standard level are assigned to category L1140.

L1140 Cyanide Wastewaters
This specific-detailed category includes wastewaters containing cyanides at or above applicable LDR treatment standard levels, regardless of the pH.

L1190 Unknown/Other Wastewaters
This unknown/other-detailed category includes waste that is consistent with the definition for the Wastewaters (L1100) summary category, but:

- Is insufficiently characterized to enable more definitive assignment into one of the L1110 through L1140 specific-detailed categories, or
- Does not meet the criteria for assignment into one of the L1110 through L1140 specific-detailed categories.

5.3.2 L2000 ORGANIC LIQUIDS
This summary category includes liquids and slurries containing $\geq$1% TOC. As shown in Figure 5-2, this waste is further evaluated per the criteria of the Aqueous/Organic Liquids (L2100) and Pure Organic Liquids (L2200) summary categories. Organic liquids that are insufficiently characterized to enable this evaluation are assigned to the Unknown/Other Organic Liquid (L2900) detailed category.

L2100 Aqueous/Organic Liquids
This summary category includes mixtures, both miscible and immiscible, of aqueous and organic liquids. The appropriate detailed MPCs for this waste are selected from the following categories.

L2110 Aqueous/Halogenated Organic Liquids
This specific-detailed category includes aqueous and organic liquids that contain at least 1,000 ppm halogenated organic compounds (HOC).

L2120 Aqueous/Nonhalogenated Organic Liquids
This specific-detailed category includes aqueous and organic liquids that contain less than 1,000 ppm HOC.

L2190 Unknown/Other Aqueous and Organic Liquids
This unknown/other-detailed category includes waste that is consistent with the

definition for the Aqueous/Organic Liquids (L2100) summary category, but it is not known whether the HOC content is less than, equal to, or greater than 1,000 ppm.

L2200 Pure Organic Liquids
This summary category includes liquids that are essentially purely organic. The appropriate detailed MPCs for this waste are selected from the following categories.

L2210 Halogenated Pure Organic Liquids
This specific-detailed category includes pure organic liquids that contain at least 1,000 ppm HOC.

L2220 Nonhalogenated Pure Organic Liquids
This specific-detailed category includes pure organic liquids that contain less than 1,000 ppm HOC.

L2290 Unknown/Other Pure Organic Liquids
This unknown/other-detailed category includes waste that is consistent with the definition for the Pure Organic Liquids (L2000) summary category, but it is not known whether the HOC content is less than, equal to, or greater than 1,000 ppm.

L2290 Unknown/Other Organic Liquids
This unknown/other-detailed category includes waste that is consistent with the definition of the Organic Liquids (L2000) summary category, but insufficient information is available to enable evaluation per the criteria of the Aqueous/Organic Liquids (L2100) and Pure Organic Liquids (L2200) summary categories.

5.3.3 L9000 UNKNOWN/OTHER LIQUIDS

This unknown/other-detailed category includes waste that is consistent with the definition for the Liquids (L) summary category, but insufficient information is available to enable evaluation per the criteria of the Aqueous Liquid/Slurry (L1000) and Organic Liquid (L2000) summary categories.

5.4 DEFINITIONS-SOLIDS AND ASSOCIATED CATEGORIES

The initial Solids (S) summary category addresses waste with physically solid matrices, including sludges. Sludges are defined as having a TSS > 30%. Certain waste with physically solid matrices are excluded from this category. These include solids that meet the criteria for assignment to the Specific (X) and Final (Z) Waste Forms summary categories (see Sections 5.5 and 5.6).

As shown in Figure 5-3, solids are initially evaluated per the criteria of the Homogeneous Solids

(S3000), Soil/Gravel (S4000), and Debris (S5000) summary categories. Solids that are insufficiently characterized to enable this evaluation, or that do not meet the criteria specified for nay of these summary categories are assigned the Unknown/Other Solids (S9000) detailed category.

5.4.1 S3000 HOMOGENEOUS SOLIDS

Homogeneous solids are defined in this guidance as solid waste materials, excluding soil/gravel (see Section 5.4.2), that do not meet the EPA LDR criteria for classification as debris. Homogeneous solids may include water or other residual or absorbed liquids. Examples of homogenous solids are sludges and particulate-type materials.

This summary category includes waste that is at least 50% by volume homogeneous solids. The balance of the matrix may be other solid physical/chemical forms. For example, a drum of waste from a spill cleanup may contain particulate absorbents and debris (e.g., rags, paper). The drum would be assigned to the appropriate homogeneous solids category provided the particulate absorbents, including any absorbed liquids, account for at least 50% of the waste volume. [If the wast volume were 50% or more debris, then the drum would be assigned to the appropriate debris category (see Section 5.4.3)].

As shown in Figure 5-4, this waste is further evaluated per the criteria of the Inorganic Homogeneous Solids (S3100) and Organic Homogeneous Solids (S3200) summary categories. Homogeneous solids that are insufficiently characterized to enable this evaluation or that do not meet the criteria specified for either of these summary categories are assigned the Unknown/Other Homogeneous Solids (S3900) detailed category.

S3100 Inorganic Homogeneous Solids

Homogeneous solids with sufficient inorganic solids content such that a minimum of approximately 20% by weight would remain as residue (i.e., ash or solids) following incineration are defined in this guidance as inorganic. This summary category includes waste that is at least 50% by volume inorganic homogeneous solids.

As shown in Figure 5-4, this waste is further evaluated per the criteria of the Inorganic Particulates (S3110), Inorganic Sludges (S3120), Paint Waste (S3130), and Salt Waste (S3140) summary MPCs, and the Solidified Homogeneous Solids (S3150) and Inorganic Chemicals (S3160) specific-detailed MPCs. Inorganic homogeneous solids that are insufficiently characterized to enable this evaluation or that do not meet the criteria specified for any of these categories are assigned the Unknown/Other Inorganic Homogeneous Solid (S3190) detailed category.

S3110 Inorganic Particulates

This summary category includes waste that is at least 50% by volume inorganic particulates, including any residual or absorbed liquids. Typical examples of inorganic

particulates are incinerator ash, dust, sandblasting residue, vermiculite, and ion-exchange media. The appropriate detailed MPCs for this waste are selected from the following categories.

S3111 Ash
This specific-detailed category includes waste that is primarily (i.e., $\geq$50% by volume bottom or fly ash resulting from incineration.

S3112 Sandblasting Media
This specific-detailed category includes waste that is primarily (i.e., $\geq$50% by volume) unused or spent surface cleaning or decontamination particulate material. Typical examples of surface cleaning or decontamination particulate materials are coarse sand and glass beads.

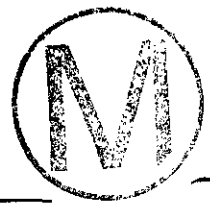
S3113 Inorganic Particulate Absorbents
This specific-detailed category includes waste that is primarily (i.e., $\geq$50% by volume) inorganic particulate absorbent materials, including absorbed aqueous liquids, if present. Typical examples of inorganic particulate absorbent materials are clay, vermiculite, and diatomaceous earth.

S3114 Absorbed Organic Liquids
This specific-detailed category includes waste that is primarily (i.e., $\geq$50% by volume) inorganic particulate absorbent materials with absorbed organic liquids. Typical examples of inorganic particulate absorbent materials are clay, vermiculite, and diatomaceous earth.

S3115 Ion-Exchange Media
This specific-detailed category includes waste that is primarily (i.e., $\geq$50% by volume) unused or spent inorganic ion-exchange resins.

S3116 Metal Chips/Turnings
This specific-detailed category includes waste that is primarily (i.e., $\geq$50% by volume) metal chips, turnings, fines, and powders, including any machining coolants, oils, etc. This category would not be selected for certain metal chips or turnings waste. This includes waste meeting the criteria for classification as Debris (S5000), Beryllium Dust (X7300), or Reactive Metals (X7500) (see Sections 5.4.3 and 5.5.2). Also, if the metals exist as oxides or hydroxides, the Metal Oxides/Hydroxides (S3144) category should be selected.

S3117 Glass/Ceramic Materials
This specific-detailed category includes waste tat is primarily (i.e., $\geq$50% by volume) glass or ceramic material too small to qualify as debris (i.e., $\leq$60-mm



particle size). Examples of this waste may be broken glassware, crushed light tubes, and ceramic packing material, such as raschig rings. (If the waste is glass beads used as the media for sandblasting, it should be assigned to S3112 as a more descriptive matrix category.)

S3118 Activated Carbon
This specific-detailed category includes waste that is primarily (i.e., $\geq$50% by volume) spent or unused activated carbon, including any residual liquids. The activated carbon may be in powdered (typically 50 to 100 μm) or granular (typically 0.1 to 1 mm) form.

S3119 Unknown/Other Inorganic Particulates
This unknown/other-detailed category includes waste that is consistent with the definition for the Inorganic Particulates (S3110) summary category, but:

- Is insufficiently characterized to enable more definitive assignment into one of the S3111 through S3118 specific-detailed categories, or
- Does not meet the criteria for assignment into one of the S3111 through S3118 specific-detailed categories.

S3120 Inorganic Sludges
This summary category includes waste that is at least 50% by volume inorganic sludges, including water content. As previously mentioned, sludges are defined as having a TSS >30%. The inorganic sludge may be mixed with stabilization agents, such as cement, provided the mixture has not properly cured to form a solidified monolith (see category S3150). The inorganic sludge may also be mixed with inorganic particulate absorbent materials. The appropriate detailed MPCs for this waste are selected from the following categories.

S3121 Wastewater Treatment Sludges
This specific-detailed category includes waste that is at least 50% by volume secondary sludge, or filtercase from wastewater treatment processes or heavy metal sludges resulting from recovery processes, excluding high-level waste (S3125).

S3122 Pond Sludges
This specific-detailed category includes waste that is at least 50% by volume inorganic sludge generated from the remediation of surface impoundments, such as evaporation or sedimentation basins.

S3123 Off-Gas Treatment Sludges
This specific-detailed category includes waste that is at least 50% by volume inorganic sludge generated from wet off-gas treatment systems.

S3124 Plating Waste Sludges
This specific-detailed category includes waste that is at least 50% by volume inorganic sludge generated from plating operations.

S3125 Reprocessing Sludges
This specific-detailed category includes waste that is at least 50% by volume inorganic sludge generated from nuclear fuel reprocessing operations.

S3129 Unknown/Other Inorganic Sludges
This unknown/other-detailed category includes waste that is consistent with the definition for the Inorganic Sludges (S3120) summary category, but:

- Is insufficiently characterized to enable more definitive assignment into one of the S3121 through
- Does not meet the criteria for assignment into one of the S3121 through S3125 specific-detailed categories.

S3130 Paint Wastes
This summary category includes waste that is at least 50% by volume new, used, or removed paint. This includes such paint waste packaged in a lab pack configuration (see Section 5.5.1). The appropriate detailed MPCs for this waste are selected from the following categories.

S3131 Paint Chips/Solids
This specific-detailed category includes waste that is at least 50% by volume solid, or unpourable, paint. Examples of waste that might be included in this category are dried paint chips or containers filled with dried paint. this category does not include waste that is 50% by volume, or more, paint-related solids, such as empty paint cans, depressurized spray paint cans, or other painting equipment (brushes, rollers, etc.). The appropriate debris category (see Section 5.4.3) would be selected for this waste. Pressurized spray paint cans are categorized as Compressed Gases/Aerosols (X7700) (see Section 5.5.2).

S3132 Paint Sludges
This specific-detailed category includes waste that is at least 50% by volume paint sludge. An example of waste that might be included in this category is opened or unopened cans of heavy, viscous paint. Paints cut sufficiently with thinners (i.e., TSS $<<$30%) would be more correctly considered liquids and categorized appropriately depending on whether packaged in bulk or lab packed (see Sections 5.3 or 5.5.1).

S3139 Unknown/Other Paint Waste
This unknown/other-detailed category includes waste that is consistent with the

definition for the Paint Waste (S3130) summary category, but:

- Is insufficiently characterized to enable more definitive assignment into either of the S3131 or S3132 specific-detailed categories, or
- Does not meet the criteria for assignment into either of the S3131 or S3132 specific-detailed categories.

S3140 Salt Waste

This summary category includes waste that is at least 50% by volume salts, including interstitial liquids, if present. The appropriate detailed MPCs for this waste are selected from the following categories.

S3141 Chloride Salts

This specific-detailed category includes waste that is at least 50% by volume salts and contains more than trace (i.e., > 1,000 ppm) levels of chlorides or other halogens.

S3142 Sulfate Salts

This specific-detailed category includes waste that is at least 50% by volume salts and contains more than trace (i.e., >1,000 ppm) levels of sulfur compounds.

S3143 Nitrate Salts

This specific-detailed category includes waste that is at least 50% by volume salts. The salts are predominantly (i.e., >50% by volume of salt) nitrates.

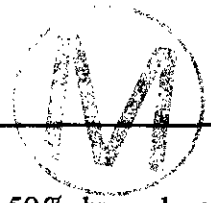
S3144 Metal Oxides/Hydroxides

This specific-detailed category includes waste that is at least 50% by volume metal oxides or hydroxides. Metal oxides resulting from roasting or other treatment processes are included in this category. Solid materials generated from the calcination of liquids, such as high-level waste calcine at the Idaho National Engineering Laboratory, are also included in this category. An example of metal hydroxides included in this category is dry chemical reagents such as sodium hydroxide. Metal hydroxide precipitation sludges should not be assigned to this category; these should be assigned to the appropriate Inorganic Sludges (S3120s) category.

S3149 Unknown/Other Salt Waste

This unknown/other-detailed category includes waste that is consistent with the definition for the Salt Waste (S3140) summary category, but:

- Is insufficiently characterized to enable more definitive assignment into one of the S3141 through S3144 specific-detailed categories, or
- Does not meet the criteria for assignment into one of the S3141 through S3144 specific-detailed categories.



S3150 Solidified Homogeneous Solids
This specific-detailed category includes waste that is at least 50% by volume solidified forms that require further treatment before disposal. An example might be a particulate or sludge waste that has been immobilized with cement and cured into a solidified form, but that does not meet LDR treatment standards, if applicable, or other relevant disposal criteria.

S3160 Inorganic Chemicals
This specific-detailed category includes waste that is at least 50% by volume discarded inorganic solid chemicals that do not meet the criteria for assignment into a more prescriptive Inorganic Homogeneous Solids category. The inorganic chemicals may be particulate- or granular-type materials, or monolithic-type chunks.

Only inorganic chemicals packaged in bulk, free form (e.g., drum, tank) are included in this category. Inorganic chemicals packaged as lab packs, or that are in temporary storage and will be packaged as lab packs before transfer to long-term storage or treatment, are assigned to other MPCs (see Section 5.5.1). Inorganic chemicals that meet the criteria for assignment into a more prescriptive Inorganic Homogeneous Solids category should be categorized as such. (For example, bulk sodium chloride should be assigned to category S3141).
S3190 Unknown/Other Inorganic Homogeneous Solids

This unknown/other-detailed category includes waste that is consistent with the definition for the Inorganic Homogeneous Solids (s3100) summary category, but:

- Is insufficiently characterized to enable evaluation per the criteria of the S3110 through S3140 summary categories and the S3150 and S3160 specific-detailed categories, or
- Does not meet the criteria specified for any of the S3110 through S3140 summary categories or the S3150 specific-detailed categories.

S3200 Organic Homogeneous Solids
Homogeneous solids with a base structure that is primarily organic such that a maximum of approximately 20% by weight would remain as residue (i.e., ash or solids) following incineration are defined in this guidance as organic. This summary category includes waste that is at least 50% by volume organic homogeneous solids.

As shown in Figure 5-4, this waste is further evaluated per the criteria of the Organic Particulates (S3210) and Organic Sludges (S3220) summary MPCs, and the Organic Chemicals (S3230) specific-detailed MPC. Organic homogeneous solids that are insufficiently characterized to enable this evaluation or that do not meet the criteria specified for any of these categories are assigned the Unknown/Other Organic

Homogeneous Solid (S3290) detailed category.

S3210 Organic Particulates
This summary category includes waste that is at least 50% by volume organic particulates, including any residual or absorbed liquids. Examples of organic particulates are certain resins used in wastewater treatment and particulate organic absorbent materials. The appropriate detailed MPCs for this waste are selected from the following categories.

S3211 Organic Resins
This specific-detailed category includes waste that is primarily (e.g., $\geq$50% by volume) spent or unused organic based resins used in wastewater treatment or other applications. An example of waste that might be included in this category is organic ion-exchange resins.

S3212 Organic Absorbents
This specific-detailed category includes waste that is primarily (e.g., $\geq$50% by volume) organic particulate absorbent materials, including any absorbed aqueous or organic liquids. Examples of organic particulate absorbents are sawdust and ground corn cobs.

S3219 Unknown/Other Organic Particulates
This unknown/other-detailed category includes waste that is consistent with the definition for the Organic Particulates (S3210) summary category, but:

- Is insufficiently characterized to enable more definitive assignment into either of the S3211 or S3212 specific-detailed categories, or
- Does not meet the criteria for assignment into either of the S3211 or S3212 specific-detailed categories.

S3220 Organic Sludges
This summary category includes waste that is at least 50% by volume organic sludges, including liquids, if present. Examples of waste included in this category are biological sludges and heavy, unpourable organic materials, such as tars or greases. The appropriate detailed MPCs for this waste are selected from the following categories.

S3221 Biological Sludges
This specific-detailed category includes waste that is at least 50% by volume biological materials generated in treating wastewater from animals or people, or other biological materials that cannot be classified as debris.

S3222 Halogenated Organic Sludges
This specific-detailed category includes waste that is at least 50% by volume

organic sludges that contain at least 1,000 ppm HOC.

S3223 Nonhalogenated Organic Sludges
This specific-detailed category includes waste that is at least 50% by volume organic sludges that contain less than 1,000 ppm HOC.

S3229 Unknown/Other Organic Sludges
This unknown/other-detailed category includes waste that is consistent with the definition for the Organic Sludges (S3220) summary category, but:

- Is insufficiently characterized to enable more definitive assignment into one of the S3221 through S3223 specific-detailed categories, or
- Does not meet the criteria for assignment into one of the S3221 through S3223 specific-detailed categories.

S3230 Organic Chemicals
this specific-detailed category includes waste that is at least 50% by volume discarded organic solid chemicals that do not meet the criteria for assignment into a more prescriptive Organic Homogeneous Solids category. The organic chemicals may be particulate- or granular-type materials, or monolithic-type chunks.

Only organic chemicals packaged in bulk, free form (e.g., drum, tank) are included in this category. Organic chemicals packaged as lab packs, or that are in temporary storage and will be packaged as lab packs before transfer to long-term storage or treatment, are assigned to other MPCs (see Section 5.5.1).

S3290 Unknown/Other Organic Homogeneous Solids
This unknown/other-detailed category includes waste that is consistent with the definition for the Organic Homogeneous Solids (S3200) summary category, but:

- Is insufficiently characterized to enable evaluation per the criteria of the S3210 and S3220 summary categories and the S3230 specific-detailed category, or
- Does not meet the criteria specified for any of the S3210 and S3220 summary categories or the S3230 specific-detailed category.

S3900 Unknown/Other Homogeneous Solids
This unknown/other-detailed category includes waste that is consistent with the definition for the Homogeneous Solids (S3000) summary category, but:

- Is insufficiently characterized to enable evaluation per the criteria of the Inorganic Homogeneous Solids (S3100) and Organic Homogeneous (S3200) summary categories, or
- Does not meet the criteria specified for either of the Inorganic Homogeneous

Solids (S3100) or Organic Homogeneous Solids (S3200) summary categories.

5.4.2 S4000 SOIL/GRAVEL

This summary category includes waste estimated to be 50% by volume soil, including sand and silt, or rock and gravel that does not meet the EPA LDR criteria for classification as debris. As shown in Figure 5-3, the appropriate MPCs for this waste are selected from the following detailed categories.

S4100 Soil

This specific-detailed category includes waste estimated to be greater than 95% by volume soil, including sand, silt, and rock and gravel, with rock and gravel volumes totalling less than 50% of the matrix.

S4200 Soil/Debris

This specific-detailed category includes waste estimated to be at least 50%, but no greater than 95%, by volume soil, sand, silt, or rock and gravel, with rock and gravel volumes totalling less than 50% of the matrix and the balance of the matrix being debris.

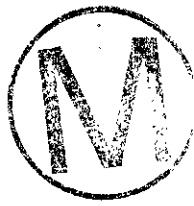
S4300 Rock/Gravel

This specific-detailed category includes waste estimated to be at least 50% by volume rock and gravel that do not meet the EPA LDR criteria for classification as debris. The balance of the matrix may be soil, including sand and silt, debris, or other solids.

S4900 Unknown/Other Soil/Gravel

This unknown/other-detailed category includes waste that is consistent with the definition for the Soil/Gravel (S4000) summary category, but:

- Is insufficiently characterized to enable more definitive assignment into one of the S4100 through S4300 specific-detailed categories, or
- Does not meet the criteria for assignment into one of the S4100 through S4300 specific-detailed categories.



5.4.3 S5000 DEBRIS WASTE

This summary category includes waste that is at least 50% by volume materials that meet the EPA LDR criteria for classification as debris. These criteria are as follows:

"Debris means solid material exceeding a 60 mm 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. However, the following materials are not debris: 1) any material for which a specific treatment standard is provided in Subpart D, Part 268, 2) process residuals such as smelter slag and residues from the treatment of waste, wastewater,

sludges, or air emission residues; and 3) intact containers of hazardous waste that are not ruptured and that retain at least 75% of their original volume. A mixture of debris that has not been treated to the standards provided by §268.45 and other material is subject to regulation as debris if the mixture is comprised primarily of debris, by volume, based on visual inspection."[40 CFR §268.2(g)]

While specifically written to address EPA regulated hazardous debris, these criteria, particularly particle size, are equally applicable to nonhazardous waste.

This summary category includes waste that is at least 50% by volume materials that meet the above criteria. The balance of the matrix may be other physical or chemical waste forms. For example, the drum of spill cleanup waste discussed in the definition for Homogeneous Solids (S3000) (see Section 5.4.1) would be assigned to the appropriate debris category, provided the debris materials account for at least 50% of the bulk matrix volume.

As shown in Figure 5-5, this waste is further evaluated per the criteria of the Inorganic Debris (S5100), Organic Debris S95300), and Heterogeneous Debris (S5400) summary categories. Debris that is insufficiently characterized to enable this evaluation is assigned the Unknown/Other Debris (S5900) detailed category.

S5100 Inorganic Debris
This summary category includes waste that is estimated to be 80% by volume, or more, inorganic debris materials. Examples of inorganic debris materials include scrap metal, concrete, brick, and glass.

As shown in Figure 5-5, this waste is further evaluated per the criteria of the Metal Debris (S5110) and Inorganic Nonmetal Debris (S5120) summary categories. Inorganic debris that is insufficiently characterized to enable this evaluation, or that does not meet the criteria specified for either of these summary categories is assigned to the Unknown/Other Inorganic Debris (S5190) detailed category.

S5110 Metal Debris
This summary category includes waste that is estimated to be 80% by volume, or more, metal debris materials. The appropriate detailed MPCs for this waste are selected from the following categories.

S5111 Metal Debris without Pb or Cd
This specific-detailed category includes waste that is estimated to be 80% by volume, or more, metal debris and does not contain any bulk, separable or bonded, lead or cadmium as part of the matrix.

S5112 Metal Debris with Pb

This specific-detailed category includes waste that is estimated to be 80% by volume, or more, metal debris and contains bulk, separable or bonded, lead as part of the matrix. Examples of waste that might be included in this category are glovebox parts with lead clad in stainless steel or scrap metal that includes some lead bricks. This category does not include waste that meets the criteria for categorization as elemental lead (i.e., $\geq$50% by volume elemental lead) or lead acid batteries (see Section 5.5).

S5113 Metal Debris with Cd

This specific-detailed category includes waste that is estimated to be 80% by volume, or more, metal debris and contains bulk, separable or bonded, cadmium as part of the matrix. This category does not include waste that meets the criteria for categorization as elemental cadmium (i.e., $\geq$50% by volume elemental cadmium) or cadmium batteries (see Section 5.5).

S5119 Unknown/Other Metal Debris

This unknown/other-detailed category includes waste that is consistent with the definition for the Metal Debris (S5110)summary category, but:

- Is insufficiently characterized to enable more definitive assignment into one of the S5111 through S5113 specific-detailed categories, or
- Contains both lead and cadmium, separable or bonded, as part of the bulk matrix.

S5120 Inorganic Nonmetal Debris

This summary category includes waste that is estimated to be 80% by volume, or more, inorganic nonmetal debris. The appropriate detailed MPCs for this waste are selected from the following categories.

S5121 Concrete Debris

This specific-detailed category includes waste that is estimated to be 80% by volume, or more, concrete debris. An example of waste that might be included in this category is concrete chunks and blocks from decontamination and decommissioning activities. This category does not include waste solidified with cement or other stabilization agents (see Sections 5.4.1 and 5.6.1).

S5122 Glass Debris

This specific-detailed category includes waste that is estimated to be 80% by volume, or more, glass debris. Examples of waste that might be included in this category are leaded glass windows, bottles, or lightbulbs.

S5123 Ceramic/Brick Debris
This specific-detailed category includes waste that is estimated to be 80% by volume, or more, ceramic or brick debris materials. Examples of waste that might be included in this category are bricks, ceramic crucibles, and ceramic refractories.

S5124 Rock Debris
This specific-detailed category includes waste that is estimated to be 80% by volume, or more, rock or gravel materials provided the particle size meets the EPA LDR criteria for classification as debris.

S5125 Asbestos Debris
This specific-detailed category includes waste that is estimated to be 80% by volume, or more, asbestos or asbestos-based debris materials. Examples of waste that might be included in this category are asbestos-containing gloves, firehoses, aprons, flooring tiles, pipe insulation, boiler jackets, and laboratory tabletops.

S5126 Graphite Debris
This specific-detailed category includes waste that is estimated to be 80% by volume, or more, graphite-based debris materials. Examples of waste that might be included in this category are crucibles, graphite components, and pure graphite.

S5129 Unknown/Other Inorganic Nonmetal Debris
This unknown/other-detailed category includes debris that is consistent with the definition for the Inorganic Nonmetal Debris (S5120) summary category, but:

- Is insufficiently characterized to enable more definitive assignment into one of the S5121 through S5126 specific-detailed categories, or
- Does not meet the criteria for assignment into one of the S5121 through S5126 specific-detailed categories.

S5190 Unknown/Other Inorganic Debris
This unknown/other-detailed category includes waste that is consistent with the definition for the Inorganic Debris (S5100) summary category, but:

- Is insufficiently characterized to enable evaluation per the criteria of the Metal Debris (S5110) and Inorganic Debris (S5100) summary categories, or
- Does not meet the criteria specified for either of the Metal Debris (S5110) or Inorganic Nonmetal Debris (S5120) summary categories.

S5300 Organic Debris
this summary category includes waste that is estimated to be 80% by volume, or more, organic debris materials. Examples of organic debris are materials constructed of plastic, rubber, wood, paper, cloth, and biological materials.

As shown in Figure 5-5, this waste is further evaluated per the criteria of the Plastic/Rubber Debris (S5310) summary category and the Wood Debris (S5320), Paper/Cloth Debris (S5330), and Biological Debris (S5340) specific-detailed categories. Organic debris that is insufficiently characterized to enable this evaluation, or that does not meet the criteria specified for any of these categories is assigned the Unknown/Other Organic Debris (S5390) detailed category.

S5310 Plastic/Rubber Debris
This summary category includes waste that is estimated to be 80% by volume, or more, plastic or rubber debris materials. Examples of plastic and rubber debris materials are plastic or rubber sheeting, containers, gloves, gaskets, and components of benelex or plexiglass. The appropriate detailed MPCs for this waste are selected from the following categories.

S5311 Leaded Gloves/Aprons
This specific-detailed category includes waste that is estimated to be 80% by volume, or more, rubber debris materials that contain a high fraction of lead or lead compounds. Examples of waste that might be included in this category are leaded glovebox gloves or aprons.

S5312 Halogenated Plastic Debris
This specific-detailed category includes waste that is estimated to be 80% by volume, or more, plastic or rubber debris materials that contain halogenated plastics, such as PVC, as part of the matrix.

S5313 Nonhalogenated Plastic Debris
This specific-detailed category includes waste that is estimated to be 80% by volume, or more, plastic or rubber debris materials, excluding leaded gloves and aprons, that do not contain halogenated plastics as part of the matrix.

S5319 Unknown/Other Plastic/Rubber Debris
This unknown/other-detailed category includes waste that is consistent with the definition for the Plastic/Rubber Debris(S5310) summary category, but:

- Is insufficiently characterized to enable more definitive assignment into one of the S5311 through S5313 specific-detailed categories,

or

- Does not meet the criteria for assignment into one of the S5311 through S5313 specific-detailed categories.

S5320 Wood Debris
This specific-detailed category includes debris that is estimated to be 80% by volume, or more, wood or wood products other paper. Examples of waste that might be included in this category are structural timbers, boxes, or pallets.

S5330 Paper/Cloth Debris
This specific-detailed category includes waste that is estimated to be 80% by volume, or more, paper or cloth debris materials. Examples of waste that might be included in this category are protective clothing, rags, or wipes. Rags and wipes may contain some absorbed organic or aqueous liquids.

S5340 Biological Debris
This specific-detailed category includes waste that is estimated to be 80% by volume, or more, biological debris materials, including any chemical agents such as lime or formaldehyde. Examples of waste that might be included in this category are biological samples and animal carcasses.

S5390 Unknown/Other Organic Debris
This unknown/other-detailed category includes waste that is consistent with the definition for the Organic Debris (S5300) summary category, but:

- Is insufficiently characterized to enable evaluation per the criteria of the S5310 summary category and the S5320 through S5340 specific-detailed categories, or

- Does not meet the criteria specified for the S5310 summary category or any of the S5320 through S5340 specific-detailed categories.

S5400 Heterogeneous Debris
This summary category includes waste that is at least 50% by volume debris materials that do not meet the criteria for assignment as either an Inorganic Debris (S5100) or Organic Debris (S5300). An example is waste that is essentially entirely debris, but is not dominant (i.e., estimated to be 80% by volume or more) in either inorganic or organic debris materials. Another examples is waste that is at least 50% by volume debris materials, with the balance being soil or homogeneous solids. The appropriate detailed MPCs for this waste are selected from the following categories.

S5410 Composite Filter Debris
This specific-detailed category includes debris that is estimated to be 50% by

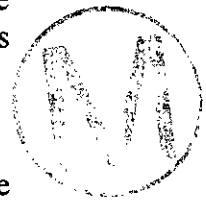
volume, or more, high-efficiency particulate air filters (HEPA) or other filters constructed of more than one material type (e.g., metal, inorganic nonmetal, and organic materials). Filters constructed of a single material type are assigned into the appropriate inorganic, organic, or heterogeneous debris category depending on the composition of the entire waste matrix.

S5420 Predominantly Inorganic Debris
This specific-detailed category includes waste that is estimated to contain at least 50%, but less than 80%, by volume inorganic debris materials. The balance of the matrix may be organic debris materials, soil, or homogeneous solids.

S5440 Predominantly Organic Debris
This specific-detailed category includes waste that is estimated to contain at least 50%, but less than 80%, by volume organic debris materials. the balance of the matrix may be inorganic debris materials (i.e., metal, inorganic nonmetal), soil, or homogeneous solids.

S5450 Asphalt Debris
This specific-detailed category includes debris that is estimated to be 50% by volume, or more, asphalt or other bituminous materials. Examples of waste that might be included in this category are asphalt materials from roadways, shingles, bituminous cement, or other materials containing both tar and gravel.

S5460 Electronic Equipment
This specific-detailed category includes waste that is estimated to be 50% by volume, or more, electronic equipment constructed of more than one material type (e.g., metal, inorganic nonmetal, and organic materials). Examples may include circuit boards, electronic laboratory equipments, computer and ancillary equipment, process controllers, etc. Electronic equipment constructed of a single material type is assigned into the appropriate inorganic, organic, or heterogeneous debris category depending on the composition of the entire waste matrix.



S5490 Unknown/Other Heterogeneous Debris
This unknown/other-detailed category includes waste that is consistent with the definition for the Heterogeneous Debris (S5400) summary category, but:

- Is insufficiently characterized to enable more definitive assignment into any of the S5410, S5420, S5440, S5450, or S5460 specific-detailed categories, or
- Does not meet the criteria for assignment into any of the S5410, S5420, S5440, S5450, or S5460 specific-detailed categories.

S5900 Unknown/Other Debris

This unknown/other-detailed category includes waste that is consistent with the definition for the Debris (S5000) summary MPC, but insufficiently characterized to enable evaluation per the criteria of the Inorganic Debris (S5100), Organic Debris (S5300), and Heterogeneous Debris (S5400) summary categories (i.e., insufficient data exist to estimate whether the waste is 80% by volume, or more, inorganic or organic debris materials).

5.4.4 S9000 UNKNOWN/OTHER SOLIDS

This unknown/other-detailed category includes waste that is consistent with the definition for the Solids (S) summary category, but:

- Is insufficiently characterized to enable evaluation per the criteria of the Homogeneous Solids (S3000), Soil/Gravel (S4000), and Debris (S5000) summary categories, or
- Does not meet the criteria for any of the Homogeneous Solids (S3000), Soil/Gravel (S4000), or Debris (S5000) summary categories.

5.5 DEFINITION-SPECIFIC WASTE FORMS AND ASSOCIATED CATEGORIES The initial Specific Waste Forms (X) summary category addresses waste that is of certain specific forms. these forms include waste with matrices that are liquids, solids, or combinations of both. As shown in Figure 5-6, specific waste forms are initially evaluated per the criteria of the Lab Packs (X6000) and Special Waste (X7000) summary categories.

5.5.1 X6000 LAB PACKS

Per this guidance, a lab pack configuration is defined as two or more waste containers packaged within a larger outer container. Typically, the inner containers are surrounded by absorbent materials; however, this is not an absolute criterion. If present, the absorbents can be homogeneous solids or debris materials. Examples may include rags, vermiculite, diatomaceous earth, and paper wipes.

This summary category includes waste that either (a) is packaged as a lab pack upon generation, or (b) will be packaged as a lab pack before transfer to long-term storage or treatment. The reason for inclusion of the second item is that many sites maintain inventories of small waste volumes (e.g., excessed or expired chemicals) in temporary storage. Often, this waste is lab packed before transfer for long-term storage or treatment.

This category does not include lab packs of elemental liquid mercury (see Section 5.5.2) or paint waste (see Section 5.4.1). In addition, waste packaged in a lab pack configuration that is considered overpacked is excluded. A typical example of an overpack is a single 55-gallon drum of waste that is placed in a 85-gallon drum because of deterioration of the 55-gallon container. This waste should be assigned the appropriate category based on the waste within the inner, overpacked container(s). The appropriate detailed MPCs for lab packs are selected from the following categories.

X6100 Organic Lab Packs
This specific-detailed category includes lab packs for which the inner waste packages contain only organic liquids. this category does not include organic scintillation fluids in containers (i.e., vials) that are packaged in a lab pack configuration.

X6200 Aqueous Lab Packs
This specific-detailed category includes lab packs for which the inner waste packages contain only aqueous liquids. This category does not include aqueous scintillation fluids in containers (i.e., vials) that are packaged in a lab pack configuration.

X6300 Solid Lab Packs
This specific-detailed category includes scintillation fluids in containers (i.e., vials) that are packaged in a lab pack configuration.

X6900 Unknown/Other Lab Packs
This unknown/other-detailed category includes waste that is consistent with the definition for the Lab Packs (X6000) summary category, but:

- Is insufficiently characterized to enable more definitive assignment into one of the X6100 through X6400 specific-detailed categories, or
- Does not meet the criteria for assignment into one of the X6100 through X6400 specific-detailed categories.

5.5.2 X7000 SPECIAL WASTE
In general, this summary category includes waste that (a) is inherently hazardous (i.e., the bulk material itself is RCRA hazardous), often with specific LDR treatment technology requirements, or (b) presents unique treatment concerns. As shown in Figure 5-6, this waste is further evaluated per the criteria of the tal Hazardous Metals (X7200), Batteries (X7400), and Reactive Metals (X7500) summary categories, and the Elemental Mercury (X7100), Beryllium Dusty (X7300), Explosives/Propellants (X7600), and Compressed Gases/Aerosols (X7700) specific-detailed categories. Special waste that does not meet the criteria specified for any of these categories is assigned to the Unknown/Other Special Waste (X7900) detailed category.

X7100 Elemental Mercury
This specific-detailed category includes waste that is bulk, pourable liquid mercury. The liquid mercury may be packaged in a lab pack configuration. Manometers, or other equipment, that contain small residual amounts of mercury should be assigned to the appropriate debris category (see Section 5.4.3).

X7200 Elemental Hazardous Metals
This summary category includes waste that contains at least 50% by volume solid, bulk elemental hazardous metals that meet the EPA size criteria for classification as debris. Waste that contains at least 50% by volume solid, bulk elemental hazardous metals that

do not meet the EPA size criteria for classification as debris are assigned into the Metal Chips/Turnings (S3116) category. Also, beryllium dust is excluded from this category (X7300).

This waste is further evaluated per the criteria of the Elemental Lead (X7210) summary MPC and the Elemental Cadmium (X7220) specific-detailed MPC. Elemental hazardous metals that do not meet the criteria specified for either of these two categories are assigned to the Unknown/Other Elemental Hazardous Metals (X7290) detailed category.

X7210 Elemental Lead
This summary category includes waste that contains at least 50% by volume bulk elemental lead. Examples of waste in this category are lead bricks, sheets, and pipes. The appropriate detailed MPCs for this waste are selected from the following categories.

X7211 Nonactivated Lead
This specific-detailed category includes waste meeting the above criteria for categorization as elemental lead in which the elemental lead shapes are only surface contaminated with radionuclides.

X7212 Activated Lead
This specific-detailed category includes waste meeting the above criteria for categorization as elemental lead in which the elemental lead shapes are activated.

X7219 Unknown/Other tal Lead
This unknown/other-detailed category includes waste that is consistent with the definition of the Elemental Lead (X7210) summary category, but it is not known whether the lead is activated or nonactivated. This category also indicated elemental lead that is not radioactive.

X7220 Elemental Cadmium
This specific-detailed category includes waste that contains at least 50% by volume bulk elemental cadmium. Examples of waste in this category are cadmium bricks, sheets, and pipes.

X7290 Unknown/Other Elemental Hazardous Metals
This unknown/other-detailed category includes waste that contains at least 50% by volume solid, bulk elemental hazardous metals, other than lead or cadmium, that meet the EPA size criteria for classification as debris. This category also includes waste that is at least 50% by volume a mixture of two or more bulk elemental hazardous metals that meet the EPA size criteria for classification as debris.

X7300 Beryllium Dust

This specific-detailed category includes beryllium waste that is subject to the metal recovery treatment standard as specified in the Third Third LDR rule (55 *FR* 22545). Waste contaminated with beryllium but not subject to the metal recovery treatment standard should be assigned to the appropriate category based on the bulk matrix compositions.

X7400 Batteries

This summary category includes waste consisting of batteries. The batteries may be packaged with absorbent materials (e.g., particulates, rags). The appropriate detailed MPCs for this waste are selected from the following categories.

X7410 Lead Acid Batteries

This specific-detailed category addresses battery waste as defined for the X7400 summary category in which only drained or undrained lead acid batteries are included.

X7420 Cadmium Batteries

This specific-detailed category addresses battery waste as defined for the X7400 summary category in which only cadmium batteries are included.

X7430 Mercury Batteries

This specific-detailed category addresses battery waste as defined for the X7400 summary category in which only mercury batteries are included.

X7490 Unknown/Other Batteries

This unknown/other-detailed category includes waste that is consistent with the definition for the Batteries (X7400) summary category, but:

- Is insufficiently characterized to enable more definitive assignment into one of the X7410 through X7430 specific-detailed categories, or
- Does not meet the criteria for assignment into any one of the X7410 through X7430 specific-detailed categories.

X7500 Reactive Metals

This summary category includes reactive metals waste. In this guidance, reactive metals are defined as waste meeting the criteria for classification as water reactive or ignitable reactive per the Third Third LDR rule (55 *FR* 22545 and 22553). Typically, this waste is sodium metal or sodium metal alloys, but can also include particulate fines of aluminum, uranium, zirconium, or other pyrophoric materials. The waste may be mixed with stabilizing materials. The appropriate detailed MPCs for this waste are selected from the following categories.

X7510 Bulk Reactive Metals

This specific-detailed category includes waste that is essentially bulk reactive metals and meets the criteria for classification as water reactive per the Third Third LDR rule. Typically, this waste is sodium metal or sodium metal alloys.

X7520 Reactive Metal Contaminated Components
This specific-detailed category includes piping, pumps, and other retired equipment waste that is considered water reactive per the Third Third LDR rule because of reactive metal contamination. The bulk of the material is not reactive metals, but the reactive metals require treatment before disposal.

X7530 Pyrophoric Fines
This specific-detailed category includes waste that is essentially bulk materials that meet the criteria for classification as ignitable reactive per the Third Third LDR rule. Examples are fines of aluminum, uranium, zirconium, or other pyrophoric materials. The waste may be mixed with stabilizing materials.

X7590 Unknown/Other Reactive Metals
This unknown/other-detailed category includes reactive metal waste with characteristics that are not consistent with the definitions for the X7510 through X7530 specific-detailed MPCs.

X7600 Explosives/Propellants
This specific-detailed category includes waste consisting of substances that undergo rapid chemical transformations that produce large amounts of gases and heat. The gases rapidly expand at velocities exceeding the speed of sound (due to the heat of reaction), which creates a shock wave and explosion. Waste that meets this definition should be identified here regardless of the specific physical form. Liquid nitroglycerine, for instance, should be categorized as an explosive and not as an organic liquid. Similarly, TNT would be categorized as explosive rather than as a homogeneous solid.

X7700 Compressed Gases/Aerosols
This specific-detailed category includes waste consisting of pressurized gas cylinders, including aerosols. Waste consisting of depressurized gas cylinders or aerosol cans would not be assigned to this category. This waste would be assigned to the appropriate debris category (see Section 5.4.3).

X7900 Unknown/Other Special Waste
This unknown/other-detailed category which includes waste that is consistent with the definition for the Special Waste (X7000) summary category, but inconsistent with the definitions for the X7200, X7400, and X7500 summary categories and the X7100, X7300, X7600, and X7700 specific-detailed categories.

5.6 DEFINITIONS-FINAL WASTE FORMS AND ASSOCIATED CATEGORIES

The initial Final Waste Forms (Z) summary category addresses waste that is in final form and meets applicable disposal criteria, including applicable LDR and PCB treatment standards. The final waste form categories currently defined in this guidance are shown in Figure 5-7. These categories are primarily intended for assignment to final waste forms resulting from the treatment of hazardous or mixed waste. Typically, preparing radioactive or sanitary waste for disposal does not require the rigorous treatments that produce these final waste forms. In other words, the final disposable forms of these primary waste types may be one of the previously defined solid MPCs (see Section 5.4). However, if applicable, the final waste form MPCs may be applied to waste other than that resulting from treatment of hazardous or mixed waste.

As shown in Figure 5-7, final waste forms are initially evaluated per the criteria of the Immobilized Forms (Z1000) and Decontaminated Solids (Z2000) summary categories. Final waste forms that do not meet the criteria specified for either of these summary categories are assigned to the Other Final Forms (Z9000) detailed category.

5.6.1 Z1000 IMMOBILIZED FORMS

This summary category includes waste forms that are immobilized. Immobilized final forms are further evaluated per the criteria of the Microencapsulated Forms (Z1100) and Macroencapsulated Forms (Z1200) categories. As defined in this guidance, the key distinction between microencapsulation and macroencapsulation is the matrix characteristic of the waste before immobilization. In general, immobilized forms resulting from the treatment of liquids and slurries, or solids with relatively small particle sizes (e.g., not meeting the EPA particle size criteria for classification as debris) are considered microencapsulated. Immobilized forms resulting from the treatment of solids with large particle sizes (e.g., debris) are considered macroencapsulated. This represents a deviation from more stringent definitions of microencapsulation used by the EPA and others.

Z1100 Microencapsulated Forms

This summary category includes waste that has been immobilized via microencapsulation. The appropriate detailed MPCs for this waste are selected from the following categories.

Z1110 Cement Forms

This specific-detailed category includes waste that has been immobilized with grout or other cement-type binders.

Z1120 Vitrified Forms

This specific-detailed category includes waste that has been immobilized via vitrification.

Z1130 Polymer Forms
This specific-detailed category includes waste that has been microencapsulated with organic binders.

Z1140 Amalgamated Forms
This specific-detailed category includes waste that has been immobilized via amalgamation.

Z1150 Crystalline Forms
This specific-detailed category includes waste that has been immobilized via methods that produce a crystalline final waste form. Example methods are microwave solidification and the Synrock process.

Z1190 Other Microencapsulated Forms
This unknown/other-detailed category includes microencapsulated forms other than those addressed by the Z1110 through Z1150 specific-detailed categories.

Z1200 Macroencapsulated Forms
This specific-detailed category includes waste that has been immobilized via macroencapsulation.

5.6.2 Z2000 DECONTAMINATED SOLIDS
This summary category includes waste that has been decontaminated and is ready for disposal or recycling. The appropriate detailed MPCs for this waste are selected from the following categories.

Z2100 Decontaminated Metal
This specific-detailed category includes metal waste that has been decontaminated and is read for disposal or recycling.

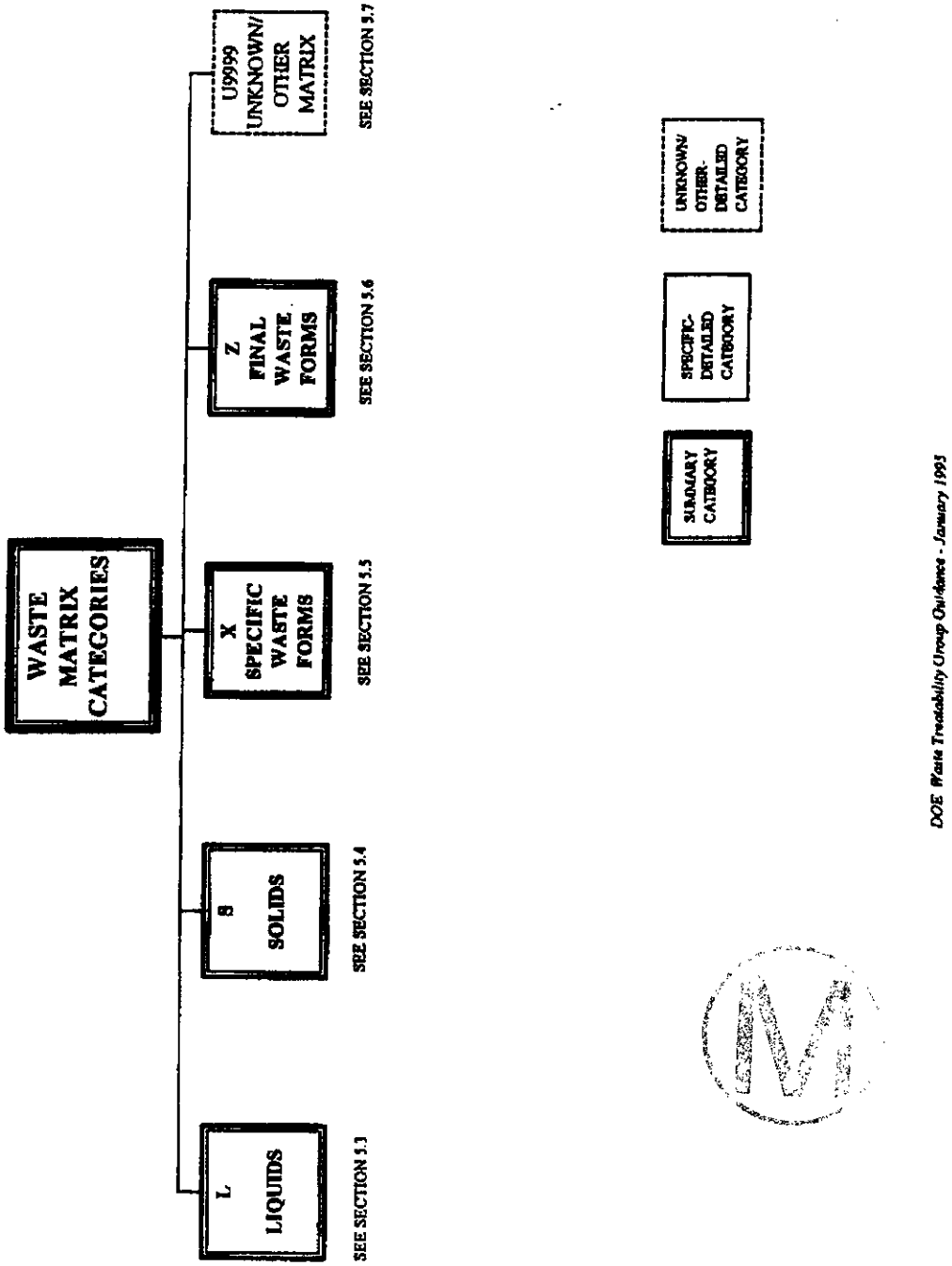
Z2900 Other Decontaminated Solids
This unknown/other-detailed category includes waste, other than metal materials, that has been decontaminated and is ready for disposal or recycling.

5.6.3 Z9000 OTHER FINAL FORMS
This unknown/other-detailed category includes final waste forms other than immobilized forms and decontaminated solids.

5.7 DEFINITION-UNKNOWN/OTHER MATRIX (U9999) CATEGORY
This category includes waste for which insufficient characterization is known to enable

evaluation per the criteria of the initial Liquids (L), Solids (S), Specific Waste Form (X), and Final Waste Form (Z) summary categories, or waste that does not meet the criteria specified for nay of those categories."

Figure 5-1. Matrix Parameter Categories - Initial Categories



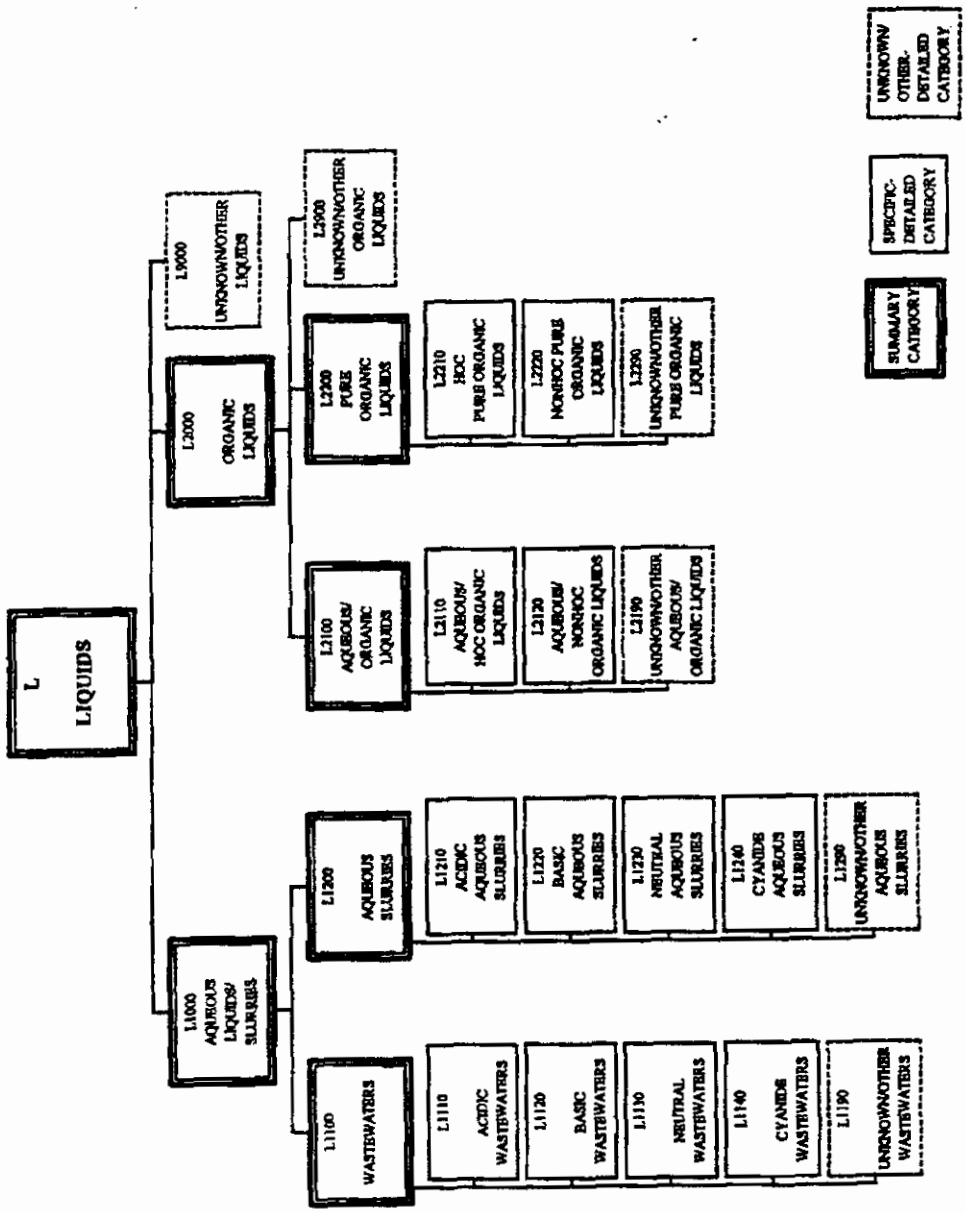
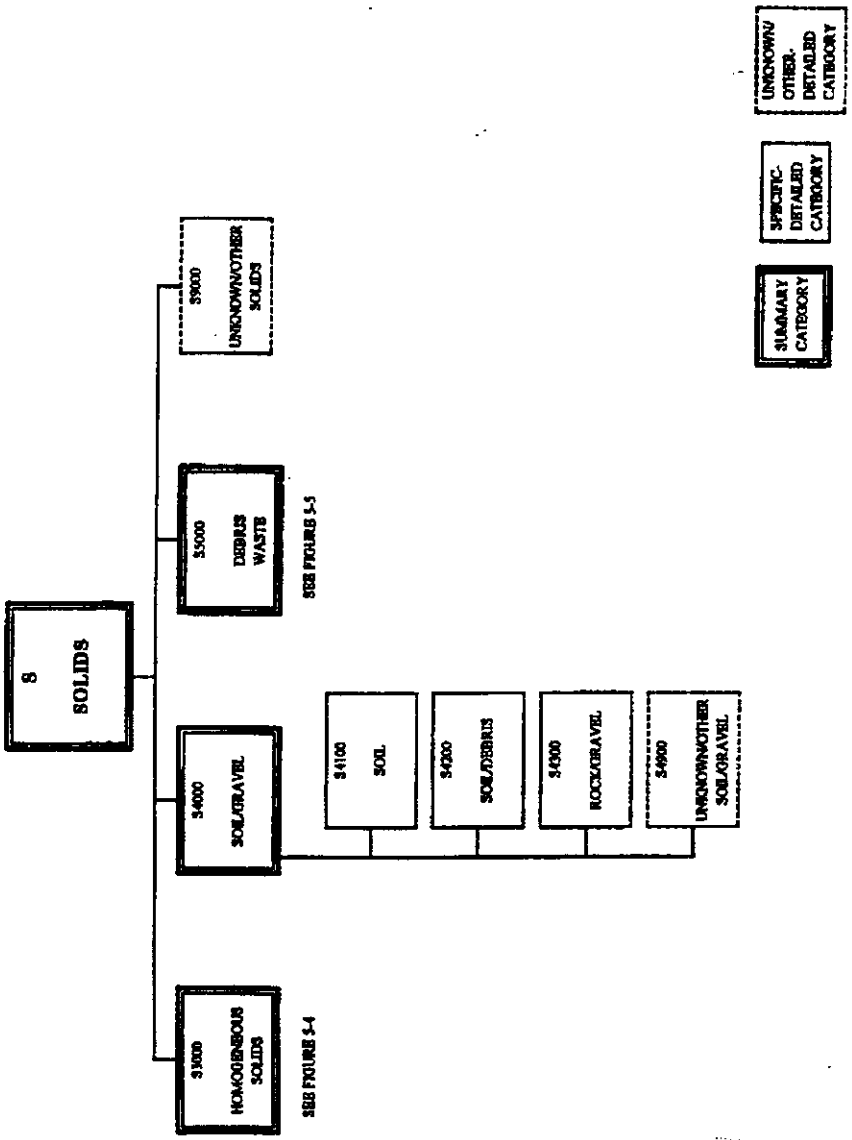


Figure 5-2. Matrix Parameter Categories- Liquids

Figure 5-3. Matrix Parameter Categories - Solids



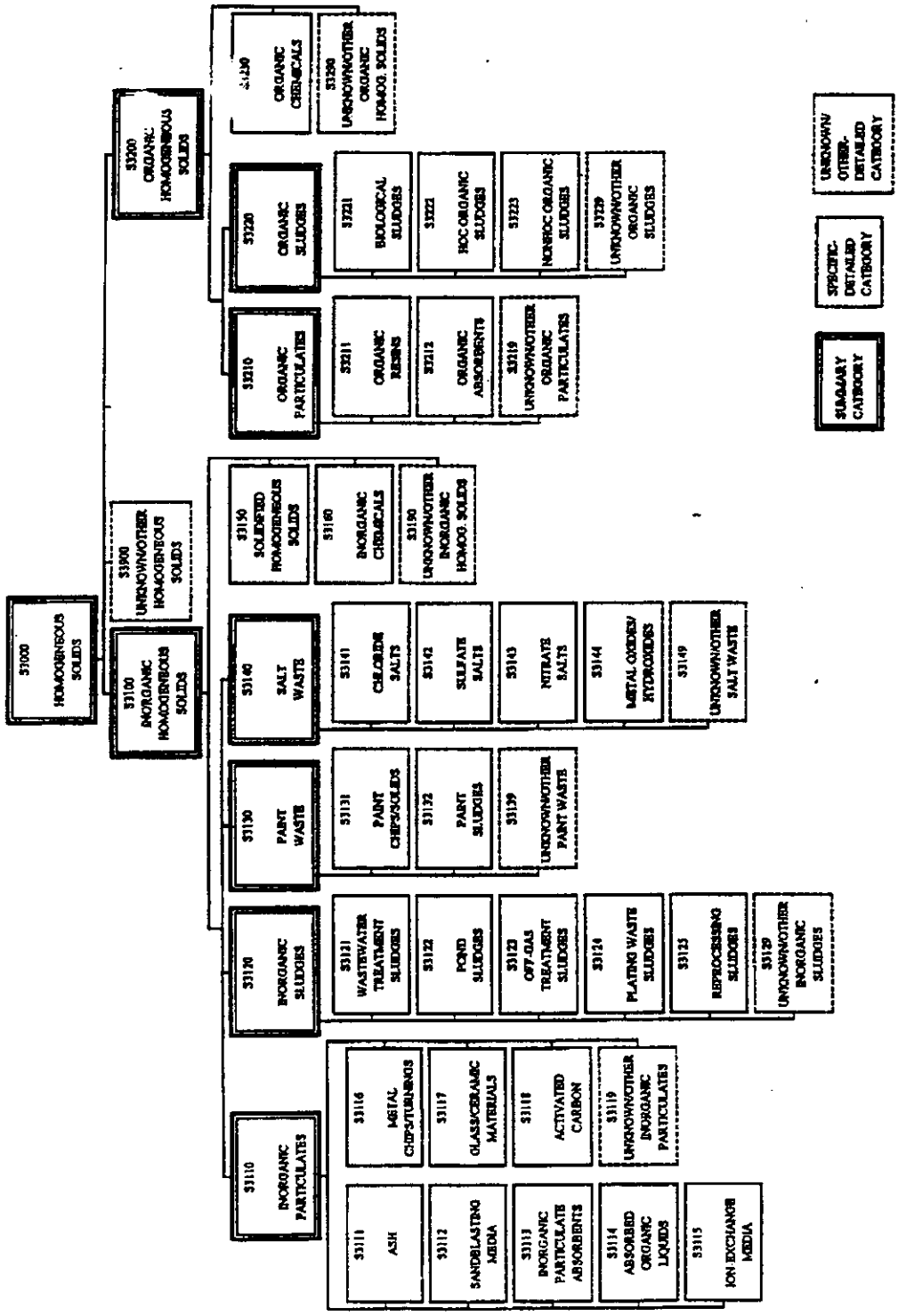


Figure 5-4. Matrix Parameter Categories - Homogeneous Solids

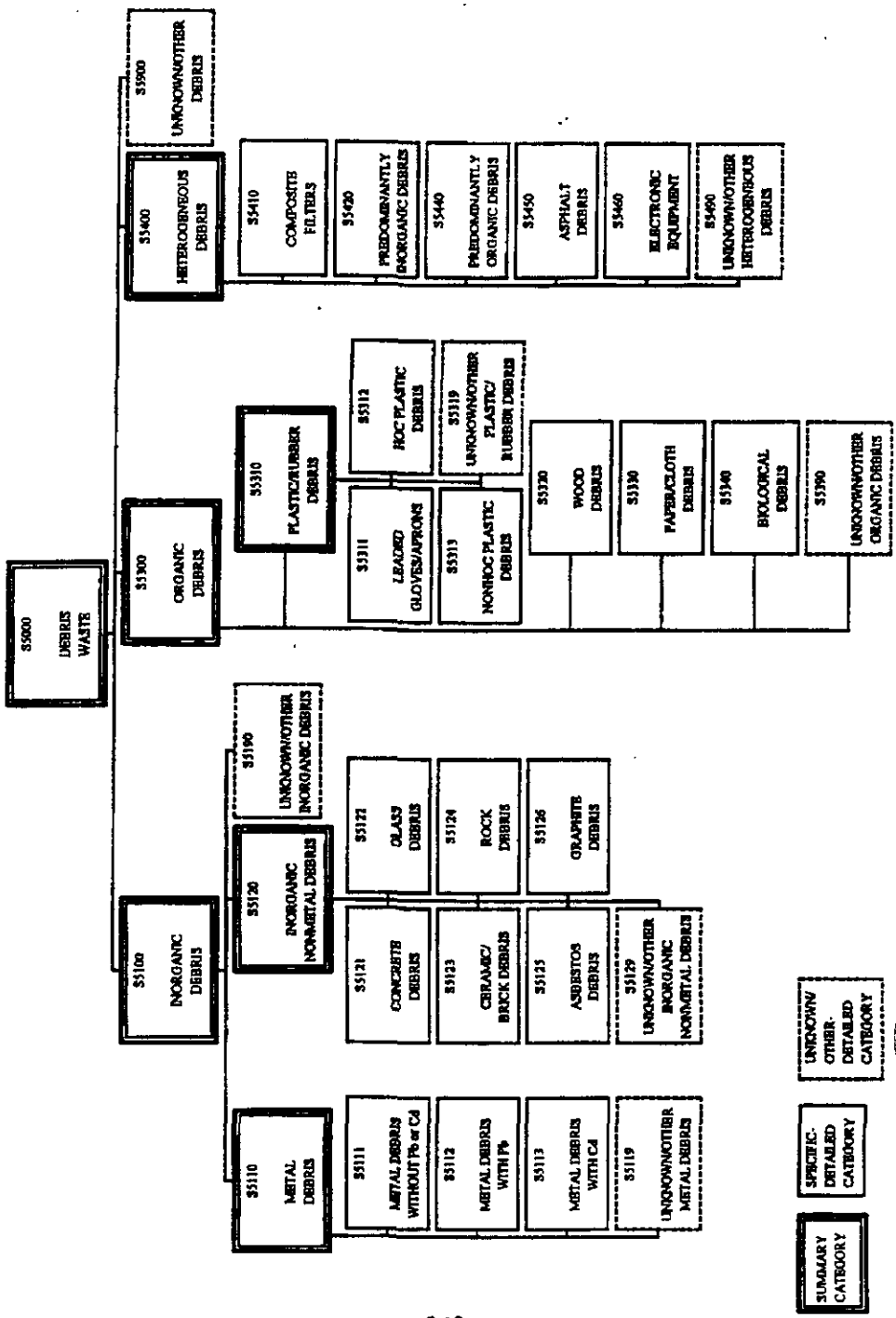


Figure 5-5. Matrix Parameter Categories - Debris

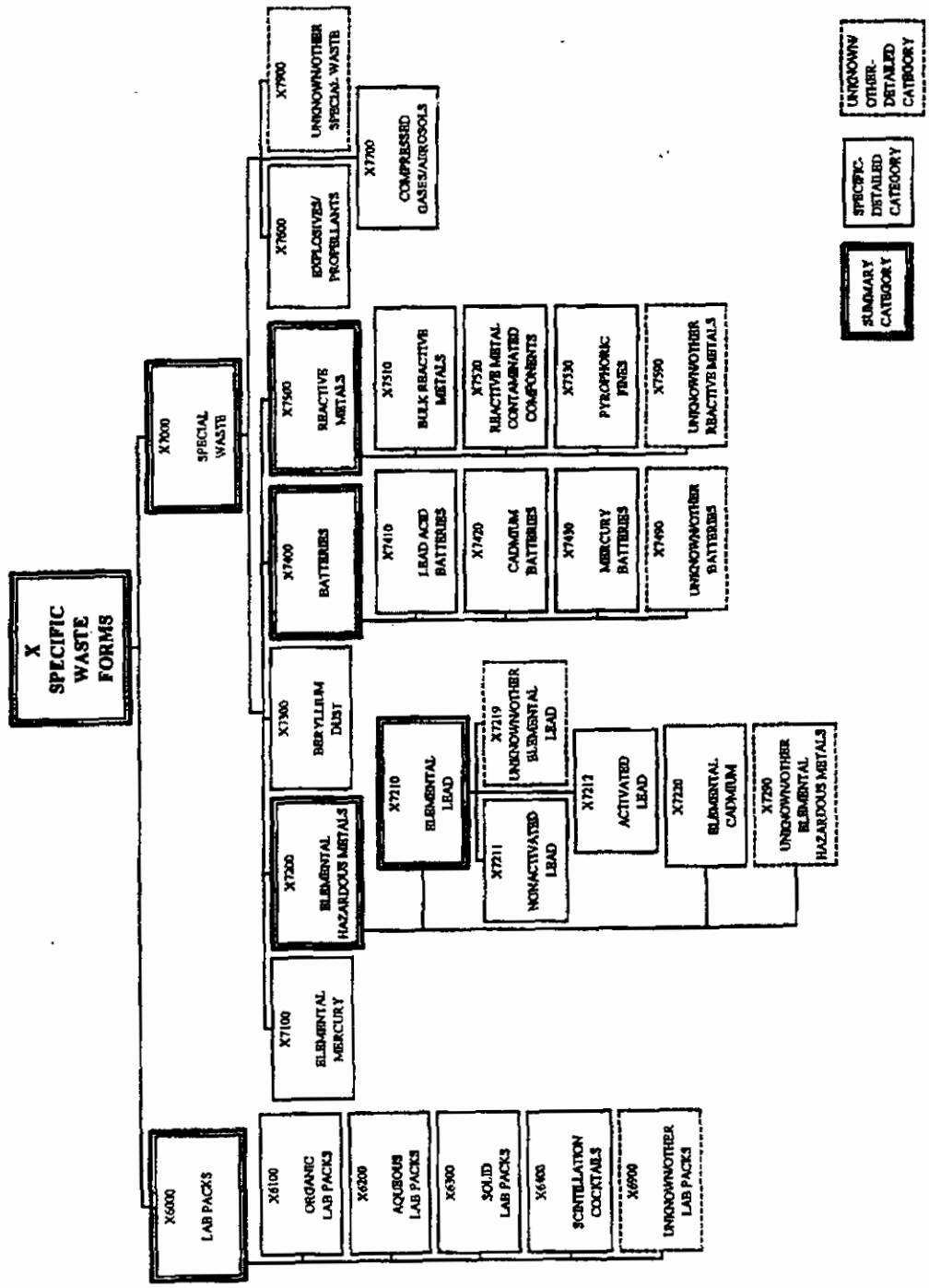


Figure 5-6. Matrix Parameter Categories - Specific Waste Forms

DOE Waste Treatability Group Guidance - January 1991

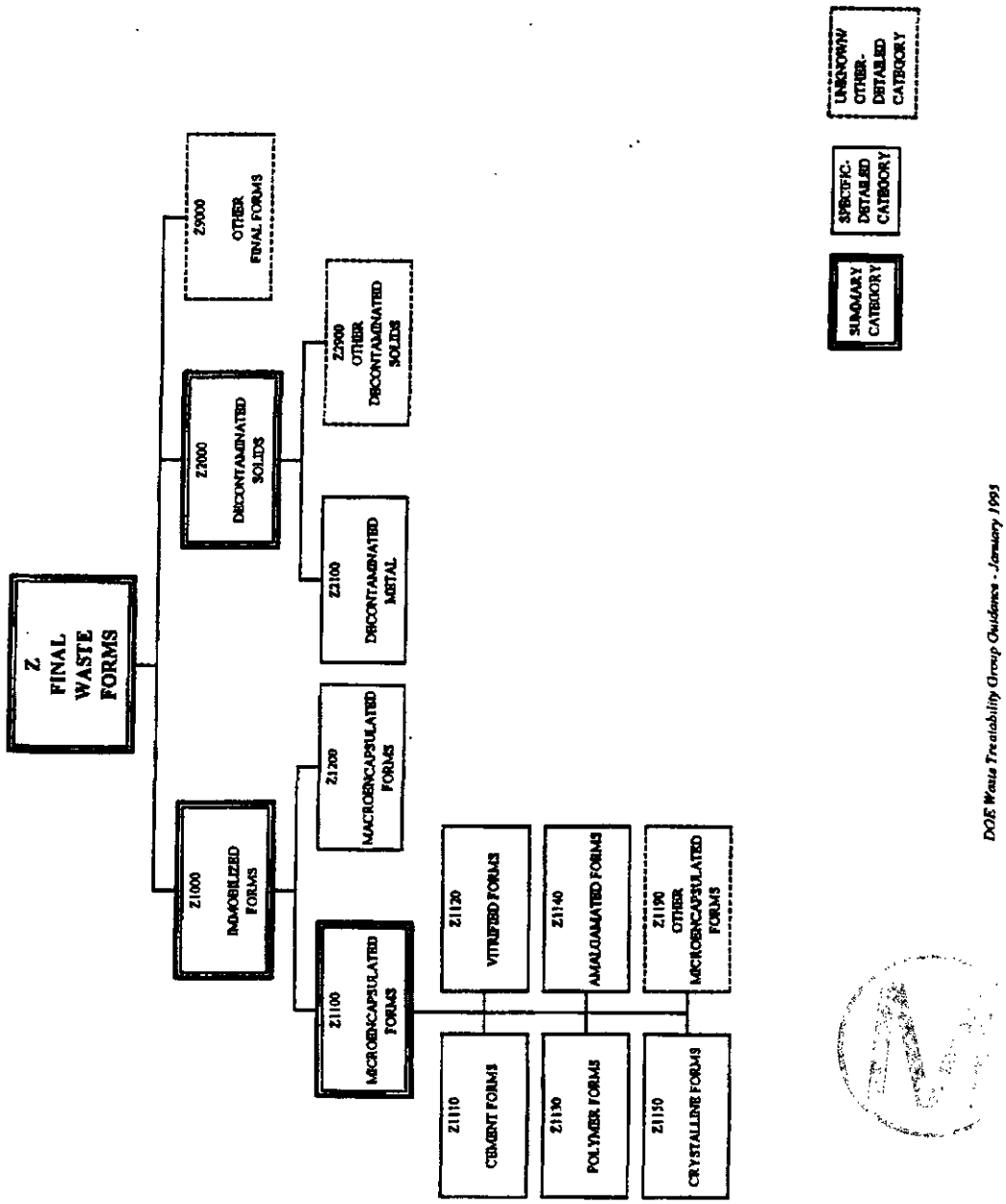


Figure 5-7. Matrix Parameter Categories - Final Waste Forms

DOE (U.S. Department of Energy). 1996a. Waste Acceptance Criteria for the Waste Isolation Pilot Plant. DOE/WIPP-96-069, Revision 5, April 1996. Carlsbad, NM.

INTRODUCTION, p. 1-1;

" The Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (WAC), DOE/WIPP-069, was initially developed by a U.S. Department of Energy (DOE) Steering Committee to provide performance requirements to ensure public health and safety as well as the safe handling of transuranic (TRU) waste at the WIPP. This revision of the WAC reflects the organizational restructuring of the DOE and the change from test phase requirements to disposal requirements. This revision incorporates the most current environmental compliance requirements from the Resource Conservation and Recovery Act (RCRA) Permit Application (Reference 1), the draft No-Migration Variance Petition (NMVP) (Reference 2) and the 40 CFR 191 Draft Compliance Certification Application (DCCA) Reference 3), along with the most up-to-date technical and regulatory requirements for transportation and operational safety. This Revision 5 of the WAC supercedes Revision 4 (Reference 11). TRU Waste Generator/Storage Sites (Sites) participating in the National Transuranic Program (NTP) must certify their TRU waste to the criteria and requirements defined in this WAC prior to transport to, and disposal in the WIPP. The characterization of TRU waste must be in accordance with the TRU Waste Characterization Quality Assurance Program Plan (Reference 4).

This WAC document applies to both contact-handled (CH) and remote-handled (RH) TRU waste forms for disposal in the WIPP. The criteria (parameters for waste acceptance) and the requirements (conditions or limits which must be met for each criterion) are presented in Section 3. Known criteria and requirements necessary for certification of CH-TRU wastes have been defined; however only preliminary characterization and transportation-related waste packaging requirements for RH-TRU waste have been identified. The WAC does not address specific local, State or Federal regulations affecting the handling or shipping of TRU mixed waste at Generator/Storage sites (e.g., State EPA Hazardous Waste Codes, DOE marking on containers, etc.). Requirements have not yet been finalized for the RH-TRU 72-B Cask but are included to provide technical guidance to Sites. Specific RH-TRU waste transportation requirements will be included after Nuclear Regulatory Commission (NRC) approval of the RH-TRU 72-B Cask Safety Analysis Report for Packaging (SARP) and issuance of a Certificate of Compliance (C of C). The WAC is a controlled document. Revised pages will be supplied to all holders of controlled copies."

3.8.3 CANISTER/CASK CONTACT DOSE RATES; 3.8.3.1 WIPP Operations and Safety Requirements, p. 3-39;

" The RH-TRU canister limit is based upon the total RH-TRU waste volume at the WIPP, not upon the Site's number of RH-TRU canisters. No more than 5 percent of the RH canisters received at the WIPP are allowed to have dose rates of > 100 rem/hr. Prior approval by the WIPP is required before RH-TRU canisters having dose rates > 100 rem/hr but ≤ 1000 rem/hr may be shipped to the WIPP. All RH-TRU canisters shall have a maximum contact dose rate at any point no greater than 1000 rem/hr. Neutron contributions are limited to 270 mrem/hr.

Neutron contributions of gretare than 20 mrem/hr to the total canister dose rate shall be reported in the data package."

DOE (U.S. Department of Energy). 1996b. WIPP Waste Information System Software Design Description, CAO-96-1111, Revision 0, September 1996. Carlsbad, NM.

1. INTRODUCTION, 1.1 Purpose, p. 1;

" The Waste Isolation Pilot Plant Waste Information System (WWIS) Software Design Description (SDD) is the primary medium for communicating software design information about the system's application software. The SDD is a translation of requirements into a description of software structure, components, interfaces, and data necessary for implementation. This document will be used by the development team as the blueprint for implementation in conjunction with the *WWIS Software Requirements Specification*,[1] which defines design requirements. This document will be developed in the design phase and used throughout the WWIS software life cycle as depicted in Figure 1.

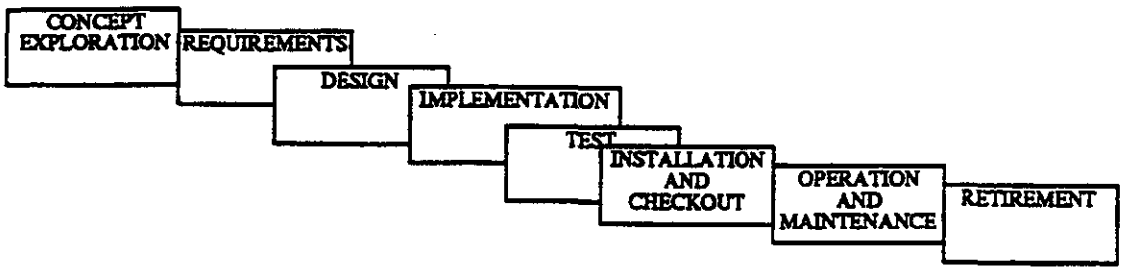


Figure 1 Software Life Cycle

DOE (U.S. Department of Energy). and State of New Mexico. 1981. Consultation and Cooperation Agreement. Appendix A to the Stipulated Agreement Resolving Civil Action, 81-0363JB, State of New Mexico vs. United States Department of Energy, United States District Court, Albuquerque, NM.

STIPULATED AGREEMENT, p. 1;

" Whereas, the plaintiff, State of New Mexico, ex rel. Jeff Bingaman, Attorney General, has brought this action to address four major concerns of the State of New Mexico; and,

Whereas, these concerns include: (1) that the final decision point for commencing construction of a permanent WIPP repository and its operation should not be reached until all interested parties including the State of New Mexico know the results of actual site and design validation tests and the SPDV program in general; and (2) that the State of New Mexico be given the opportunity to have a final resolution of all essential and integral off-site state government concerns involving health, safety, and public welfare issues prior to a final decision to commence construction of permanent WIPP facilities; and (3) that the State of New mexico be entitled to a binding and enforceable consultation and cooperation agreement that does not waive any right by the State to judicial review of any federal agency action with respect to the WIPP project; and (4) the concern that the withdrawal provisions of the Federal Land Policy and Management Act be complied with, including public hearings to be held before a decision is made to withdraw federal lands from the public domain for the WIPP project; and"

p. 2, para. 6;

" NOW, THEREFORE, the parties hereby stipulate and agree as follows:

1. Simultaneous with the entry of the Stipulated Agreement, the United States Department of Energy and the State of New Mexico shall execute a consultation and cooperation agreement which shall provide for the timely exchange of information about the WIPP project and procedures for them to follow to attempt to resolve conflicts between them relating to the public health, safety or welfare of the citizens of the State should any such conflicts arise during the course of that project. This consultation and cooperation agreement shall be a binding, enforceable agreement between the Department of Energy and the State of New Mexico and shall expressly provide that it does not constitute a waiver by the State of any right it may have to judicial review of federal agency actions with respect to the WIPP project. The consultation and cooperation agreement is attached to and incorporated herein as Appendix A hereto."

First Modification to the July 1, 1981 "Agreement for Consultation and Cooperation" on WIPP by the State of New Mexico and U. S. Department of Energy; Modifications to Agreement for Consultation and Cooperation; 1. Modify Article VI - WIPP MIssion by revising existing paragraphs B. and C.; , p 3, line 13;

" The analyses in the WIPP FEIS use the upper limit of 100 rem per hour as the maximum surface dose rate for a canister of remote handled transuranic (RH-TRU) waste and an expected maximum activity level of 23 curies per liter for the waste. The Record of

decision dated January 22, 1981 also limited the total volume of RH-TRU to be shipped to WIPP to 250,000 cubic feet."

U.S. Congress. 1992a. Federal Faciltiy Compliance Act. Public Law 102-386.

" An Act

To amend the Solid Waste Disposal Act to clarify provisions concerning the application of certain requirements and sanctions to Federal facilities.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

TITLE I-FEDERAL FACILITY
COMPLIANCE ACT

SEC.101.SHORT TITLE.

This title may be cited as the "Federal Facility Compliance Act of 1992"."

SEC.105.MIXED WASTE INVENTORY REPORTS AND PLAN.

" (b) DEFINITION.-Section 1004 of the Solid Waste Disposal Act (42 U.S.C. 6902) is amended by adding at the end the following new paragraph:

"(41) The term 'mixed waste' means waste that contains both hazardous waste and source, special nuclear, or by- product material subject to the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.)."."

U.S. Congress, 1992b. Waste Isolation Pilot Plant Land Withdrawal Act, Public Law 102-579, October 1992. 102nd Congress, Washington, D.C.

"An Act
To withdraw land for the Waste Isolation Pilot Plant, and for other purposes.
Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,"

"SEC.7.DISPOSAL OPERATIONS.
(a)TRANSURANIC WASTE LIMITATIONS.--
(1) REM LIMITS FOR REMOTE-HANDLED TRANSURANIC WASTE.--
(A) 1,000 REMS PER HOUR.--No transuranic waste received at WIPP may have a surface dose rate in excess of 1,000 rems per hour.
(B) 100 REMS PER HOUR.--No more than 5 percent by volume of the remote-handled transuranic waste received at WIPP may have a surface dose rate in excess of 100 rems per hour.
(2) CURIE LIMITS FOR REMOTE-HANDLED TRANSURANIC WASTE.--
(A) CURIES PER LITER.--Remote-handled transuranic waste received at WIPP shall not exceed 23 curies per liter maximum activity level (averaged over the volume of the canister).
(B) TOTAL CURIES.--The total curies of the remote-handled transuranic waste received at WIPP shall not exceed 5,100,000 curies."
(3) CAPACITY OF WIPP.--The total capacity of WIPP by volume is 6.2 million cubic feet of transuranic waste."

BIBLIOGRAPHY DOCUMENTS

ASME (American Society of Mechanical Engineers), 1989a. Quality Assurance Program Requirements for Nuclear Facilities. ASME NQA-1-1989.

INTRODUCTION, 1 PURPOSE, p 1;
" This Standard sets forth requirements for the establishment and execution of quality assurance programs for the siting, design, construction, operation, and decommissioning of nuclear facilities. Nonmandatory guidance is provided in the Appendices."

ASME (American Society of Mechanical Engineers), 1989b. Quality Assurance Requirements for Nuclear Facility Applications. ASME NQA-2a-1990 Addenda, Part 2.7, to ASME NQA2-2-1989 edition.

Part 2.7 Quality Assurance Requirements of Computer Software for Nuclear Facility Applications, 1 GENERAL, p 58.3;

" Part 2.7 provides requirements for the development, procurement, maintenance, and use of computer software, as applied to the design, construction, operation, modification, repair, and maintenance of nuclear facilities. It supplements the requirements of ASME NQA-1 and shall be used in conjunction with applicable Basic and Supplementary Sections of ASME NQA-1 when and to the extent specified by the organization invoking this Part."

ASME (American Society of Mechanical Engineers). 1989c. Quality Assurance Program Requirements for the Collection of Scientific and Technical Information for Site Characterization of High-Level Nuclear Waste Repositories. ASME NQA-3-1989, excluding Sections 2.1(b), 2.1(c), and 17.1.

FOREWORD, p iii;

" Early in 1975, the American National Standards Institute (ANSI) assigned overall responsibility for coordination among technical societies, development, and maintenance of nuclear power quality assurance standards to the American Society of Mechanical Engineers (ASME). The ASME Committee on Nuclear Quality Assurance was constituted on October 3, 1975, and began operating under the ASME Procedures for Nuclear projects. The ASME Committee on Nuclear Quality Assurance currently operates under the ASME Operating Procedures and Practices for Nuclear Codes and Standards Development Committees. This committee prepared ANSI/ASME NQA-1, Quality Assurance Program requirements for Nuclear facilities and ANSI/ASME NQA-2, Quality Assurance Requirements for Nuclear facility Applications. The need for a document like ASME NQA-3 was established after extensive studies by the ASME Nuclear Quality Assurance Subcommittee on Nuclear Waste Management, and after contractors and government agencies experienced difficulty in implementing NQA-1 as the Quality Assurance Program standard on the unique type of work involved in a high-level nuclear waste management program.

In 1984, the NQA Subcommittee on Nuclear Waste management was assigned responsibility for developing a Quality Assurance Program standard appropriate to site characterization of high-level nuclear waste repositories. This Subcommittee prepared ASME NQA-3, Quality Assurance Program requirements for the Collection of Scientific and Technical Information for Site Characterization of High-Level Nuclear Waste Repositories.

NQA-3 is to be used in conjunction with NQA-1 to set forth Quality Assurance Program requirements and nonmandatory guidance for the collection of scientific and technical information for site characterization of high-level nuclear waste repositories. It contains an Introduction, Basic Requirements, and Supplements. In addition, nonmandatory guidance is provided in the appendices, which do not set forth requirements. The requirements of NQA-1 and NQA-3 are intended to meet and clarify the criteria of 10CFR50, Appendix B and 10CFR60, Subpart G (Repository Quality Assurance Requirements) for high-level nuclear waste repositories.

The arrangements of the basic and supplementary requirements of these standards permit judicious application of the entire documents or only portions of the documents. The extent to which these documents should be applied, either wholly or in part, will depend upon the nature and scope of the work to be performed and the relative importance of the items being produced or services being provided. The extent of application is to be determined by the organization imposing this document. For example, it may only involve the Basic Requirements, or the Basic Requirements in combination with Supplements and Nonmandatory Appendices. These documents may be modified, as appropriate, or they may be applied in their entirety. These documents are written to allow application to any

structure, system, component, or activity that is essential to the satisfactory completion of site characterization of high-level nuclear waste repositories. . . ."

EPA (U.S. Environmental Protection Agency), 1993. Environmental Radiation Protection Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes, 40 CFR Part 191, Final Rule. 58 FR 66398.

PREAMBLE: SUMMARY;

" The U.S. Environmental Protection Agency (EPA) is promulgating amendments to the environmental standards for the disposal of spent nuclear fuel, high-level and transuranic wastes (40 CFR 191.15 and Subpart C).

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Today's action represents the Agency's response to this legislation and to the issues raised by the court pertaining to individual and ground-water protection requirements. After considering the relevant comments received on the February 10, 1993 proposed rulemaking, the Agency has taken this final action in the form of amendments to parts 191 of title 40 of the Code of Federal Regulations. In so doing, EPA has not revised any of the regulations reinstated by the WIPP LWA.

DATES: These amendments will become effective on January 19, 1994. These amendments will be promulgated for purposes of judicial review at 1 p.m. eastern standard time on December 20, 1993."

EPA (U.S. Environmental Protection Agency), 1993. 40 CFR Part 191 Environmental Radiation Protection Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes, Final Rule. Federal Register, Vol. 58, No. 242, pp. 66398-66416, December 20, 1993, Office of Radiation and Indoor Air, Washington, D.C. WPO 39133.

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EPA (U.S. Environmental Protection Agency). 1994. Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste: A Guidance Manual. EPA 530-R-94-024. Washington, D.C.

MEMORANDUM, Transmittal of Waste Analysis Plan Guidance Manual (OSWER Directive Number 9938.4-03);

" Attached is the revised waste analysis guidance manual. The manual will provide guidance to the regulated community, permit writers and enforcement officials in establishing the criteria to properly evaluate and prepare RCRA waste analysis plans (WAP).

The guidance manual updates the Agency's 1984 manual and incorporates the many changes to the hazardous waste regulations including the Land Disposal Restrictions (LDR). The manual is divided into the following four parts;

- **Part One** - provides guidance on determining individual waste analysis responsibilities and how to meet these responsibilities.
- **Part Two** - provides facility-specific procedures for conducting waste analysis and developing a waste analysis plan. Some important components include:
  - Content and organization of a WAP
  - Waste analysis parameters
  - Sampling procedures
  - Laboratory testing and analytical methods
  - Waste re-evaluation frequencies.
- **Part Three** - provides a checklist to ensure that all relevant waste analysis responsibilities at individual facilities have been addressed.
- **Part Four** - provides facility-specific (i.e., generator, disposal, and on and off-site treatment facilities) model WAPs. These should be used as guides when developing site-specific WAPs.

. . ."

1.5 How Can You Meet The Waste Analysis Requirements For Your Facility?, p. 1-11;

" You can meet general and specific waste analysis requirements using several methods or combinations of methods. Wherever feasible, the preferred method to meet the waste analysis requirements is to conduct *sampling and laboratory analysis* because it is more accurate and defensible than other options. (The procedures and equipment for both obtaining and analyzing samples are discussed in Part Two of this manual, and are described in Appendices I and II of 40 CFR Part 261.)

However, 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.

Acceptable knowledge can be broadly defined to include:

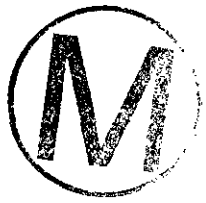
- "**Process knowledge**," whereby detailed information on the wastes is obtained from existing published or documented waste analysis data or studies conducted on hazardous wastes generated by processes similar to that which generated the waste.

As mentioned previously, EPA lists (i.e., F, K, P, and U lists) certain hazardous wastes in 40 CFR Part 261. The K-listed wastes, for example, contain wastes generated from specified sources. Examples of K-listed wastes include:

- K001 -- Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol.
- K062 - Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry.

K-listed wastes, therefore, are identified by comparing the specific process that generated the waste to those processes listed in 40 CFR §261.32 (rather than conducting a chemical/physical analysis of the waste). Similarly, any waste described in the F, P, or U list has already been designated as hazardous by EPA. Therefore, with many listed wastes the application of acceptable knowledge is appropriate because the physical/chemical makeup of the waste is generally well known and consistent from facility to facility.

- **Waste analysis data** obtained from facilities which send wastes off site for treatment, storage, or disposal (e.g., generators).
- **The facility's records of analysis performed before the effective date of RCRA regulations**. While seemingly attractive because of the potential savings associated with using existing information (such as published data), the facility must ensure that this information is current and accurate."



EPA (U.S. Environmental Protection Agency), 1996. 40 CFR Part 194: Criteria for the Certification and Re-Certification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR Part 191 Disposal Regulations; Final Rule. Federal Register, Vol. 61, No. 28, pp. 5224-5245, February 9, 1996. Office of Air and Radiation, Washington, D.C. In NWM Library as KF70.135.C751 1996 (Reference).

SUMMARY, p. 5224, col. 1;
" The Environmental Protection Agency (EPA) is promulgating criteria for determining if the Waste Isolation Pilot Plant (WIPP) will comply with EPA's environmental radiation protection standards for the disposal of radioactive waste. If the Administrator of the EPA determines that the WIPP will comply with the standards for disposal, then the Administrator will issue to the Secretary of Energy a certification of compliance which will allow the emplacement of transuranic waste in the WIPP to begin, provided that all other statutory requirements have been met. If a certification is issued, EPA will also use this final rule to determine if the WIPP has remained in compliance with EPA's environmental radiation protection standards, once every five years after the initial receipt of waste for disposal at the WIPP. This rulemaking was mandated by the WIPP Land Withdrawal Act of 1992. EFFECTIVE DATE: These regulations are effective April 9, 1996."

p. 5238, col. 2;
" §194.14. Content of compliance certification application
. . .
(b) A description of the design of the disposal system including:
(1) Information on materials of construction including, but not limited to: Geologic media, structural materials, engineered barriers, general arrangement, and approximate dimensions, and
(2) Computer codes and standards that have been applied to the design and construction of the disposal system."

p. 5240, col. 2;
" §194.24 Waste characterization.
(a) Any compliance application shall describe the chemical, radiological and physical composition of all existing waste proposed for disposal in the disposal system. To the extent practicable, any compliance application shall also describe the chemical, radiological and physical composition of to-be-generated waste proposed for disposal in the disposal system. These descriptions shall include a list of waste components and their approximate quantities in the waste. This list may be derived from process knowledge, current non-destructive examination/assay, or other information and methods.

p. 5243, Assurance Requirements, col. 3;
" §194.44 Engineered barriers.
(a) Disposal systems shall incorporate engineered barrier(s) designed to prevent or

substantially delay movement of water or radionuclides toward the accessible environment."

EPA (U.S. Environmental Protection Agency). 1996. Criteria for the Certification and Re-Certification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR Part 191 Disposal Regulations, 40 CFR Part 194, final rule. 61 FR 5224.

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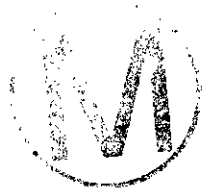
NMAC (New Mexico Administrative Code). 20 NMAC 4.1 Subpart V, §264.13. and Subpart VIII, §268.35(d).

NOTE: This document utilizes the appropriate portions of 40 CFR §264.13 and 40 CFR §268.35(d).



RCRA 1976. Resource, Conservation, and Recovery Act of 1976. Public Law 94-580, 90 Stat. 2795.

"An Act
To provide technical and financial assistance for the development of management plans and facilities for the recovery of energy and other resources from discarded materials and for the safe disposal of discarded materials, and to regulate the management of hazardous waste.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SHORT TITLE

Section 1. This Act may be cited as the 'Resource Conservation and Recovery Act of 1976'."

42 USC 6902. OBJECTIVES;
"Sec. 1003. The objectives of this Act are to promote the protection of health and the environment and to conserve valuable material and energy resources by--

"(1) providing technical and financial assistance to State and local governments and interstate agencies for the development of solid waste management plans (including resource recovery and resource conservation systems) which will promote improved solid waste management techniques (including more effective organizational arrangements), new and improved methods of collection, separation, and recovery of solid waste, and the environmentally safe disposal of nonrecoverable residues;

"(2) providing training grants in occupations involving the design, operation, and maintenance of solid waste disposal systems;

"(3) prohibiting future open dumping on the land and requiring the conversion of existing open dumps to facilities which do not pose a danger to the environment or to health;

"(4) regulating the treatment, storage, transportation, and disposal of hazardous wastes which have adverse effects on health and the environment;

"(5) providing for the promulgation of guidelines for solid waste collection, transport, separation, recovery, and disposal practices and systems;

"(6) promoting a national research and development program for improved solid waste management and resource conservation techniques, more effective organizational arrangements, and new and improved methods of collection, separation, and recovery, and recycling of solid wastes and environmentally safe disposal of nonrecoverable residues;

"(7) promoting the demonstration, construction, and application of solid waste management, resource recovery, and resource conservation systems which preserve and enhance the quality of air, water, and land resources; and

"(8) establishing a cooperative effort among the Federal, State, and local governments and private enterprise in order to recover valuable materials and energy from solid waste."

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