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APR 08 1994

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FFCO

Mr. Joel Dougherty
Hazardous Waste Management Division
RCRA Enforcement Branch (ALONM)
Environmental Protection Agency, Region 6
1445 Ross Ave., Suite 1200
Dallas, TX 75202-2733

Dear Mr. Dougherty:

This letter transmits the final versions of the Los Alamos National Laboratory (LANL) deliverables and reports prepared in response to the following milestones:

AR 100	**Annual Report**
ATS 100	**Program Management Plan for Generic Development, Design, Permitting, Construction, and Operation of Low-Level Mixed Waste (LLMW) Treatment Skids**
GAS 100	**Gas Cylinder Work-Off Plan**
IFLL 100	**Preconceptual Study to Identify Required LLMW Storage Upgrades**
HLL 100	**Characterization Plan for Historical LLMW**
OSS 100	**Feasibility of Diversified Scientific Services, Inc., Treatment**
WM 100	**Waste Minimization Plan**
WM 200	**Waste Minimization Annual Work Plan**

The Department of Energy's (DOE) submittal of these documents to the Environmental Protection Agency (EPA) is required to ensure compliance with the Federal Facilities Compliance Agreement (FFCA). This FFCA has just been signed addressing hazardous and radioactive mixed wastes pursuant to the Resource Conservation and Recovery Act. The FFCA specified a due date for compliance with the referenced milestones within 30 days of the signature date (April 14, 1994).

We have prepared these documents to be consistent as possible in appearance and format. It is our expectation that this format would be used for all future deliverables, notices and reports prepared pursuant to the FFCA. Please advise us as to whether this format is acceptable or whether changes are desired.

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An initial Annual Report was prepared and submitted herewith (AR 100). While it complies with the FFCA Appendix B requirements by providing information on the current status of implementation of waste minimization efforts (WM 100), treatment skid development, design, and construction (ATS 100), and the availability/applicability of off-site treatment capacity for low-level mixed wastes (OSS 100), it also provides discussion on

APR 08 1994

the status of all other FFCA milestones, as well as an explanation of the interrelationships among milestones. It is our expectation that this format would be used for all future annual reports.

Additionally, as you have discussed with my staff, changes and updates to the waste inventory information in the FFCA Appendix B enclosures which have occurred since their development will be included in the AR 100 report. Thereafter, the inventory information will be updated and reported to you annually in the AR 100 report, and modifications to the FFCA will be made, if necessary.

Notifications of the completion of milestones HW 100, HW 300, LD 100, and CAI 100 are being sent to you concurrently under separate cover.

Supporting documentation will be retained in DOE and LANL files to support the FFCA, and will be made available to EPA and the State of New Mexico upon request. If you have any questions regarding this activity, please contact Jon Mack of my staff at (505) 665-5026.

Sincerely,

Joseph C. Vozella

Joseph C. Vozella, Chief
Environment, Safety, and Health
Branch

LESH:7JM-114

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FFCO

HLL 100
LOW-LEVEL MIXED WASTE CHARACTERIZATION PLAN

Final

Submitted in partial fulfillment of the requirements of the Federal Facility Compliance Agreement addressing hazardous and mixed waste under the Resource Conservation and Recovery Act

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PREFACE

This *Low-Level Mixed Waste (LLMW) Characterization Plan* (HLL 100) is being submitted to the United States Environmental Protection Agency (EPA) by the Department of Energy (DOE) and Los Alamos National Laboratory (LANL) in fulfillment of DOE's commitment to EPA under the Federal Facility Compliance Agreement (FFCA) developed pursuant to the Land Disposal Restrictions (LDR) requirements of the Resource Conservation and Recovery Act (RCRA), as promulgated in 40 CFR Part 268. This LLMW Characterization Plan is provided as a deliverable in compliance with Milestone HLL 100 in Appendix B of the FFCA.

The FFCA Appendix B, Section II.D, outlines the actions necessary to bring LANL into compliance with the LDR requirements. The LLMW will be fully characterized and a LLMW prioritization plan (HLL 200) developed to schedule waste streams for treatment. The ongoing progress of the LLMW characterization and the subsequent prioritization of LLMW treatment will be reported in the Annual Reports (AR 100). Potential treatment options identified for the LLMW include the use of off-site treatment capacity, incineration in LANL's Controlled-Air Incinerator, and use of the treatment skids at the Hazardous Waste Treatment Facility (HWTF). The purpose of this LLMW Characterization Plan is to present both the methodology and schedule for characterizing the waste. This plan describes the knowledge of process (KOP) methodology to be used to characterize the LLMW and identifies available analytical resources and how they will be used to characterize these wastes. Analytical capability is limited because the waste is both radioactive and hazardous. The additional characterization may identify hazardous or radioactive components that may require new treatment processes to be developed for these wastes.

The following table discusses the LDR FFCA milestones that relate to HLL 100 and the nature of each interrelationship:

PRIMARY MILESTONE	SECONDARY MILESTONE	NATURE OF INTERRELATIONSHIP
HLL 100	OSS 200	Information developed from the waste characterization plan will be reviewed for its applicability to selection of off-site treatment/disposal facilities and will be used to develop action plans for off-site shipment of wastes.
	CAI 200	Information developed from the waste characterization plan will be reviewed to support selection of wastes to be used for the RCRA trial burn.
	CAI 300	Information developed from the waste characterization plan will be reviewed for its applicability to the CAI work-off plan.
	ATS 100	Information developed from the waste characterization plan will be utilized to further develop and refine LLMW treatment skids and to support the selection of new skids for development (reported in the Annual Report AR 100).
	HW 200	Applicable information developed from the waste characterization plan will be incorporated into the definitive design (Title II) for the Hazardous Waste Treatment Facility (HWTF).

PRIMARY MILESTONE	SECONDARY MILESTONE	NATURE OF INTERRELATIONSHIP
	HW 300	Information developed from the waste characterization plan will be reviewed to determine whether any modifications to the RCRA Mixed Waste (MW)permit application to the NMED are required.
	HW 400	Applicable information developed from the waste characterization plan, such as waste segregation information, will be used to develop the schedule for bringing the HWTF into use.
	HW 500	Applicable information developed from the waste characterization plan, such as waste segregation information, will affect construction components of the HWTF.
	HW 600	Applicable information developed from the waste characterization plan will support development of the LLMW work-off plan for the HWTF.
	HW 700	Applicable information developed from the waste characterization plan, such as waste segregation information, will affect construction components of the HWTF.
	HW 800	Applicable information developed from the waste characterization plan will affect treatment operations at the HWTF.
	HW 900	Applicable waste characterization information developed from the LLMW characterization plan will affect information compiled for the LLMW work-off plan for the HWTF.
	HLL 200	Information developed from the waste characterization plan will be the basis for the development of the formal plan for prioritizing LLMW treatment.

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LIST OF ACRONYMS

ACIS	Automated Chemical Inventory Systems
AET	Applied Environmental Technologies
ALARA	As Low As Reasonably Achievable
ATLAS	Advanced Testing for Actinide Separations
BAT	Best Available Technology
BDAT	Best Demonstrated Available Technology
BEJ	Best Engineering Judgment
BIF	Boiler and Industrial Furnace
CAI	Controlled-Air Incinerator
CAMs	Continuous Air Monitors
CFC	Chlorinated Solvents
CFR	Code of Federal Regulations
CLS	Analytical Chemistry Group
CWM	Chemical Waste Management, Inc.
CWDR	Chemical Waste Disposal Request
DOE	U.S. Department of Energy
DOE/AL	DOE Albuquerque Operations Office
DOT	Department of Transportation
DSSI	Diversified Scientific Services, Inc.
EPA	U.S. Environmental Protection Agency
ERC	Earth Resources Corporation
ES&H	Environment, Safety, and Health
FERC	Federal Energy Regulatory Commission
FFCA	Federal Facility Compliance Agreement
FY	Fiscal Year
GCP	Gas Cylider Project
GSA	General Services Administration
HEPA	High Efficiency Particulate Air Filter
HSWA	Hazardous and Solid Waste Amendments
HWFP	Hazardous Waste Facility Permit
HWTF	Hazardous Waste Treatment Facility
ICP	Inductively Coupled Plasma
IPC	Industrial Partnership Center
JCI	Johnson Control Incorporated
KOP	Knowledge of Process
LAMPF	Los Alamos Meson Physics Facility
LANL	Los Alamos National Laboratory
LAO	LANL Assessment Office
LDR	Land Disposal Restriction
LLMW	Low-Level Mixed Waste
LLW	Low-Level Radioactive Waste
LP	LANL Procedures
MSDS	Material Safety Data Sheet
MWRSF	Mixed Waste Receiving and Storage Facility
NEPA	National Environmental Policy Act
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NMED	New Mexico Environmental Department
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission

LIST OF ACRONYMS
(Continued)

PPAC	Pollution Prevention Awareness Campaign
PRD	Program Required Document
PTS	Project Tracking System
PWA	Process Waste Assessments
QA	Quality Assurance
QAP	Quality Assurance Plan
RCRA	Resource Conservation and Recovery Act
R&D	Research and Development
R&M	Redistribution and Marketing Center
RES	Rollins Environmental Services
RMMA	Radioactive Material Management Area
RSWD	Radioactive Solid Waste Disposal Record
SOP	Standard Operating Procedure
SSP	Site Specific Plans
SWDA	Solid Waste Disposal Act
TA	Technical Area
TCLP	Toxicity Characteristic Leaching Procedure
TRU	Transuranic
TSCA	Toxic Substance Control Act
TSDF	Treatment, Storage, or Disposal Facility
UBC	Uniform Building Code
UL	Underwriters Laboratories
ULISSES	Uranium Line for Special Separation Sciences
WAC	Waste Acceptance Criteria
WBS	Work Breakdown Structure
WIPP	Waste Isolation Pilot Plant
WMC	Waste Management Coordinator
WMPO	Waste Minimization Program Office
WPF	Waste Profile Form

HLL 100
LOW-LEVEL MIXED WASTE
CHARACTERIZATION PLAN

1.0 INTRODUCTION

The Los Alamos National Laboratory (LANL) has produced many low-level radioactive wastes that contain components defined as hazardous under the Resource Conservation and Recovery Act (RCRA) and are therefore defined as Low-Level Mixed Waste (LLMW). With few exceptions, the volume of individual waste streams is small but the number of wastes with different characteristics is large. The diversity of waste streams reflects LANL's mission of research and development. LLMW has been stored at LANL since 1986. Legacy LLMW (generated before May 1991) was not fully characterized for treatment before being placed in storage and therefore will require additional characterization to meet RCRA requirements and to allow off-site treatment or to develop on-site treatment.

Approximately 4997 containers of LLMW containing approximately 7347 distinct LLMW items are stored at Technical Area (TA)-54, Area G and Area L. This waste characterization plan describes the process that will be used to characterize the stored contained wastes. FFCA milestone HLL 200 (*Formal Plan for Prioritizing LLMW Treatment)*, AR 100 *(Treatment Skid Annual Report)*, HW 600 (*LLMW Work-Off Plan for the Hazardous Waste Treatment Facility)*, and CAI 300 (*Work-Off Plan for Applicable LLMW)* will address treatment options for the fully characterized LLMW in storage.

The waste characterization process consists of a series of activities that can be organized into five phases: reviewing existing waste data, conducting knowledge-of-process (KOP) interviews with waste generators, determining where KOP information is inadequate to characterize wastes, providing sampling and analysis of the remaining waste containers, and characterizing the waste for RCRA codes and DOE treatability groups.

As previously mentioned, LANL has a large breadth of waste types because of its charter as a research and development facility. Characterization of waste at other DOE facilities, such as the Nevada Test Site, relies upon established waste acceptance criteria for current waste and will rely heavily upon sampling to characterize legacy waste. Because LANL has a large variety and a small volume of legacy LLMW, the implementation of a realistic, timely, and cost effective waste characterization program mandates a heavy reliance on KOP interviews. The criteria for acceptance of the data gained from these interviews will be based upon applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used (40 CFR 262.11(c)(2)) and subsequent proposed rulings regarding the quality of information (Federal Register, Vol. 58, No. 176, 48111, September 14, 1993).

2.0 REVIEW OF EXISTING LABORATORY INFORMATION

LANL procedures for storing of LLMW have changed during LANL's history influenced by a permit for management of LANL's hazardous waste. LANL received its *Hazardous Waste Facility Permit* (HWFP) November 8, 1989. The "Waste Analysis Plan" of the HWFP emphasized the development and refinement of a waste tracking and characterization system. Forms have been developed to record waste characterization information and track waste movement through LANL (see Appendix A). Legacy LLMW (pre-May 1991) required only a *Chemical Waste Disposal Request* (CWDR); a *Radioactive Solid Waste Disposal Record (*RSWD) was also required for solid wastes. At that time, this information was considered to be sufficient for the Chemical Waste Management Section (EM-7, now CST-7) to pick up and store the waste. Since May 1991, LLMW requiring storage have necessitated completing a *Waste Profile Form* (WPF) and an RSWD for solid wastes in addition to a CWDR (see Appendix C for LANL forms). The WPF is used to identify the waste, any characteristic or radioactive properties, volume of waste, and any other specific parameters needed for waste management. Unused liquids, or liquids that are suspected to be radioactive only do not require a WPF, but require only an MSDS for each specific waste item. Current procedures dictate that once a LLMW is generated, the generator

out the WPF before the waste can be picked up. LANL's Waste Characterization and Tracking System functions well at this time; however, legacy waste for storage was not as well characterized. Currently, LANL is streamlining its waste characterization and tracking process, including the CWDR/RSWD paperwork, to further reduce repetitive information. Waste characterization information is maintained by the Environmental Protection Group at LANL. Additional information is maintained in the Chemical Waste Database by the Waste Management Group and is used to record appropriate characterization, transportation, and storage information and to track the waste from the LANL generator to the appropriate storage area.

3.0 SUMMARY OF THE WASTE CHARACTERIZATION PROCESS

The scope of this project is to fully characterize for treatment, LLMW that were received before January 1, 1991. The characterization process begins by assembling data packages using available LANL information. A separate data package is prepared for each container or group of containers of wastes produced from the same process. The data package provides the KOP interviewers with a hard-copy summary of all existing information to facilitate gathering additional information during KOP interviews. Information in the data package consists of information from LANL waste databases, copies of generator disposal forms, and generator interview forms. These forms are provided in Appendix D. These forms provide a guide for knowledgeable personnel conducting KOP interviews, as well as a consistent format for recording the information. They were developed to provide interviewers with the best available information to obtain the broadest understanding of the waste. Interviewers do not assume the accuracy of the data; the data packages serve only as the beginning of the characterization process.

Waste generators are interviewed to obtain detailed waste information based upon KOP. In addition, the evaluation identifies radioactive constituents and packaging information for each item. Generators are notified before the interview and instructed to gather all pertinent data. After the generators have been interviewed, supplemental information that is applicable to the containerized waste, such as Material Safety Data Sheets (MSDSs) and generalized packaging procedures, is obtained and compiled in the data packages. This information is then reviewed using the guidelines established in the Quality Assurance Plan (QAP) (Appendix A) and according to the Data Quality Objectives (Appendix B).

Characterizing the wastes consists of thoroughly reviewing the data for each item of waste as detailed further in Appendix E. RCRA waste codes and an applicable DOE mixed waste treatability code are assigned to each item. DOE Mixed Waste Treatability Codes are in Appendix F.

An LLMW characterization project data management system is used to maintain and manage the characterization data. This data management system is separate from databases maintained by LANL. The data management system facilitates searches and provides LANL with the waste characterization information in a format that is compatible with its need. When additional or conflicting information is obtained, it is entered into the project data management system rather than amended to the LANL database.

During each phase of the project, the QAP addresses precision, accuracy, representativeness, completeness, and comparability of data. These parameters are qualitative and quantitative measures of how well project objectives have been met.

4.0 KNOWLEDGE OF PROCESS

KOP interviews are initiated by locating the generator of each waste grouping. The generator's identity is initially assumed to be the name indicated on the CWDR. Frequently, however, the CWDR was signed by a waste management coordinator (WMC) for the actual waste generator, the generator no longer works in the division, or the generator has retired. In these cases, the generator is located, generally by contacting the generator's original group office where historical employee records are maintained. Most wastes are generated with complete knowledge of more than one person, allowing characterization even when the primary generator is retired or deceased. After contact has been made with a generator, interviews are scheduled and conducted either in person

at LANL or over the telephone. Information provided by the generators will be copied onto the appropriate forms during the interview. The interviewer will record the date, time, and generator name in a logbook.

During the interview, generators are asked to describe in detail the process that generated the waste. Specific questions about chemical, physical, and radiological components for the waste as well as packaging information will be collected and shown on the interview forms. A waste generation flow diagram is used to supplement the description when applicable. When the KOP interview is completed, the interviewer will return the folder to the project coordinator so that the information may be reviewed and the container characterized.

The generator interviews will be conducted in a manner that adheres to the project-specific QAP (Appendix C). Project efforts as of December 31, 1993 have yielded interviews for 2150 of the approximately 4997 containers.

5.0 WASTE CHARACTERIZATION

A waste characterization team consisting of knowledgeable professionals will conduct all RCRA characterizations. The team will review all existing data, KOP information gained during the generator interview, and additional information collected after the interview (e.g., MSDSs) for each data package. While each waste characterization team member is reviewing the data package to characterize it, he or she will check the generator interview forms for completeness.

The waste characterization team member will complete the project-specific *Waste Characterization Form* (see Appendix E) while reviewing the data package and characterizing the waste. The form will identify the hazardous constituents of the wastes, the RCRA hazardous waste code, and the rationale for assigning the code, as well as a DOE treatability code for each waste .

The waste characterization team will conduct characterizations according to the methodology outlined in Appendix E. All characterizations will be reviewed and confirmed by a senior characterization team member.

If it is not possible to obtain sufficient KOP for some containerized wastes, these wastes will be deferred for sampling and analysis as outlined in Section 6.0. Characterization information will be considered adequate when sufficient components of the waste forms and generator interview forms have been completed. The degree to which the wastes can be characterized, based on KOP rather than laboratory analytical data, depends on the availability, completeness, and accuracy of existing records.

The waste characterization team leader will use best professional judgment to determine whether sufficient information exists on a case-by-case basis. As of December 31, 1993, 1388 of the 2150 containers for which interviews have been conducted, for characterization. Sixteen of the 1388 containers reviewed have been determined to have insufficient information to characterize and have been targeted for sampling and analysis.

6.0 FOLLOW-UP SAMPLING AND ANALYSIS APPROACH

KOP waste characterization information may be insufficient to fully characterize some containers. This insufficiency is generally because a specific waste generator or another knowledgeable individual could not be located and contacted, insufficient documentation was available to determine who generated a particular waste, and/or the waste generator could not recall waste-specific information.

Additional work will be necessary to characterize the containers with insufficient KOP and to provide information to determine appropriate treatment. This additional work is expected to consist of sampling and analyzing of the containers. A detailed sampling and analyzing plan will be developed to collect the data necessary to fully characterize these containers for treatment. Because of the broad spectrum of waste materials generated at LANL, little if any economy would be achieved by composting wastes or randomly sampling them. Some items may be so small that a sample would constitute nearly the entire item.

The sampling and analysis phase of LLMW characterization is still under development because the amount and nature of waste materials requiring sampling and analysis is unknown. The goal of the sampling and analysis plan will be to characterize the remaining containers as quickly and as cost effectively as possible. Protocol from the most current *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods,* EPA SW-846, will be used for sampling the various types of wastes. The principal cost for obtaining adequate information to characterize these containers will probably be analytical cost. Analyzing of a single sample for volatile organic compounds, semivolatile organic compounds, heavy metals, gross radioactivity, radioactive isotope identification, and hazardous characteristic testing is anticipated to exceed $2000 per sample. Since many containers will contain more than one item, multiple samples per container may be required, driving the cost even higher. An additional challenge is locating an analytical laboratory with sufficient capacity. LANL licensing limits for radioactive material may preclude many non-DOE laboratories from accepting these samples. Few analytical laboratories are available that can analyze these samples. The laboratories with the appropriate licenses to analyze mixed waste samples are in demand and their backlog may be substantial. Radioactive screening and sample transportation within analytical method holding times will also be a challenge. Because of the limitations of commercial analytical laboratories, these samples may have to be analyzed at an analytical laboratory on site. An on-site laboratory may also have a substantial backlog of samples that will limit the number of samples that can be submitted.

To effectively characterize the wastes while minimizing the number of samples to be collected, the overall approach to the sampling and analysis program will be as follows:

- Use a sampling and analysis plan to ensure proper sampling, health and safety, and chain of custody procedures are followed.

- Prepare sampling protocol to address

  - Representatives of samples (determine whether or not holding time protocols apply given that the waste has been in prolonged storage [i.e., samples will be representative of what was in the containers when they were taken, not what are in the containers when they are being treated])

  - Required sample size

  - Environmental, Safety, and Health (ES&H) issues, maintaining guidelines outlined in the Accident Prevention and Safety Plan (see Appendix G, Environmental Safety and Health)

  - Sample documentation, such as custody certification, radionuclide type and activity level certification

  - Labeling for shipment

- Determine analytical laboratory availability by analyzing

  - Capability for analyzing LLMW to determine radioactivity and RCRA code
  - Capability to receive LLMW per NRC or State licensing criteria
  - Capacity for analyzing LLMW
  - Current LLMW workload
  - LLMW analytical cost
  - LLMW laboratory QA plan
  - LANL requirements for allowing off-site sample shipment
  - Off-site laboratory requirements for sample shipment

- Determine chemical and radiological screening necessary to assign a RCRA code and knowledge of the contaminating radionuclide(s) and its associated activity levels.

  - All RCRA codes will be D, F, U, or P

- Screening for appropriate code through RCRA characteristic testing procedures is suggested, using gas chromatograph/mass spectroscopy (GC/MS)and inductively coupled plasma (ICP)

- Radionuclide identification and quantification through appropriate assay methodology (e.g., liquid scintillation counting, gamma spectroscopy, radiochemistry will be performed).

- Determine major constituents of sample matrix for treatability.

- Group wastes into similar RCRA waste types based on any available documentation or information.

- Using a sampling and analysis plan, for each of these groups, open the container, collect a sample, and perform field screening analysis for parameters such as organic/aqueous content, density, pH, and gross radioactivity.

- Using the field screening results as a basis, determine which wastes are similar and should be composited with other wastes for treatment. Collect a composite sample from these similar wastes and send that sample for laboratory analysis.

- Complete the waste characterization based on the laboratory data.

- Categorize the wastes based on analytical results to provide the basis for future treatment options.

Since these wastes are expected to contain radioactive materials, it will be necessary to perform the sampling within as low as reasonably achievable (ALARA) guidelines. Sampling will need to be closely coordinated with laboratory capabilities given the relatively short holding times for sampled materials, especially for volatile organic compound analysis. Because of analytical laboratory capacity limitations, many rounds of sampling are anticipated to be required. Each round of sampling would collect only as many samples as the analytical laboratory can analyze within the established method is holding times.

7.0 PROJECT MANAGEMENT

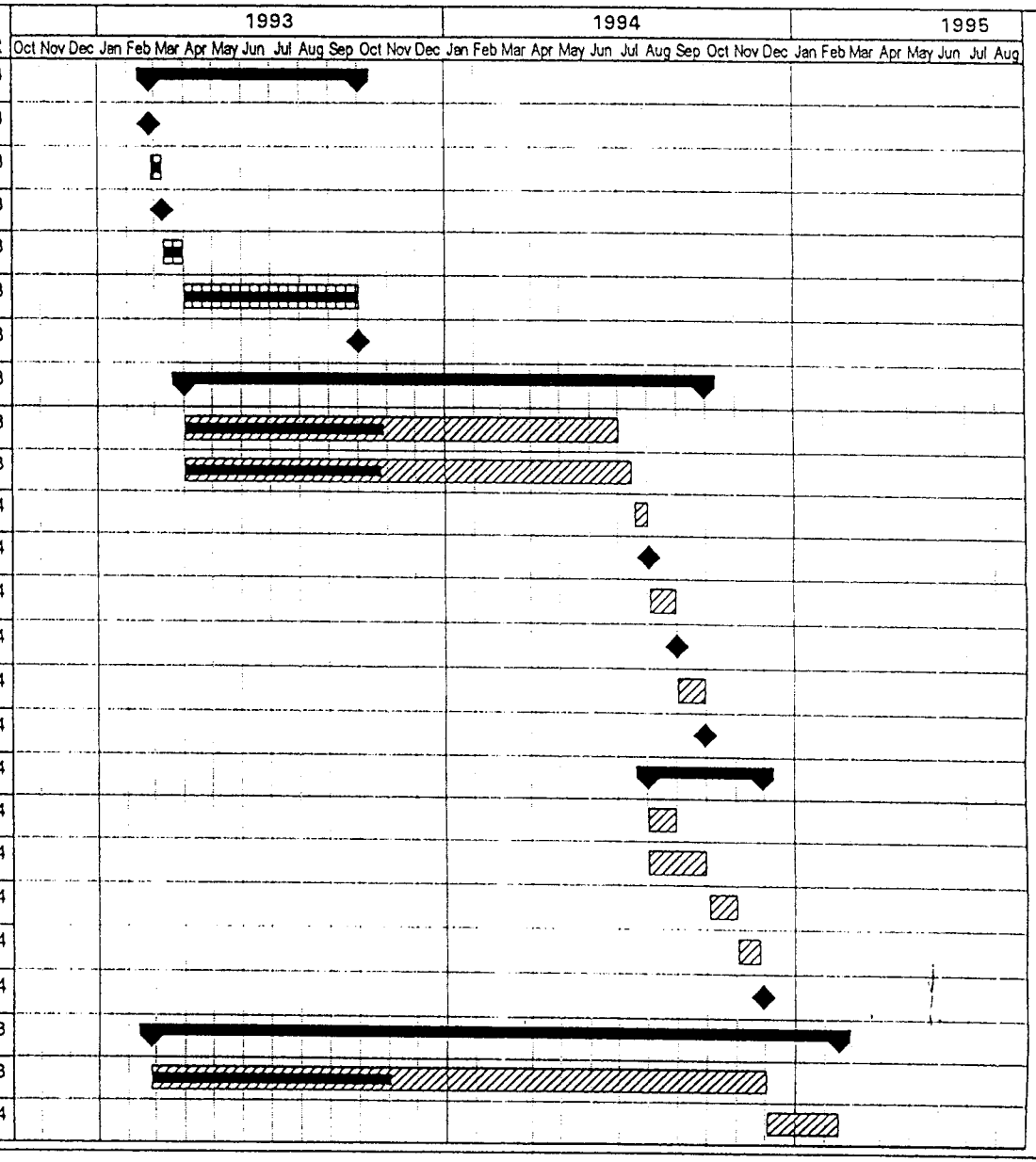
A summary project schedule is outlined in Figure 7-1. As the primary deliverable requirement for completion of this project, data packages or folders for each container or group of containers with wastes generated from like processes will be finalized and delivered to LANL. These packages will provide a hard copy of all waste characterization data, LANL forms, interview forms, and characterization forms.

An LLMW characterization project data management system has been created to maintain the waste characterization data from each container or each group of containers with wastes generated from like processes. Information from existing LANL sources and generator interviews is entered into this data management system as it is received. This system facilitates searches for information based on container identification, waste type, waste codes, radiological constituents, and chemical or physical properties. The LLMW characterization data management system does not duplicate existing databases at LANL within the Environmental Protection and Waste Management Groups. Instead, it contains all information collected and compiled during the knowledge of process evaluation that is critical to characterizing the wastes. The system also helps to identify any and all inconsistencies between the LANL database and all waste information gathered during the knowledge of process interviews. The data management system is in Microsoft Access Version 1.1 and will be modified if necessary to be compatible with the existing LANL databases. The data management system is maintained in accordance with the requirements of the QAP in Appendix A.

The final waste characterization report will be prepared and delivered at the conclusion of the project. The report will detail the results of the waste characterization project and will discuss the implementation of this waste characterization plan, a summary of characterization results, the final data packages mentioned above, the data management system as it applies to future FFCA issues, and recommendations for future of LLMW management at LANL.

FIGURE 7-1
LOW LEVEL MIXED WASTE CHARACTERIZATION SCHEDULE

ID	Name	Scheduled Start
1	Waste Char. Plan Prep.	2/24/93
2	Issue Draft Plan	2/24/93
3	LANL Review	2/25/93
4	LANL Issues Comments	3/9/93
5	Finalize WC Plan	3/10/93
6	Await FFCA Negotiation	3/31/93
7	Issue WC Plan	10/1/93
8	Process Knowledge Characterization	4/1/93
9	Conduct Process Knowledge Interview	4/1/93
10	Input Data & Operate Database	4/1/93
11	Prepare Draft Waste Char. Report	7/18/94
12	Issue Draft Waste Char. Report	8/2/94
13	LANL Review	8/3/94
14	Lanl Issues Comments	8/31/94
15	Finalize Waste Char. Report	9/1/94
16	Issue Final WC Report	9/30/94
17	Post Process Knowledge	8/1/94
18	Microfilm Folders	8/1/94
19	Prepare Sampling & Analysis Plan	8/1/94
20	LANL Review	10/3/94
21	Sampling & Analysis Plan Update	11/2/94
22	Issue Final S&A Plan	11/28/94
23	Project Management	2/24/93
24	Ongoing Project Management	2/24/93
25	Project Closeout	12/2/94



Project: LLMW Characterization
Date: 11/3/93

Critical — Noncritical — Progress — Milestone — Summary — Rolled Up

Appendix A
Quality Assurance Plan

QUALITY ASSURANCE PLAN

INTRODUCTION

This QAP defines the quality assurance (QA) program applied to ensure that the quality of technical work performed meets the primary objective of this waste characterization program. The technical approach for the characterization program is identified in Section 3.0.

QA functions such as internal consistency reviews and the work review processes are standard work practices conducted by the Team. Specific QC instructions are contained in Part III, Performance, Sections 5.1 and 5.2 of this QAP. This plan was prepared in accordance with DOE Order 5700.6C, Quality Assurance (1991). Applicable portions of the following list of documents were also used to develop this QAP:

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

2. ASME NQA-2, 1990, Quality Assurance Requirements for Nuclear Facility Applications. 1989 Edition and Addenda ASME NQA-2a-1990.

3. ASME NQA-3, 1989, Quality Assurance Program Requirements for the Collection of Scientific and Technical Information for Site Characterization of High-Level Nuclear Waste Repositories.

The purpose of this QAP is to identify QA and QC functions, requirements, and instructions necessary to ensure the overall quality of the waste characterization program. The scope of these QA requirements and instructions are applied to all quality activities performed during the waste characterization process.

MANAGEMENT

1.0 Program - Criterion 1

1.1 The project team leader is responsible for ensuring all QA/QC requirements and instructions are developed and implemented.

1.2 The project team manager or designee is responsible to ensure all work performed by team personnel meets the requirements and instructions contained in this QAP.

1.2.1 The team project manager may appoint individuals as team leaders to ensure work is performed to the requirements of the Waste Characterization Plan.

1.2.2 The team project manager is responsible for identifying those documents that require control per the requirements of this QAP.

1.2.3 The team project manager is responsible for determining qualifications and providing training as necessary for individuals performing technical work activities.

1.3 The team QA manager is responsible for developing and implementing the requirements and instructions in this QAP.

1.4 The QA functions for this specific project consist of performing QC checks and reviews of documents, records, and data generated during the characterization process. The QC work instructions to perform these activities are contained in Part III, Performance, Sections 5.1 and 5.2 of this QAP.

1.5 The QC activities shall be performed to verify acceptable accomplishment of the various work activities performed during the characterization process. The following QC activities shall be performed:

1.5.1 Check completion of the *Generator Process Knowledge Interview, Waste Profile for Generator Interview*, and *Waste Characterization* forms.

1.5.2 Review the rationale used to determine the RCRA waste code assigned to waste items based on the characterization results.

1.5.3 Verify documents used for the final characterization decision are referenced or included in the characterization package.

1.5.4 Complete a *Quality Control Checklist* for each drum or group of drum characterization packages.

2.0 Personnel Training and Qualifications - Criterion 2

2.1 Training and qualification requirements are determined by the appropriate technical management personnel in conjunction with the team project manager.

2.2 Personnel performing waste characterization activities and conducting interviews are trained by their respective management.

2.2.1 All personnel conducting interviews will attend a training session before beginning work.

2.2.2 All personnel will sign and date an attendance sheet for document training.

2.3 Personnel performing QA and QC activities are trained by the team QA manager or designated personnel.

2.4 All training and qualification documentation will be contained within the project files.

2.5 Records of training will be provided by the technical lead and maintained in the project files.

2.6 All management provides retraining when changes in operations or work activities occur.

3.0 Quality Improvement - Criterion 3

The quality improvement process employed by the team is an internal activity not directly charged to any customer program or project. The aim is to improve operations and work processes, thus providing better value to all customers. The continuous quality improvement process embraces the basic concepts and principles of Total Quality Management (TQM). These principles include understanding the customer's requirements and expectations, implementing quality improvement tools, involving all personnel in the improvement process, and measuring the impact of improvements on operations, services, and products.

4.0 Documents and Records - Criterion 4

4.1 Documents

4.1.1 Data packages prepared for the waste characterization project will be controlled by the team document controller in accordance with the requirements of the *Standard Operating Procedures for Quality Assurance Records*

4.2 Records

4.2.1 Quality assurance records generated by the implementation of this QAP consist of the *Quality Control Checklist*. These quality records are controlled and maintained by the team document controller or designated personnel in accordance with the requirements of the *Standard Operating Procedures for Quality Assurance Records.*

4.2.2 Unless otherwise specified by LANL procedures, QA records will be maintained in 1-hour fire-retardant cabinets for the duration of this project.

4.3 The team document controller shall retain the *Quality Control Checklist* as the packages are accepted. Upon completion of work, all records shall be transferred to the LANL project leader.

PERFORMANCE

5.0 Work Processes - Criterion 5

5.1 Work

5.1.1 Quality assurance work instructions describe the QC activities to be performed for the following list of QC inspection and acceptance review (test) activities.

5.1.1.1 Check for proper completion of the *Generator Process Knowledge Interview* and *Waste Profile for Generator Interview* forms.

5.1.1.2 Review the rationale used to determine the RCRA waste code assigned to each waste item.

5.1.1.3 Verify that documents used for the final decision are referenced to or included in the characterization package.

5.1.1.4 Complete a *Quality Control Checklist* for the full characterization for each drum or group of drums.

5.1.2 Technical work instructions describe the work activities to be performed to accomplish characterization of wastes. These work instructions were outlined as applicable in the final LLMW Characterization Plan of October 1993.

5.2 Identification and Control of Items

5.2.1 Items as used in this QAP refer to the documents contained in the characterization packages, and the *Quality Control Checklist*.

5.2.2 These items receive a unique number, code, or other designation for control purposes. The QC checklist attached with each characterization package also receives a unique control number assigned by the QC group.

5.2.3 All items that fall into the category of QA documents and QA records must meet the requirements of Part II, Management, Section 4.0 (Documents and Records).

5.3 Handling, Storing, and Shipping

5.3.1 Items for handling, storing, and shipping include those identified in Section 5.2 of this section of the QAP.

5.4 Calibration and Maintenance of Monitoring and Data Collection Equipment

5.4.1 This section is not required for this QAP because the task performed by the team does not require the use of monitoring and data collection equipment.

6.0 Design - Criterion 6

6.1 Design requirements as applied to this QAP refer to the design of the complete database used to identify the waste characterizations of the drums and groups of drums.

7.0 Procurement - Criterion 7

This section is not required for this QAP because the task performed by the team does not require the procurement of any directly related quality-affecting items or services.

8.0 Inspection and Acceptance Testing - Criterion 8

8.1 Inspection

8.1.1 *Inspection* as used in this QAP refers to performing checks (inspections) of characterization packages containing the *Generator Process Knowledge Interview*, *Waste Profile for Generator Interview*, and *Waste Characterization* forms.

8.1.2 Inspection activities will be performed using the *Quality Control Checklist*. The inspector shall check or inspect to ensure all items required for the characterization are present in the characterization package.

8.2 Acceptance Testing

8.2.1 Acceptance testing as used in this QAP means completing the *Quality Control Checklist* for each characterization package.

8.2.2 Using the checklist, the designated project QC personnel shall accept the characterization package as complete and accurate based on the information and criteria detailed in Section 5.0 of the LLMW Characterization Plan and in Appendixes E and F.

8.2.3 The checklist shall be completed and annotated indicating acceptance of the package.

8.2.4 Rejected packages shall be returned to the responsible management for correction prior to re-submittal for acceptance. This corrective process shall continue until all packages are determined to be acceptable.

8.2.5 Each *Quality Control Checklist* becomes a quality record. These records are filed and maintained per the requirements of Part II, Management, Sections 4.2 and 4.3, of this QAP.

8.3 Measuring and Test Equipment

8.3.1 This section is not required for this QAP because the inspection and acceptance test performed by team personnel does not require the use of any inspection and test equipment.

ASSESSMENT

9.0 Management Assessment - Criterion 9

Program management has determined that management surveillance or audits will not be conducted during this program.

9.1 Team management has established that a series of technical staff assessments will be conducted consisting of periodic reviews of the characterization process to focus on evaluating and improving quality.

9.2 Assessments will be conducted by senior management familiar with the characterization process.

10.0 Independent Assessment - Criterion 10

Independent assessments may be conducted by LANL on a schedule and scope deemed appropriate by LANL.

Appendix B
Data Quality Objectives

To achieve the project objective, the LLMW Characterization Plan will be implemented through three phases of activities: obtaining and analyzing available waste data and information, interviewing waste generators to document process knowledge, and characterizing the wastes. To ensure that project objectives are successfully met, data quality objectives in the form of critical performance steps have been developed. For each critical performance step defined, the required work activities necessary to complete the step have also been identified. The following critical performance steps are to be completed as part of the characterization process:

A. Prepare data packages.

B. Conduct generator interviews.

C. Review available data.

D. Perform waste characterization.

E. Record data in the data management system.

F. Finalize data packages.

Table B-1 summarizes these critical project steps and corresponding work activities.

I. PARCC Parameter Evaluation

The PARCC (precision, accuracy, representativeness, completeness, and comparability) parameters are qualitative and quantitative measures of how well project objectives have been met. The following sections provide a brief discussion of each parameter and its application to the waste characterization project.

1.0 Precision

Precision measures the reproducibility of measurements taken under a given set of conditions. Because of the nature of the waste characterization process, this quantitative measure does not apply to this project.

2.0 Accuracy

Accuracy is determined by measurement against a known standard and thus measures the bias present in a system. In the waste characterization process, the accuracy of process knowledge determination is difficult to estimate. Possible sources for bias include human error caused by recollection and communication difficulties during the interview and completion of waste characterization forms, potentially unavailable LANL information, and errors in the LANL databases, waste management forms, and information sheets. The gathering of accurate KOP through interviews with waste generators is a key element of the waste characterization process. The characterization team must assume that the waste generators providing this information are knowledgeable, trustworthy LANL personnel and that they are the best available personnel to interview to obtain accurate knowledge of that process. Negative effects on quality caused by inaccurate recollection of process information, communication difficulties, and errors during the transfer of data from one source to another will be controlled in the following manner. The completed *Generator Process Knowledge Interview* and *Waste Profile for Generator Interview* forms are subject to LANL review to ensure that generator responses have been accurately recorded by the team member completing the form. Comments returned from LANL will be incorporated into the data package before waste characterization. In addition, the forms are

subject to a quality control review to ensure completeness and consistency. Instructions for checking that waste information has been consistently and accurately transferred from one source to another are presented in the QAP, Appendix A.

To further ensure accuracy and completeness, the team will gather and review relevant and available information on drummed wastes from all possible sources. In addition to obtaining process knowledge through interviews with waste generators, this includes reviewing RCRA codes, historical data, and treatability information concerning the wastes. Because of the nature of this project, it is impossible to determine when sufficient process knowledge has been gathered to meet project objectives. However, the RCRA Characterization Team leader will use best professional judgment to make decisions on a case-by-case basis.

3.0 Representativeness

Representativeness as used in the context of this project expresses the degree to which the information gathered during the waste characterization process accurately represents reality. Representativeness is a qualitative parameter that is ensured through the development and review of the waste characterization process (project design) and the work instructions necessary to perform critical work activities.

4.0 Completeness

The target completeness objective is to provide the required characterization and summary data for all waste drums defined by LANL as being within the scope of this project.

Table B-1 Data Quality Objectives for the Waste Characterization Process

Steps to Accomplish Objective	Activity to Perform Steps
Prepare data packages for each drum or group of identical waste drums by qualified team personnel to ensure that a complete set of approved forms are assembled prior to generator interview.	Access existing LANL databases, generate *Existing Drum Waste Data* form summarizing generator/waste data. Obtain copies of *Chemical Waste Disposal Request* and *Radioactive Solid Waste Disposal Record* from LANL for each waste item. Assemble data package consisting of these records and the *Team Generator Process Knowledge Interview* and *Waste Profile for Generator Interview* forms prepared for each drum or group of identical waste drums.
Conduct LANL generator/contact interview to obtain process knowledge required to accomplish characterization of drum(s).	Identify LANL generator/contact; conduct interview with generator/contact completing *Generator Process Knowledge Interview* and *Waste Profile for Generator Interview* forms according to Work Instruction No. 4, *Completing Waste Characterization Forms*, Appendix A4 to the final LLMW Characterization Plan , October 1993. Provide copy of generator interview forms for LANL review and approval.
Review MSDSs, LANL notes, chemical analysis data, procurement records, process control sheets, and design documents as available to augment process knowledge documented during generator/contact interview, and provide data required to accomplish characterization of drum(s).	Determine availability of additional information for waste items. Contact appropriate LANL source to obtain information; add to data package.
Characterize waste.	Review data gathered in the above steps for completeness and content. In accordance with Work Instruction No. 5, *Characterization Rationale for Assigning RCRA Hazardous Waste Codes*, Appendix A5 to the final LLMW Characterization Plan, October 1993, complete Waste Characterization form. Add forms to data package.
Create data management system for waste characterization process.	Develop data management system; enter data into system; provide hard copy and computer records to LANL.
Finalize waste characterization data packages to summarize process knowledge, clarify drum history, and document characterization performed.	Complete *Quality Control Checklist* to ensure data package completeness; provide completed drum packages to LANL.

5.0 Comparability

Comparability expresses the confidence in which one set of data can be compared to another. Comparability is a qualitative parameter that is ensured by implementation of an approved LLMW Characterization Plan, QAP, and work instructions outlined in the final LLMW Characterization Plan, October 1993.

Appendix C
LANL Waste Management Forms

Existing LANL waste management forms will be copied and incorporated into the data packages for each container or group of containers with wastes generated from like processes. LANL waste management forms, used since 1986, are outlined below.

I. *WASTE PROFILE FORM* (Form No. 1346)

The WPF exhibited in Figure 5-1 is the form used by waste generators to provide initial details on the characteristics of the waste. The generator completes this form based on process knowledge or analysis data. The waste classification is assigned by ES&H-8. If a generator cannot fill out the WPF based on process knowledge or analysis data, ES&H-8 will offer assistance and may request laboratory analysis if necessary.

II. *CHEMICAL WASTE DISPOSAL REQUEST* (Form No. 1541)

The CWDR (Figure 5-2) includes information regarding the number of waste containers, size of waste containers, volume, weight, and a brief description of the waste. CST-7 requires this information before the waste container can be picked up.

III. *RADIOACTIVE SOLID WASTE DISPOSAL RECORD* (Form No. 1354)

Data concerning the radioactive elements of a solid waste are noted on the RSWD (Figure 5-3). Prior to 1991, all that was requested was a notation of the radionuclide expected to be in the waste and the radionuclide content determined by analysis, measurement, or estimation. The current RSWD has added sections to be filled out by CST-7 only. These sections include storage/disposal method, receiving site information, compaction information, disposal/storage location, and data management sign-offs.

IV. *CHEMICAL AND MIXED WASTE OPERATIONS WASTE DATA FORM*

CST-7 has developed this form specific to each drum of mixed waste. It compiles data gathered from the WPFs, CWDRs, and additional CST-7-specific data such as storage code, CST-7 code, and reactivity group number, as well as waste transport and quality control data. This form is generated with specific item information, including EPA code and radioactivity data.

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NATIONAL LABORATORY

WASTE PROFILE FORM

EM-8 USE ONLY
Reference Number

Complete both sides of this form using a black or blue pen. Incomplete forms will be rejected. Send form to ATTN: WPF, MS K490

Division/Group	Telephone	Mail Stop	Technical Area	Building	Room

Method of Characterization
☐ *Knowledge of Process* (KOP) ☐ MSDS attached (optional) -OR- ☐ *Chemical/Physical Analysis* (specify below) ☐ Request for analysis ☐ Analysis attached

Waste Categories (*Choose one or more of the categories below that most accurately describes your waste.*)

☐ Flammable	☐ Pesticide	☐ Photographic	☐ Spent Coolant	☐ Plastics
☐ Combustible	☐ Beryllium	☐ Sanitary	☐ Aerosol cans	☐ Filter media
☐ High Explosive	☐ Asbestos	☐ Radiochemistry	☐ Motor oil	☐ Vacuum filter media
☐ DOT Oxidizer	☐ Solvent	☐ Paint waste	☐ Pump oil	☐ Cement paste
☐ Pyrophoric	☐ Waste rags	☐ Laboratory trash	☐ Capacitor oil	☐ Nonsalvageable
☐ Cyanide	☐ Glass	☐ Metallurgic	☐ UST remediation	☐ Nonrecyclable
☐ Heavy metal	☐ Plating solution	☐ Scrap Metal	☐ Contaminated soils	☐ Building debris
☐ Corrosive	☐ Etchant	☐ Medical/Biological	☐ Environmental/SWMU	☐ Firing site debris

General Description (*Provide a general description of the waste and/or waste-generating process below.*)

_____

_____

Waste Description (*Check only one box in each column.*)

Form	Ignitability (F)	Corrosivity (pH)	Reactivity	PCBs
☐ Solid	☐ < 100°	☐ ≤ 2.0	☐ Unstable	☐ < 50 ppm
☐ Semisolid/sludge	☐ 100° to 139°	☐ 2.1 to 12.4	☐ Water Reactive	☐ 50 to 500 ppm
☐ Absorbed liquid	☐ 139° to 200°	☐ ≥ 12.5	☐ Cyanides	☐ > 500 ppm
☐ Liquid	☐ > 200°	☐ Not aqueous	☐ Sulfides	☐ None
☐ Gas cylinder or vessel	☐ Not ignitable		☐ Shock sensitive	
☐ Multilayered			☐ Class A or B explosive	
☐ Suspended solids			☐ Nonreactive	
☐ Powder or ash				

Waste Origination

A. Is this waste generated in a radiation controlled area? ☐ Yes ☐ No

B. If yes, is the waste generated or accumulated in a properly defined, registered radioactive materials management area (RMMA)? (RMMA # _____) ☐ Yes ☐ No

C. If the answer to question A is yes and you have determined that your waste is nonradioactive, provide justification in the additional comments section on the reverse side of this form.

Radioactivity ☐ Nonradioactive

☐ Suspect ☐ Radioactive

Activity Measure	Radiation Type	
☐ ≤ 2.0 nCi/g	☐ alpha	☐ gamma
☐ >2.0 nCi/g	☐ $t^{1/2}$ < 20 yr	☐ tritium
☐ >10.0 nCi/g	☐ $t^{1/2}$ ≥ 20 yr	
☐ >100.0 nCi/g	☐ beta	

WASTE GENERATOR CERTIFICATION: *Based on my knowledge of the waste and/or chemical/physical analysis, I certify that the information on this form is correct. I understand that this information will be made available to regulatory agencies and that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.*

Waste Generator's Name (last, first, middle)	Z Number	Signature	Date

If your waste management coordinator is the custodian of your waste management documentation, provide the name and mail stop of this person (optional). —>	Name (last, first, middle)	Mail Stop

Form 1346 (9/92) *Complete Reverse Side* ☛ Page 1 of 2

Figure C-1 Laboratory Waste Profile Form

Toxic Metals *(Indicate if any of the following toxic metals are present in your waste at the posted concentrations.)*

arsenic	☐ None	☐ <5.0 ppm	☐ ≥5.0 ppm	☐ TCLP	☐ Other_____
barium	☐ None	☐ <100.0 ppm	☐ ≥100.0 ppm	☐ TCLP	☐ Other_____
cadmium	☐ None	☐ <1.0 ppm	☐ ≥1.0 ppm	☐ TCLP	☐ Other_____
chromium	☐ None	☐ <5.0 ppm	☐ ≥5.0 ppm	☐ TCLP	☐ Other_____
lead	☐ None	☐ <5.0 ppm	☐ ≥5.0 ppm	☐ TCLP	☐ Other_____
mercury	☐ None	☐ <0.2 ppm	☐ ≥0.2 ppm	☐ TCLP	☐ Other_____
nickel	☐ None	☐ <134.0 ppm	☐ ≥134.0 ppm	☐ TCLP	☐ Other_____
selenium	☐ None	☐ <1.0 ppm	☐ ≥1.0 ppm	☐ TCLP	☐ Other_____
silver	☐ None	☐ <5.0 ppm	☐ ≥5.0 ppm	☐ TCLP	☐ Other_____
thallium	☐ None	☐ <130.0 ppm	☐ ≥130.0 ppm	☐ TCLP	☐ Other_____

Organic Compounds *(Indicate if any of the following organic compounds are present in your waste at the posted concenctrations.)*

benzene	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
carbon tetrachloride	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
chlorobenzene	☐ None	☐ <100.0 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
chloroform	☐ None	☐ <6.0 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
cresol	☐ None	☐ <200.0 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
1,4-dichlorobenzene	☐ None	☐ <7.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
1,2-dichloroethane	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
1,1-dichloroethylene	☐ None	☐ <0.7 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
2,4-dinitrotoluene	☐ None	☐ <0.13 ppm	☐ ≥0.13 ppm	☐ TCLP	☐ Other_____
hexachlorobenzene	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
hexachlorobutadiene	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
hexachloroethane	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
methyl ethyl ketone	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
nitrobenzene	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
pentachlorophenol	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
pyridine	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
tetrachloroethylene/perchloroethylene	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
trichloroethylene	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
2,4,5-trichlorophenol	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
2,4,6-trichlorophenol	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____
vinyl chloride	☐ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other_____

Hazardous Constituents *(Identify hazardous constituents for F and K listed wastes and substances causing waste to exhibit a characteristic.)*

_____ _____ _____

_____ _____ _____

_____ _____ _____

Additional Comments *(Provide comments regarding the chemical or radiological nature of the waste.)*

_____

_____

_____

_____

Do Not write in this box - EM-8 use only

Waste Classification

☐ Non-RCRA waste	☐ RCRA-regulated solid waste	☐ RCRA-regulated hazardous waste	☐ Radioactive waste
☐ PCB ☐ non-PCB TSCA waste ☐ asbestos	☐ municipal refuse ☐ nonhazardous chemical waste ☐ administratively controlled waste ☐ non-PCB TSCA waste	☐ hazardous waste ☐ mixed low-level waste ☐ mixed transuranic waste	☐ Radioactive waste

RCRA Code 1	RCRA Code 2	RCRA Code 3	RCRA Code 4	RCRA Code 5	RCRA Code 6	RCRA Code 7	RCRA Code 8

EM-8 Reviewer's Signature	Date	Cost Center/Program Code for Analysis	Reference Number

Page 2 of 2

Figure C-1 Laboratory Waste Profile Form

LOS ALAMOS
NATIONAL LABORATORY

CHEMICAL WASTE DISPOSAL REQUEST (CWDR)

EM-7 USE ONLY
CWDR Identification Number

MAIL TO: CWDR, MAIL STOP J593

THE CHEMICAL AND MIXED WASTE OPERATIONS OF EM-7 WILL NOT PROCESS THIS FORM UNLESS ALL APPLICABLE BOXES HAVE BEEN COMPLETED, APPROPRIATE DOCUMENTS ATTACHED, AND CERTIFICATION STATEMENTS HAVE BEEN SIGNED. ITEM-BY-ITEM INSTRUCTIONS ARE ON THE LAST PAGE OF THIS FORM. CALL 665-4000 FOR ADDITIONAL ASSISTANCE IN COMPLETING THIS FORM.

1. Division/Group	Program Code

	Technical Area	Building	Room
2. Waste Generated At:			
3. Waste Accumulated At:			

4. Area Designation:

Is the waste accumulated at: ☐ Satellite ☐ Less Than 90 Days (*Start Date* ___/___/___) ☐ Other _____

Was the waste generated or accumulated in a Radioactive Materials Management Area *(RMMA)*?	☐ Yes	☐ No
Is waste stored in a security area?	☐ Yes	☐ No
Is waste classified or a property numbered item?	☐ Yes	☐ No
Is waste generated from an environmental restoration project?	☐ Yes	☐ No
If materials are new or unused, has material recycle been tried?	☐ Yes	☐ No
Have waste minimization procedures from Waste Minimization Plan been followed?	☐ Yes	☐ No

List volume of waste reduced to date (*for calendar year*) _____

WASTE GENERATOR CERTIFICATION: I certify that the information on this form is correct. I understand that this information will be made available to regulatory agencies and that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

5. Generator Name *(Print)*		Signature	
Z Number	Telephone	Mail Stop	Date

WASTE MANAGEMENT COORDINATOR CERTIFICATION STATEMENT: My signature certifies that all information on this form has been reviewed and is correct to the best of my knowledge.

6. Waste Coordinator Name *(Print)*		Signature	
Z Number	Telephone	Mail Stop	Date

Form 1541 (11/92)

Figure C-2 Laboratory Chemical Waste Disposal Request Form

7. List all "Spent or "Process" waste(s) requested for pickup below. Attach a WPF for each different waste listed. If you need additional space use the "Spent or Process Waste Continuation Sheet."

ITEM	NUMBER OF CONTAINERS	VOLUME PER CONTAINER	UNIT [1]	GROSS WEIGHT PER CONTAINER	UNIT [2]	TYPE OF CONTAINER [3]	DESCRIPTION OF WASTES AS DESCRIBED IN WPF	WPF NUMBER
A								
B								
C								
D								
E								
F								
G								
H								

REFER TO PAGE 4 FOR DETAILED INSTRUCTIONS

8. List all "New" or "Unused" Chemical(s) requested for pickup below. Itemize below by trade-name product or chemical name. If you need additional space use the "New or Unused Waste Continuation Sheet." If material is listed as a trade-name product, attach Material Safety Data Sheet.

ITEM	NUMBER OF CONTAINERS	VOLUME PER CONTAINER	UNIT [1]	GROSS WEIGHT PER CONTAINER	UNIT [2]	COMPOUND OR PRODUCT NAME	WASTE FORM [4]					
							S	L	G	FS	A	P
01												
02												
03												
04												
05												
06												
07												
08												
09												
10												
11												
12												
13												
14												
15												
16												
17												

[1] Units for Volume:
G = Gallons
L = Liters
F = Cubic Feet
M = Cubic Meters
ML = Milliliters
FL = Fluid Ounce
P = Pint

[2] Units for Weight:
P = Pounds
K = Kilograms
GR = Grams
OZ = Ounce

[3] Type of Container:
DM = Metal Drum
TP = Portable Tank
CY = Cylinder
CF = Fiber or Plastic Box
BG = Glass Bottle or Container
O = Other Specify _____
DF = Fiber or Plastic Drum
DT = Dump Truck
CW = Wooden Box
BP = Plastic Bottle or Container
PB = Plastic Bag

[4] Waste Form:
S = Solid
L = Liquid
G = Gas
FS = Factory Sealed
A = Aerosol
P = Powder or Ash

Page 2 of 4

Figure C-2 Laboratory Chemical Waste Disposal Request Form

9. If any items in block 7 or 8 are suspect radioactive or radioactive:
Provide radioactive data for each item with the corresponding item letter or number.
Refer to page 4 for detailed instructions.

ITEM	RADIONUCLIDE	AMOUNT	UNITS (S)*	UNCERTAINTY (%)	METHOD+	DOSE RATE**
Example 1	H 3	. E +/-		%		. E +/-
Example 2	U 2 3 8	1 . 6 2 E +/- 0 4	C	10 %	C	5 . 0 0 E +/- 0 1
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-
		. E +/-		%		. E +/-

*Units: C = Curies M = Grams
NOTE: nCi/g is not an acceptable unit

+ Methods: A = Analysis M = Measurement
C = Calculated E = Estimated

** Dose Rate: Contact dose rate in mR/hr

GENERAL INSTRUCTIONS FOR COMPLETING THE CWDR FORM

The CWDR form is available from your Waste Management Coordinator (WMC) or by requesting forms from EM-7 at 665-4000. **Photocopies of this form WILL NOT be accepted.** All information must be typed or printed in blue or black ink. Incomplete information or missing signatures will delay waste disposal. If there are any discrepancies or inconsistencies, the form will be returned to your WMC for assistance in correcting the problems. If you need additional assistance in completing this form, contact your WMC. Call EM-7 at 665-4000 for further clarification.

INSTRUCTIONS FOR THE WASTE GENERATOR

Complete ALL sections on pages 1 and the applicable section(s) on page 2. Use page 3 for applicable radionuclide information for any waste listed on page 2.

SECTION 1. Name of division/group requesting disposal of waste and program code for tracking purposes.

SECTION 2. Location where waste was generated.

SECTION 3. Location where waste is accumulated.

SECTION 4. Area Designation:
Answer all the questions about the area where the waste is generated or accumulated. For further assistance in waste minimization, recycling, and waste reduction, call Waste Minimization at 665-8293.

SECTION 5. Provide all the information requested. Read the "Generator Certification" statement before signing it.

SECTION 6. To be completed by your WMC.

SECTION 7. "Spent" or "Process" waste are those materials that have been used, and as a result of that use, have become contaminated by physical or chemical impurities and can no longer serve the purpose for which they were intended. Acceptable units and type of containers are listed in the footnotes on the bottom of page 2 of 4 (use ONLY the choices given). For any waste listed in this section a Waste Profile Form (WPF) is required. If you need additional space, use the "Spent or Process Waste Continuation Sheet." (The "Spent or Process Waste Continuation Sheet" may be photocopied).

NOTE: The first time disposal is requested on a waste stream, the original WPF must be attached to the CWDR. Keep a photocopy for your records. Turnaround time for future waste pick-ups referencing the same WPF can be improved if a copy of the WPF is attached with each CWDR.

SECTION 8. A "New" or "Unused" chemical is a product either in its original container or in a secondary container that has not been used, changed, or contaminated by any process. A chemical or trade-name product that has been partially used and has not been altered or had materials added also meets this definition. Attach an MSDS to this form if the item is a trade-name product. Acceptable units and hazard codes are listed in footnotes on the bottom of page 2 of 4 (use ONLY the choices given). If you need additional space, use the "New or Unused Waste Continuation Sheet." (The "New or Unused Waste Continuation Sheet" may be photocopied).

SECTION 9. If any waste listed in section 7 or 8 is radioactive or suspect radioactive, provide the radionuclide information in this section. Reference the listed item in section 7 or 8 with the item in section 9. Footnotes are explained on the bottom of page 3 of 4.

NOTE: Waste generated and/or accumulated in an RMMA is considered, at miminum, suspect radioactive. Refer to AR 10-3 for definitions of "suspect" radioactive and RMMA. If a waste is suspect radioactive, only the "radionuclide" is required to be listed with no amount (see example 1).

For radioactive waste, include all the required information. Enter the information accurately in relation to the decimal points. Do not alter the decimal point positions (see example 2).

Submit the CWDR and all applicable documents to your WMC for review. Consult your WMC for procedures about disposal of classified or property numbered items. Keep a photocopy of this request and any attachments for your files.

INSTRUCTIONS FOR THE WASTE MANAGEMENT COORDINATOR

1. Review and verify "to the best of my knowledge" that all the required information has been provided and is correct.

2. Provide the information requested in section 6.

3. Make photocopies for your files of all forms and attachments being sent to EM-7.

4. Mail the CWDR and all other applicable documents to EM-7, MS J593.

5. If you need clarification, call EM-7 at 665-4000.

Figure C-2 Laboratory Chemical Waste Disposal Request Form

LOS ALAMOS
NATIONAL LABORATORY

EM-7 USE ONLY

RADIOACTIVE SOLID WASTE DISPOSAL (RSWD) RECORD
APPLICATION FOR STORAGE/DISPOSAL

Date
Group
Technical Area
Building
Return Mail Stop

INSTRUCTIONS

1. Read and follow detailed instructions on last page.
2. For further assistance contact your Waste Management Coordinator.
3. Send completed form to "LLW Reviewer," EM-7, MS J595, for approval.

Figure C-3 Laboratory Radioactive Solid Waste Disposal Record

EM-7 USE ONLY

1. Waste Originator Information

Date (MM,DD,YY)	Group	TA	Building	Wing	Mail Stop	Telephone	Certified WS No.

Generator No.	Waste Stream No.	Cost Code	Program Code	WMC No.

2. Waste Characterization and Packaging Information

Waste Profile Request No. | Hazardous Materials Transfer Form HM No. | Waste Code | ☐ Actual Rad ☐ Suspect Rad ☐ Mixed Waste ☐ Non-Rad

Total Waste Volume | ☐ Meters^3 ☐ Feet^3 ☐ Gallons | Estimated Weight | ☐ Kilograms ☐ Pounds ☐ Tons | Serial No. | Is this a dumpster? ☐ Yes ☐ No If yes, ☐ Compactible ☐ Non-Compactible Dumpster No.

Waste Description

Radiation Exposure Rate | ☐ R/hr ☐ mR/hr

C & D Form Numbers

Comments

Package Codes* 01 - Bulk (unpackaged)	Package Code*	Package Volume (Individual Package)	Volume Units**	Number of Packages	Total Vol. of Package Type (Pkg. Vol. X No. of Pkgs.)	Volume Units**
02 - Wooden crate						
03 - Drum						
04 - Cardboard box						
05 - Plastic bag						
06 - Steel box						
07 - Sheet cask						
08 - Other (specify below)						

Volume Units**: M = Meters^3, F = Feet^3, G = Gallons

Radionuclide	Amount			Units+	Uncertainty		Method++	SS Acct.	Proj. Code
		E	+/-		+/-	%			
		E	+/-		+/-	%			
		E	+/-		+/-	%			
		E	+/-		+/-	%			
		E	+/-		+/-	%			
		E	+/-		+/-	%			
		E	+/-		+/-	%			
		E	+/-		+/-	%			

+Units: C = Curies M = Grams

++Methods: A = Analysis M = Measurement C = Calculation E = Estimation

3. Waste Certification

GENERATOR CERTIFICATION STATEMENT: My signature certifies that the waste is as described here and on the attached Waste Profile Request form. Waste meets all applicable acceptance and storage or disposal criteria listed in Administrative Requirement 10-2, "Low-Level Radioactive Solid Waste," and in "Waste Acceptance Criteria for Low-Level Radioactive Waste Disposal at TA-54, Area G."

Generator's Name (Print)	Signature	Z Number	Date

WASTE MANAGEMENT COORDINATOR STATEMENT: My signature certifies that all information on this form has been reviewed and is correct to the best of my knowledge.

Waste Management Coordinator's Name (Print)	Signature	Z Number	Date

Figure C-3 Laboratory Radioactive Solid Waste Disposal Record

This Page For EM-7 Use Only	EM-7 USE ONLY

4. EM-7 Approval (*No waste can be accepted without approval signature*)

EM-7 APPROVAL STATEMENT: My signature certifies that the waste described on this application is acceptable, AS DESCRIBED, for storage or disposal by EM-7.

EM-7 Approver's Name (*Print or Stamp*)	Signature	Date Approved

Disposition

- ☐ MAP Shaft
- ☐ Be Shaft
- ☐ PCB Shaft
- ☐ MW Storage Shaft
- ☐ Other _____
- ☐ Low-Level H3 Shaft
- ☐ High-Level H3 Shaft
- ☐ Animal Tissue Shaft
- ☐ MFP Shaft
- ☐ HEPA Filter Shaft
- ☐ Source Shaft
- ☐ Powder Shaft
- ☐ Holding Shed
- ☐ MW H3 Shed
- ☐ Compactor
- ☐ LLW Pit
- ☐ Asbestos Pit
- ☐ MW Storage Dome
- ☐ Certifiable TRU Dome
- ☐ Uncertified TRU Storage

5. Receiving Site Information

Date Waste Received	(*MM,DD,YY*)
Actual Volume	☐ Meters^3 ☐ Feet^3 ☐ Gallons
Gross Weight (lbs)	
Tare Weight (-)	
Net Weight	

Vehicle Code

- ☐ Dumpster (01)
- ☐ Dump truck (02)
- ☐ Flatbed (03)
- ☐ Pickup (04)
- ☐ Shield cask (05)
- ☐ EM-7 truck (06)
- ☐ Other (*specify below*) (07) _____

Treatment Code

- ☐ Compaction (01)
- ☐ Incineration (02)
- ☐ Other (03)
- ☐ None (04)

Exposure Rate Contact _____ mR/hr

Exposure Rate at 1 Meter _____ mR/hr

Number of RSWDs on this load _____

Driver's Signature	HS-1 Monitor's Signature (*TA-54*)	Non-Conformance? ☐ No ☐ Yes	Non-Conformance Report No.

6. Compaction Information

Bale No.	Compaction Date	Bale Volume (M^3)	Comments
	(*MM,DD,YY*)		

7. Disposal Location Information

Disposal Date	Area	Shaft	Pit	Transit Sequence No.	Post(s)	Layer	Position
(*MM,DD,YY*)							

8. Storage Location Information

Storage Date	Area	Shaft	Building	Column	Layer	Row	Pad	Post(s)	Layer	Position
(*MM,DD,YY*)										

9. Director of Disposal Operations

DIRECTOR OF DISPOSAL OPERATIONS CERTIFICATION: My signature certifies that all waste receiving, storage, and/or disposal requirements were met.

Director of Disposal or Storage Operations (*Print*)	Signature	Date

Screened Paperwork (*Initial*)	
Supervised Disposal (*Initial*)	

10. Data Management Information

Date Entered in Logbook	Date Entered in Database	Date Entry Verified
(*MM,DD,YY*)	(*MM,DD,YY*)	(*MM,DD,YY*)
Initial	Initial	Initial

Figure C-3 Laboratory Radioactive Solid Waste Disposal Record

INSTRUCTIONS FOR COMPLETING APPLICATION

Filling out the application. The waste generator must complete all sections on the front sheet and on page 1 of this application to document the nature of all waste disposed of or stored at TA-54, Area G. Be sure to complete each section before proceeding to the next. Print all information legibly in ink; illegible information will result in disapproval of the application and will delay the shipment of your waste. Do not use correction fluid. Make all corrections by marking out the incorrect information with a single line, initializing the change, and adding the correct information. Do not change any documents or forms (including the Waste Profile Request [WPR] form and the Radioactive Solid Waste Disposal [RSWD] Record) after they have been approved.

NOTE: These instructions apply only to low-level radioactive solid waste (LLW). For mixed waste, please call the Chemical and Mixed Waste Operations Section of EM-7 at 7-7579.

RSWD APPLICATION PROCESS

1. The waste generator obtains this application from his/her waste management coordinator (WMC) and completes all sections on the cover sheet and on page 1.
2. The waste generator signs the certification statement in section 3 and delivers the completed application to his/her WMC.
3. The WMC reviews and signs the application and then forwards the application to the EM-7 LLW Reviewer at MS J595 for approval.
4. EM-7 reviews the application. If it is approved, EM-7 returns it to the WMC, who delivers the application to the generator and assists in arranging for transportation of the waste. If the application is disapproved, EM-7 contacts the WMC to determine how best to correct the discrepancies.
5. RSWD approval is good for six months. If six months has elapsed and the waste has not been shipped, a new application must be prepared.

NOTE: For waste to be accepted at TA-54, Area G, each shipment must be accompanied by (at a minimum) an approved RSWD Record, a current completed and signed WPR, and a Hazardous Materials Transfer Form (available from the Packaging and Transportation Group of the Materials Management [MAT] Division). See AR 10-2, "Low-Level Radioactive Solid Waste," for further details.

INSTRUCTIONS FOR WASTE GENERATOR

1. Do not use more than the alloted spaces on the application.
2. Print legibly.
3. Note where decimal point positions are indicted. Enter information accurately in relation to these decimal points. *Do not alter decimal point positions.*
4. Use the number zero on the application *ONLY* for entries requiring that numerical designation. *Do not use zeros to fill blank spaces.*
5. When the amount of information available for a waste load is greater than the space available on one application, use additional applications.
6. When code numbers or letters are requested, choose the appropriate code from the list of current waste codes supplied by EM-7 (contact your WMC for assistance).
7. Where boxes are to be checked, use an *X* and be sure each box is clearly marked.
8. Sign the application.
9. Attach a photocopy of the approved WPR for this waste (keep the original WPR in your files).
   NOTE: If personnel other than those in EM-8 change a WPR, the RSWD data package will be disapproved.
10. See detailed instructions for completing the technical information.

INSTRUCTIONS FOR WASTE MANAGEMENT COORDINATOR

1. Review the information on this application that the generator provides.
2. Verify that all required information has been provided and is in the proper format (that is, decimal locations and field lengths are observed).
3. Verify that "*to the best of your knowledge*" the information provided is correct.
4. Sign the application.
5. Forward the application to EM-7 for approval.
6. When the approved application is returned to you, assist the waste generator in arranging for transportation of the waste. If the application has been disapproved, relay to the waste generator the reasons for disapproval and aid in correcting the problems(s).
7. If you have any questions or need help, call EM-7 at 5-WAST.

Appendix D
LLMW Knowledge of Process Interview Forms

The following are descriptions of the project-specific forms.

I. *EXISTING DRUM WASTE DATA*

This form (Figure D-1) relays information on data currently present in the LANL database. This form is computer-generated and contains information specific to the waste in a container or group of containers with wastes generated from like processes. The information on this form is reviewed with the generator during the interview.

II. *GENERATOR PROCESS KNOWLEDGE INTERVIEW*

This form (Figure D-2) is completed by KOP interviewing team members during the interviews with the generators and consists of six pages of questions used to gather the information necessary to characterize the wastes to meet RCRA requirements and to identify information to assist in evaluating treatment options.

III. *WASTE PROFILE FOR GENERATOR INTERVIEW*

This form (Figure D-3) is completed by team members during the generator interview only for those waste items for which a LANL WPF does not exist. The questions contained on this two-page form provide additional information necessary to complete characterization of the wastes and augment the *Generator Process Knowledge Interview* form. If available, the LANL WPFs are used in place of the *Waste Profile for Generator Interview* form.

LOS ALAMOS
NATIONAL LABORATORY

Container ID

EXISTING DRUM WASTE DATA

Generator	Generator Z No.	Generator ID (CWDR)

Division/Group	Telephone	Mail Stop	Technical Area	Building	Room

Item No.	WPF No.	Waste Item Description	Storage Code	Reactivity Group No.	Gross Vol.	Vol. Units	Gross Weight	Weight Units	RCRA Code(s)

*☐ Information has been reviewed with generator.

Interviewer _____ Date _____

Form DB-1(2/93) page ___ of ___

Figure D-1 Existing Drum Waste Data Form

LOS ALAMOS
NATIONAL LABORATORY

GENERATOR PROCESS KNOWLEDGE INTERVIEW

Container ID
Item Number(s)

1. Waste Item Description

2. Person Interviewed/Z Number		Telephone
Date of Interview	Time of Interview	Type of Interview Phone ☐ In Person ☐

3. General description of the waste-generating process

4. Waste Generation Process Block Flow Diagram (if necessary for clarification)

☐ Not Applicable

5. Is additional process information available? ☐ Yes (Please check below) ☐ No ☐ Unknown

☐ Mass balance ☐ Unit operations ☐ Design documents ☐ Other (specify)_____

	Print name	Signature	Date
Prepared by			
Reviewed by			

Form GI-1(Rev. 3/93) page 1 of 6

Figure D-2 Generator Process Knowledge Interview Form

LOS ALAMOS
NATIONAL LABORATORY

Container ID
Item Number(s)

GENERATOR PROCESS KNOWLEDGE INTERVIEW

6. What are the chemical constituents and approximate composition (%) of each constituent in the waste?

_____

_____

_____

_____

_____

_____

_____

_____

_____

7. Waste Information

Is the item wastewater treatment sludge?	☐ Yes	☐ No	☐ Unknown
Is the item an unused chemical?	☐ Yes	☐ No	☐ Unknown
Is the item a spill residue?	☐ Yes	☐ No	☐ Unknown
Was the item used for its solvent properties?	☐ Yes	☐ No	☐ Unknown
Was the item used as part of a degreasing process?	☐ Yes	☐ No	☐ Unknown

8. How was the waste packaged?

☐ Containerized ☐ Bulk ☐ Unknown

9. If the wastes were packed in containers, please answer the following:

A. Was the waste packed in a manner that you would expect the waste to still be in the container?

☐ Yes ☐ No ☐ Unknown

Please explain: _____

_____

_____

B. Was the container in good condition (e.g., no cracks, rust, broken lids, etc.)?

☐ Yes ☐ No ☐ Unknown

Please explain: _____

_____

_____

Prepared by _____ _____
Initials Date

Reviewed by _____ _____
Initials Date

Form GI-1 (Rev. 3/93) page 2 of 6

Figure D-2 Generator Process Knowledge Interview Form

LOS ALAMOS
NATIONAL LABORATORY

Container ID
Item Number(s)

GENERATOR PROCESS KNOWLEDGE INTERVIEW

10. If the waste was packed in containers complete this section.
Paint a picture of the packaging procedure. Detail the types of primary containers, size of primary containers, covers, caps, lids, seals, tape were used on the containers.

Types of Containers:
- Glass containers or bottles
- Plastic containers or bottles
- Metal containers or bottles
- Plastic boxes
- Cardboard or wood boxes
- Lead boxes
- Plastic bags
- Paper bags
- Other (specify)

Was there free space in the container? (explain)

Was the waste compacted? (explain)

Was fill material (e.g., vermiculite, clay) used? (explain)

Prepared by _____ Initials _____ Date

Reviewed by _____ Initials _____ Date

Form GI-1 (Rev. 3/93) page 3 of 6

Figure D-2 Generator Process Knowledge Interview Form

LOS ALAMOS
NATIONAL LABORATORY

Container ID
Item Number(s)

GENERATOR PROCESS KNOWLEDGE INTERVIEW

11. If you packed the wastes into the drum, paint a picture of how the waste was packaged into the drum. Detail types of containers, size of containers, order of placement, etc.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Was there free space in the drum? (explain)

_____

_____

_____

Was the waste compacted? (explain)

_____

_____

_____

Was fill material (e.g., vermiculite, clay) used? (explain)

_____

_____

_____

Was the drum overpacked? (explain)

_____

_____

_____

Prepared by _____ _____
Initials Date

Reviewed by _____ _____
Initials Date

Form: GI-1 (Rev. 3/93) page 4 of 6

Figure D-2 Generator Process Knowledge Interview Form

LOS ALAMOS
NATIONAL LABORATORY

Container ID
Item Number(s)

GENERATOR PROCESS KNOWLEDGE INTERVIEW

12. In addition to the noted waste in the drums, is there a potential that other physical items (e.g., metal tools, trash, etc.) are in the drum?

☐ Yes (specify) ☐ No ☐ Unknown

13. Waste Origination

Was the waste generated in a radiation controlled area? ☐ Yes ☐ No ☐ Unknown

If yes, is the waste generated or accumulated in a properly defined, registered radioactive materials management area (RMMA)? ☐ Yes ☐ No ☐ Unknown

RMMA # _____ WPF # _____

Radioactive Waste Handling

☐ Contact handled
☐ Remote handled
☐ Alpha wastes
☐ Unknown

14. What radioactive isotopes, if any, were present in this process?

15. Is there any other radiological information available?

☐ Yes (specify) ☐ No ☐ Unknown

16. Is additional information available? ☐ Yes (Please check below) ☐ No ☐ Unknown

☐ MSDS ☐ Laboratory notes ☐ Chemical analysis ☐ Procurement records

☐ Process control sheets ☐ Other (Specify) _____

Prepared by _____ _____
Initials Date

Reviewed by _____ _____
Initials Date

Form GI-1 (Rev 3-93) page 5 of 6

Figure D-2 Generator Process Knowledge Interview Form

LOS ALAMOS
NATIONAL LABORATORY

Container ID
Item Number(s)

GENERATOR PROCESS KNOWLEDGE INTERVIEW

17. Are there additional personnel that assisted in the generation of this waste and that are more knowledgeable about certain aspects of this waste than you are?

☐ Yes ☐ No Name _____

Telephone Number _____

What aspect (e.g., packaging, rads, analytical information, etc.) of the waste?

_____

_____

_____

18. Does a Laboratory Waste Profile Form exist?

Yes ☐ No ☐

If NO, please complete a Waste Profile For Generator Interview Form.
If YES, what is the WPF No. _____.
If YES, please review Waste Profile Form with generator and initial: _____

19. If the database or CWDR do not identify the volume and/or weight of the waste items, please estimate one or both of these values for each waste item.

_____

_____

_____

_____

_____

_____

_____

20. Additional Generator Comments:

Prepared by _____ _____
Initials Date

Reviewed by _____ _____
Initials Date

Form G1-1 (Rev. 2/93) page 6 of 6

Figure D-2 Generator Process Knowledge Interview Form

LOS ALAMOS
NATIONAL LABORATORY

Container ID
Item Number(s)

WASTE PROFILE FOR GENERATOR INTERVIEW

1. Waste Item Description

2. Generator's Description of Waste

Form	Flashpoint (°F)	pH	Reactivity	PCBs
☐ Solid	☐ < 100°	☐ 2.0 or less	☐ Unstable	☐ < 50 ppm
☐ Semisolid/sludge	☐ 100° to 139°	☐ 2.1 to 12.4	☐ Water reactive	☐ 50 to 500 ppm
☐ Absorbed liquid	☐ 140° to 200°	☐ 12.5 or greater	☐ Cyanides	☐ > 500 ppm
☐ Liquid	☐ > 200°	☐ Not aqueous	☐ Sulfides	☐ None
☐ Gas cylinder or vessel	☐ Not ignitable	☐ Unknown	☐ Shock sensitive	☐ Suspect
☐ Multilayered	☐ Unknown		☐ Class A or B explosive	☐ Unknown
☐ Suspended solids			☐ Nonreactive	
☐ Powder or ash			☐ Unknown	
☐ Unknown				

3. Waste Radioactivity

Radioactivity	Activity Measure	Radiation Type	Half-Life
☐ Nonradioactive	☐ ≤ 2.0 nCi/g	☐ alpha →	☐ $t^{1/2}$ < 20 yr
☐ Radioactive	☐ > 2.0 nCi/g	☐ beta →	☐ $t^{1/2}$ ≥ 20 yr
☐ Suspect	☐ > 10.0 nCi/g	☐ gamma	☐ Unknown
☐ Unknown	☐ > 100 nCi/g	☐ tritium	
		☐ Unknown	

4. Does the waste contain metals? If yes, please estimate the concentration.

Arsenic	Yes ☐	No ☐	< 5.0 ppm ☐	≥ 5.0 ppm ☐	Unknown ☐
Barium	Yes ☐	No ☐	< 100.0 ppm ☐	≥ 100.0 ppm ☐	Unknown ☐
Cadmium	Yes ☐	No ☐	< 1.0 ppm ☐	≥ 1.0 ppm ☐	Unknown ☐
Chromium	Yes ☐	No ☐	< 5.0 ppm ☐	≥ 5.0 ppm ☐	Unknown ☐
Lead	Yes ☐	No ☐	< 5.0 ppm ☐	≥ 5.0 ppm ☐	Unknown ☐
Mercury	Yes ☐	No ☐	< 0.2 ppm ☐	≥ 0.2 ppm ☐	Unknown ☐
Nickel	Yes ☐	No ☐	< 134.0 ppm ☐	≥ 134.0 ppm ☐	Unknown ☐
Selenium	Yes ☐	No ☐	< 1.0 ppm ☐	≥ 1.0 ppm ☐	Unknown ☐
Silver	Yes ☐	No ☐	< 5.0 ppm ☐	≥ 5.0 ppm ☐	Unknown ☐
Thallium	Yes ☐	No ☐	< 130.0 ppm ☐	≥ 130.0 ppm ☐	Unknown ☐

Other _____ Estimated concentration _____

Prepared by _____ Print name _____ Signature _____ Date

Reviewed by _____ Print name _____ Signature _____ Date

Form GI-2 (Rev. 3/93) page 1 of 2

Figure D-3 Waste Profile for Generator Interview Form

LOS ALAMOS
NATIONAL LABORATORY

Container ID
Item Number(s)

WASTE PROFILE FOR GENERATOR INTERVIEW

5. Does the waste contain any of the following chlorinated organic chemicals? If yes, please estimate the concentration.

Carbon tetrachloride	Yes ☐	No ☐	< 0.5 ppm ☐	≥ 0.5 ppm ☐	Unknown ☐
Chlorobenzene	Yes ☐	No ☐	< 100.0 ppm ☐	≥ 100.0 ppm ☐	Unknown ☐
Chloroform	Yes ☐	No ☐	< 6.0 ppm ☐	≥ 6.0 ppm ☐	Unknown ☐
1,4-dichlorobenzene	Yes ☐	No ☐	< 7.5 ppm ☐	≥ 7.5 ppm ☐	Unknown ☐
1,2-dichloroethane	Yes ☐	No ☐	< 0.5 ppm ☐	≥ 0.5 ppm ☐	Unknown ☐
1,1-dichloroethylene	Yes ☐	No ☐	< 0.7 ppm ☐	≥ 0.7 ppm ☐	Unknown ☐
Hexachlorobenzene	Yes ☐	No ☐	< 0.13 ppm ☐	≥ 0.13 ppm ☐	Unknown ☐
Hexachlorobutadiene	Yes ☐	No ☐	< 0.5 ppm ☐	≥ 0.5 ppm ☐	Unknown ☐
Hexachloroethane	Yes ☐	No ☐	< 3.0 ppm ☐	≥ 3.0 ppm ☐	Unknown ☐
Pentachlorophenol	Yes ☐	No ☐	< 100.0 ppm ☐	≥ 100.0 ppm ☐	Unknown ☐
Tetrachloroethylene	Yes ☐	No ☐	< 0.7 ppm ☐	≥ 0.7 ppm ☐	Unknown ☐
Trichloroethylene	Yes ☐	No ☐	< 0.5 ppm ☐	≥ 0.5 ppm ☐	Unknown ☐
2,4,5-trichlorophenol	Yes ☐	No ☐	< 400.0 ppm ☐	≥ 400.0 ppm ☐	Unknown ☐
2,4,6-trichlorophenol	Yes ☐	No ☐	< 2.0 ppm ☐	≥ 2.0 ppm ☐	Unknown ☐
Vinyl chloride	Yes ☐	No ☐	< 0.2 ppm ☐	≥ 0.2 ppm ☐	Unknown ☐

6. Does the waste contain any of the following organics? If yes, please estimate the concentration.

Benzene	Yes ☐	No ☐	< 0.5 ppm ☐	≥ 0.5 ppm ☐	Unknown ☐
Cresol	Yes ☐	No ☐	< 200.0 ppm ☐	≥ 200.0 ppm ☐	Unknown ☐
2,4-dinitrotoluene	Yes ☐	No ☐	< 0.13 ppm ☐	≥ 0.13 ppm ☐	Unknown ☐
Methyl ethyl ketone	Yes ☐	No ☐	< 200.0 ppm ☐	≥ 200.0 ppm ☐	Unknown ☐
Nitrobenzene	Yes ☐	No ☐	< 2.0 ppm ☐	≥ 2.0 ppm ☐	Unknown ☐
Pyridine	Yes ☐	No ☐	< 5.0 ppm ☐	≥ 5.0 ppm ☐	Unknown ☐

Prepared by _____ _____
Initials Date

Reviewed by _____ _____
Initials Date

Form GI-2 2 93 page 2 of 2

Figure D-3 Waste Profile for Generator Interview Form

Appendix E
LLMW Characterization Forms and Methodology

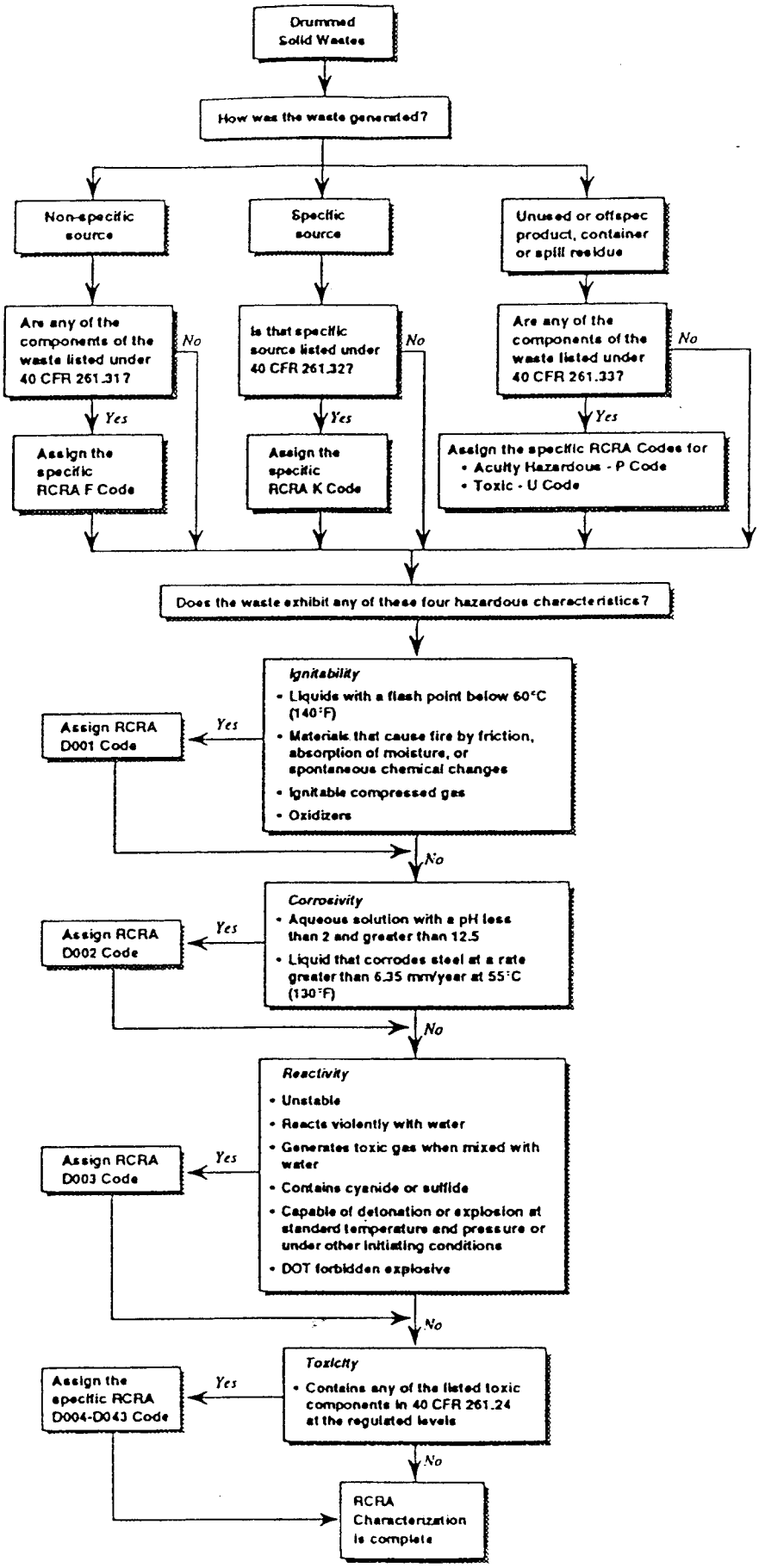

Figure E-1 Assignment of RCRA Hazardous Waste Codes

LOS ALAMOS
NATIONAL LABORATORY

Container ID

WASTE CHARACTERIZATION

Item No. _____ Waste Item Description _____

RCRA Hazardous Waste Code(s):

Code	Rationale

DOE Mixed Waste Treatability Code _____

Rationale _____

Item No. _____ Waste Item Description _____

RCRA Hazardous Waste Code(s):

Code	Rationale

DOE Mixed Waste Treatability Code _____

Rationale _____

Item No. _____ Waste Item Description _____

RCRA Hazardous Waste Code(s):

Code	Rationale

DOE Mixed Waste Treatability Code _____

Rationale _____

Continued on Waste Characterization Supplemental Form ☐

Prepared by _____ Print name _____ Signature _____ Date

Reviewed by _____ Print name _____ Signature _____ Date

Form WC-1 (Rev.6/93) page 1 of ____

Figure E-2 WasteCharacterization Form

LOS ALAMOS
NATIONAL LABORATORY

Container ID

WASTE CHARACTERIZATION SUPPLEMENTAL FORM

Item No. _____ Waste Item Description _____

RCRA Hazardous Waste Code(s):

Code	Rationale

DOE Mixed Waste Treatability Code _____

Rationale _____

Item No. _____ Waste Item Description _____

RCRA Hazardous Waste Code(s):

Code	Rationale

DOE Mixed Waste Treatability Code _____

Rationale _____

Item No. _____ Waste Item Description _____

RCRA Hazardous Waste Code(s):

Code	Rationale

DOE Mixed Waste Treatability Code _____

Rationale _____

Prepared by _____ _____ _____
Print name Signature Date

Reviewed by _____ _____ _____
Print name Signature Date

Form WC-1 (Rev 6 93) page ___ of ___

Figure E-2 WasteCharacterization Form

Appendix F
DOE Mixed Waste Treatability Codes

LANL has provided the LLMW characterization team with mixed waste characterization codes that are used by DOE facilities to further characterize wastes. These treatability codes were developed for the DOE Mixed Waste Treatment Project for use in classifying wastes for planning and waste management operations. The drummed LLMW at LANL will be characterized according to these mixed waste treatability codes. One code will be assigned to each item within a drum.

The waste descriptions are divided into nine major classes (Figure F-1). The major categoris are the following:

1000	aqueous liquid wastes
2000	organic liquids
3000	solid process residues
4000	soils
5000	debris wastes
6000	special wastes
7000	inherently hazardous wastes
8000	unknown wastes
9000	treated wastes.

Table F-1 further describes the waste categories and subcategories. The wastes will be classified into these mixed waste treatability codes by trained members of the characterization team. The project-specific *Waste Characterization Form* (Figure E-2) will be used by the characterization team to identify the code that best describes the drummed waste. The rationale for assigning the treatability code will also be summarized on this form.

According to DOE, most liquid wastes (1000s and 2000s) and solid process residues (3000s) are generated routinely from process operations and are subject to all RCRA regulations. They are generally homogeneous within a specific waste stream; however, it has been reported within other DOE facilities that other foreign materials such as a failed pump may have been included within process waste drums. Soils (4000s) are to be the subject of a future regulation and will likely be further subdivided at that time. Debris materials (5000 codes), as classified by the EPA, do not need characterization before processing because of their heterogeneity and the difficulty in characterization. The debris materials must only be treated by an appropriate technology and the process residues being included in the appropriate process residue categories. The regulations specify that debris must be solid materials with an average particle size larger than 60 millimeters. Debris are materials that 1) have been originally manufactured or processed (such as tanks, pipes, vales, scrap metal, appliances, paper, plastic rubber, glass, concrete, brick, and crushed drums); 2) are plant or animal matter; or 3) are natural geologic materials. Debris can be an inseparable mixture of such materials with soil, liquid, sludge, or other solid waste materials, but the debris must be more than 50 percent of the total material. Debris cannot be process residuals (1000s and 2000s above).Special wastes (6000s) are those that need specific treatment or are not currently considered in the DOE Mixed Waste Treatment Project because of safety or regulatory concerns. Inherently hazardous wastes (7000s) are those that can be treated to remove the contamination. If very low-level radioactive materials become releasable for general use, the first objective is to recycle these materials for use within DOE or for use in general commerce . Unknown wastes (8000s) are those wastes that cannot be reasonably included into a specific waste category because of lack of information on that stream. The treated wastes (9000s) will result from the treatment processes and should be suitable for disposal.

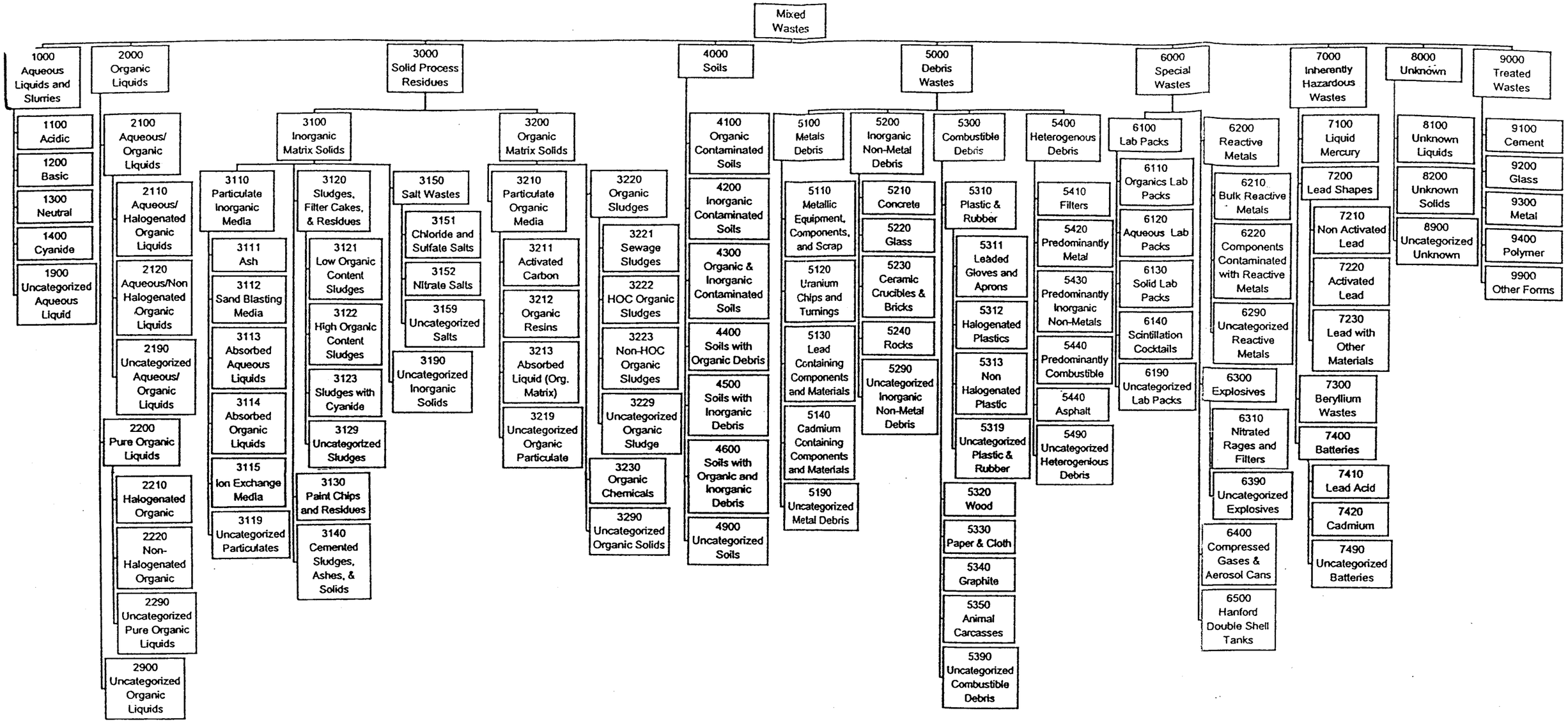

Figure F-1 LLL Mixed Waste Treatability Codes

Table F-1 DOE Mixed Waste Treatability Codes

Code Number	Title	Description	Treatment Concern
1000	Aqueous Liquids and Slurries	Aqueous solutions or slurries that have less than 1% organic content. Solids must be pumpable, but can comprise up to 35-40% of the mass.	
1100	Acidic	These solutions have a pH less than 2 and a RCRA code of D002. Principle sources of these wastes are general wastewaters, plating line solutions, and electropolishing activities.	The acid nature of the wastes.
1200	Basic	These are solutions with a pH greater than 12.5 and a RCRA code of D002. They are generated from a variety of activities, and can result from neutralization of acidic streams.	The basic nature of the wastes.
1300	Neutral	These are solutions with a pH between 2 and 12.5. Evaporator condensate is a typical stream.	
1400	Cyanide	Any stream that contains cyanide as a significant component. Solutions will generally be basic.	Cyanide gas generation.
1900	Uncategorized Aqueous Liquid	These are aqueous liquid streams for which insufficient information is available to further characterize. Mixtures of streams are also included.	
2000	Organic Liquids	These are liquid streams are either essentially a pure organic stream or are streams that contain both aqueous and organic materials. Solids must be pumpable, but can be up to 35-40% of the mass.	
2100	Aqueous/Organic Liquids	These liquid streams contain mixtures of aqueous and organic liquids with organic contents between 1% and 99%.	
2110	Aqueous/Halogenated Organic Liquids	Liquid streams that contain mixtures of aqueous and halogenated organic liquids with contents of 1% or more of organic liquids by less than 99% organic.	
2120	Aqueous/Non-Halogenated Organic Liquids	These liquid streams contain mixtures of aqueous and non-halogenated organic liquids with contents of 1% or more or organic liquids but are less than 99% organic.	
2190	Uncategorized Aqueous/Organic Liquids	These liquid streams contain mixtures of aqueous and uncategorized organic liquids.	
2200	Pure Organic Liquids	Liquids with only organic materials.	

Code Number	Title	Description	Treatment Concern
2210	Halogenated Organics	Nearly pure organic liquids containing more than 1000 ppm halogens (e.g., F, Cl, Br). Contaminated freon and high-level PCB wastes are potential streams.	Treatment must provided for PCB destruction.
2220	Non-Halogenated Organic	Nearly pure organic liquids that are free of halogens (e.g., F, Cl, Br) at concentrations above 1000 ppm. Oils, hexon, and methanol are typical streams.	
2290	Uncategorized Pure Organic Liquid	Organic liquids that cannot be categorized a halogenated or non-halogenated.	
2900	Uncategorized Organic Liquids	Organic liquids for which insufficient information is available to determine the aqueous content and if the organic liquid is more than trace halogenated.	
3000	Solid Process Residues	These materials are typically residues from process operations (e.g., wastewater treatment) or are process-specific listed wastes.	
3100	Inorganic Matrix Solids	These are materials that have an inorganic matrix or a high inorganic content. Upon incineration, these materials will produce a high volume of residue. They may contain both hazardous organics and metals. They may also contain some water or organic liquids as part of their structure.	Destruction or removal of organics in solids and immobilization of toxic metals
3110	Particulate Inorganic Media	Fine particulate wastes. Typical sources are incinerator ash, dusts, vermiculite, sandblasting, and ion exchange media.	Dispersibility of the wastes
3111	Ash	Materials generated from the incineration of radioactive wastes. This stream includes bottom ash, fly ash, and other solid residues.	May contain residual carbon and heavy metals in a very dispersible form.
3112	Sand Blasting Media	Particulate material (generally coarse sand or glass) used to decontaminate or clean radioactively-contaminated materials.	
3113	Absorbed Aqueous Liquids	Inorganic materials such as clay, vermiculite, or diatomaceous earth used to absorb aqueous liquids (e.g., placed in drums if internal containers leak).	
3114	Absorbed Organic Liquids	Inorganic materials such as clay, vermiculite, or diatomaceous earth used to absorb organic liquids or placed in drums to absorb liquids if internal containers leak.	
3115	Ion Exchange Media	Inorganic materials that have been used to remove ions from liquid streams.	

Code Number	Title	Description	Treatment Concern
3119	Uncategorized Particulate Materials	Particulate materials that cannot be assigned to any of the above categories or are a mixture of such materials (e.g., absorbed materials).	
3120	Sludges, Filter Cakes, and Residues	Generally materials from wastewater treatment or from settling ponds. They may contain organic materials in limited quantities from laundry or other sources. Heavy metals are present in some sludges. Sometimes equipment and filters have been included with some drums.	Identification of foreign items in drums
3121	Low Organic Content Sludges	Sludges with less than 1 percent of hazardous organic materials.	
3122	High Organic Content Sludges	Sludges with greater than 1 percent hazardous organic material. The organics can be either halogenated or non-halogenated materials.	
3123	Sludges with Cyanide	Sludges such as those in 211 that contain cyanide at more than trace concentrations.	Destruction of cyanide
3129	Uncategorized Sludges	Sludges with unknown levels of organic content or sludges with other components such as paper filter media.	
3130	Paint Chips and Residues	New or removed paint. The paint may be liquid or contain a liquid, either original paint or paint stripper. It may also be only paint chips. Painting equipment would be a debris waste.	It will likely have a high residue after incineration.
3140	Cemented Sludges, Ashes, and Solids	Sludges or solids that contain cement, either as a water absorber or that are mixed with cement to produce a homogenous solid waste, but do not yet meet disposal requirements. Final treated cemented materials are a 9100 waste.	Residual or free water in waste
3150	Salt Wastes	Salt wastes.	
3151	Chloride and Sulfate Salts	Evaporated or process salt that may contain more than trace concentrations of sulfate and chlorides or other halogens.	The corrosion potential for process equipment and the limited solubility in glass waste forms
3152	Nitrate Salts	Evaporated or process salts that are predominantly nitrate salts.	Destruction of NOx
3159	Uncategorized Salts	Salt wastes with unknown salts, a combination of 3151 and 312 salts, or are non-chloride, sulfate, or nitrate.	

Code Number	Title	Description	Treatment Concern
3190	Uncategorized Inorganic Solids	Inorganic solid waste streams that cannot be further characterized or are a mixture of 211 to 217 materials.	Insufficient characterization information.
3200	Organic Matrix Solids	These are materials that have an organic matrix or base structure. They may have some liquid present, but will not leave a large residue when incinerated.	Destruction of the organic content.
3210	Particulate Organic Media	Particulate organic material, including spent organic resins, spent carbon filters used in wastewater treatment, or particulate organic material used to adsorb organic or aqueous liquids.	Destruction of the organic content. Some resins are not compatible with cement or grout systems.
3211	Activated Carbon	Particulate activated carbon that has often been used for removal of organic materials from off-gas streams or liquid streams.	
3212	Organic Resins	Organic-based resins that have been used in wastewater treatment or other applications.	
3213	Absorbed Liquids (Organic Matrix)	Liquids absorbed on a particulate organic matrix such as cellose or pulverized corn cobs.	
3219	Uncategorized Organic Particulate	Particulate materials or media that cannot be included in any of the above organic particulate categories or that is a mixture of the above particulate materials.	
3220	Organic Sludges	Organic-based sludges of various types.	
3221	Sewage Sludges	Sludges generated by treating wastewater from animals or people.	Streams may contain PCBs.
3222	HOC Sludges	Halogenated organic-containing materials that cannot be poured from a drum at room temperature for treatment as an organic liquid.	Transfer of contents from containers.
3223	Non-HOC Sludges	Nonhalogenated organic-containing materials that cannot be poured from a drum at room temperature for treatment as an organic liquid.	Transfer of contents from containers.
3229	Uncategorized Organic Sludges	Organic sludges that could not be categorized as a 3221, 3222, or 3223 because they are a combination of materials or because they are of unknown chemistry.	
3230	Organic Chemicals	Drums of unused organic chemicals.	
3290	Uncategorized Organic Solids	Materials that cannot be included in any of the above organic solid categories or are a combination of categories.	

Code Number	Title	Description	Treatment Concern
4000	Soils	Soils contaminated with hazardous materials and radioactivity. Codes 4100-4300 may contain up to 5 percent debris. Codes 4400-4600 may have 5 percent-50 percent debris. Streams with more than 50 percent debris are debris waste (Code 5000). This group may be further subdivided when specific EPA regulations are promulgated.	
4100	Organic Contaminated Soils	Soils contaminated with hazardous organics from activities such as spills, drains, and wastewater treatment.	Removal or destruction of the hazardous organic materials
4200	Inorganic Contaminated Soils	Soils contaminated with hazardous inorganics from activities such as spills, drains, and wastewater treatment.	Removal or immobilization of the hazardous inorganic materials
4300	Organic and Inorganic Contaminated Soils	Soils contaminated with both hazardous organic and inorganic materials from activities such as spills, drains, and wastewater treatment.	
4400	Soils with Organic Debris	Soils contaminated with more than 5 percent hazardous organics debris from activities such as spills, drains, destruction and decontamination, and previous waste disposal actions. These streams may also contaminated organic or inorganic hazardous materials.	
4500	Soils with Inorganic Debris	Soils contaminated with more than 5 percent hazardous inorganics debris from activities such as spills, drains, destruction and decontamination, and previous waste disposal actions. These streams may also contain organic or inorganic hazardous materials.	
4600	Soils with Both Inorganic and Organic Debris	Soils contaminated with more than 5 percent of either or both hazardous organic and inorganic debris from activities such as spills, drains, destruction and decontamination, and previous waste disposal actions. These streams may also contain organic or inorganic hazardous materials.	
4900	Uncategorized Soils	Soils contaminated with unknown materials or with a combination of Code 4000-series waste categories.	
5000	Debris Wastes	Wastes that meet the EPA criteria for debris. Debris materials are divided into four groups: metal, inorganic nonmetal, combustible, or heterogeneous (mixtures of materials). If the wastes are dominant in one type of material, the waste should be classed as that material; otherwise the waste is heterogeneous.	

Code Number	Title	Description	Treatment Concern
5100	Metal Debris	Streams that generally have a metal content greater than 95%.	
5110	Metallic Equipment, Components, and Scrap	General metallic items that have been used in process operations or maintenance. Typical items include piping, pumps, metal filters, traps, wire, and fixtures.	
5120	Uranium Chips and Turnings	Uranium metal components or particulate materials with other material types to reduce uranium reactivity.	
5130	Lead-Containing Components and Materials	Lead-containing materials, including gloveboxes, lead wool, lead-base solder materials, or lead components used in radioactive processes. This stream does not include lead acid batteries, which is a separate waste category.	
5140	Cadmium-Containing Components and Materials	Components formed from cadmium or containing a significant fraction of cadmium. This stream does not include cadmium batteries, which are a separate waste category.	
5190	Uncategorized Metal Debris	Metallic components that cannot be classed as a specific metallic waste stream because of lack of information or because they contain multiple categories.	
5200	Inorganic Non-Metal Debris	Debris composed of about 95 percent inorganic non-metal materials.	
5210	Concrete	Concrete materials removed from buildings or roadways.	
5220	Glass	Items composed primarily of glass (e.g., process equipment, laboratory equipment, window materials, vessels, bottles, or light bulbs). The glass may contain small amounts of organic or other inorganic materials.	Glass from fluorescent bulbs that may contain some Hg or PCB contamination
5230	Ceramic Crucibles and Bricks	Crystalline or glass materials used as crucibles or refractories.	
5240	Rocks	Rocks and gravel that have a particle size greater than 60 mm.	
5290	Uncategorized Inorganic Nonmetal Debris	Nonmetal debris that cannot be classified as specific waste streams because of lack of information or because it contains multiple waste categories.	
5300	Combustible Debris	Specific waste streams that contain more than 95 percent combustible materials.	

Code Number	Title	Description	Treatment Concern
5310	Plastic and Rubber	Plastic and rubber items (e.g., sheeting, containers, gloves, gaskets, and components of benelex or plexiglass).	The halogen content during combustion
5311	Leaded Gloves and Aprons	Rubber materials that contain a high fraction of lead and lead compounds.	
5312	Halogenated Plastics	Plastics (e.g., PVC) that contain halogens as part of their chemical structure.	The halogen content during combustion
5313	Non-Halogenated Plastics	Plastics (e.g., polyethylene) that are free of halogenated materials.	
5319	Uncategorized Plastic and Rubber Materials	Materials that cannot be separated into any of the above categories because of lack of knowledge or because they contain a mixture of plastic and rubber materials.	
5320	Wood	Wood items (e.g., structural timbers, boxes, or pallets).	Residence time required for complete combustion
5330	Paper and Cloth	Paper and cloth items (e.g., protective clothing and items used to wipe up contamination or absorb liquids). Wipes may contain some absorbed organic and aqueous liquids.	Nitrate-containing rags and rapid combustion rates
5340	Graphite	Crucibles or components of graphite or carbon.	Sufficient residence time to totally oxidize
5350	Animal Carcasses	Dead animals or parts of animals. Most animals have been used in testing and may contain chemical agents (e.g., lime) to stabilize them.	Biological hazards may be present. May have a high residue volume from stabilizing agents.
5390	Uncategorized Combustible Debris	Uncharacterized combustible debris or mixtures of combustible materials in the above categories.	
5400	Heterogeneous Debris	Mixtures of metals, nonmetals, combustibles, soils, and process residues that can be classified as debris.	Sorting may be necessary for treatment
5410	Filters	HEPA filters and other process filters. Filters are contaminated with fine particulates. HEPA filters may have either wood or metal frames.	Mixtures of materials that can not be easily separated
5420	Predominately Metal Debris	Mixtures of metal and other materials that contain more than 50 percent metals.	
5430	Predominately Inorganic Nonmetal Debris	Debris that contains 50 percent-95 percent nonmetal inorganics.	

Code Number	Title	Description	Treatment Concern
5440	Predominately Combustible Debris	Mixtures of debris materials that contain 50 percent - 95 percent combustible materials.	
5450	Asphalt	Asphalt materials from roadways or other sources that contain both tar and gravel.	
5490	Uncategorized Heterogenous Debris	Heterogeneous debris that cannot be further characterized or does not contain a dominance of metals, nonmetals, or combustible debris.	
6000	Special Wastes	These waste streams will require specific treatment methods that are not expected to be common with other waste types. They also include wastes streams for which treatment capacity may not be initially established as part of the Mixed Waste Treatment Project.	
6100	Lab Packs	This category includes all wastes that contain liquids in containers with surrounding packing materials (e.g., vermiculite). Mixtures of chemicals in drums. Chemicals are mostly solid but can contain liquids in bottles.	Sorting of materials. Wide variety of chemicals. Ability to characterize.
6110	Organic Lab Packs	Lab-packed materials that contain organic liquids.	
6120	Aqueous Lab Packs	Lab-packed materials that contain aqueous liquids.	
6130	Solid Lab Packs	Lab-packed materials that do not contain liquids.	
6140	Scintillation Cocktails	Solutions used for scintillation counting. Solutions are most often in the original glass or plastic analysis bottles.	Removal of the solutions from the bottles and containers and subsequent treatment of the containers
6190	Uncategorized Lab Packs	Lab-packed materials that could be classified as more than one lab pack waste code or that have insufficient information available to further classify.	
6200	Reactive Metals	Reactive metals are typically sodium metal or alkali metal alloys, but can also be particulate fines of aluminum, uranium, zirconium, or other pyrophoric materials. Reactive metals may be mixed with stabilizing materials.	Reactive nature of materials and potential for hydrogen gas generation
6210	Bulk Reactive Metals	Nearly pure reactive metals in containers. They may have various types of impurities, but the bulk of materials is reactive metal and can be treated in a bulk processing system.	Reactive nature of materials and potential for hydrogen gas generation

Code Number	Title	Description	Treatment Concern
6220	Components Contaminated with Reactive Metals	Piping, pumps, and other materials that have reactive metal contamination. The bulk of the material is not reactive metals, but the reactive metals require treatment before disposal.	May not be readily accessible to chemical reaction
6290	Uncategorized Reactive Metals	Non-alkali metal reactives or mixtures of reactives.	
6300	Explosives	Any material that may explode during normal or extreme handling.	Serious handling problem and worker safety problem
6310	Nitrated Rags and Filters	Rags that have absorbed nitric acid and then been left in storage.	Nitrocellulose may form during storage
6390	Uncategorized Explosives	Materials that may be explosive that are not nitrated rags or filters.	
6400	Compressed Gases and Aerosol Cans	Aerosol cans and gas cylinders with gases of any composition. Containers are expected to be pressurized.	Rapid gas release from container failure during processing
6500	Hanford Double Shell Tanks	Wastes in Hanford Double Shell Tanks.	
7000	Inherently Hazardous Wastes	Materials that are composed of inherently hazardous materials.	
7100	Liquid Mercury	Liquid mercury that is pourable from containers. Category includes drums containing elemental mercury in containers.	Separation of mercury from other waste materials
7200	Lead Shapes	Bulk lead materials that are separable from other wastes in the form of bricks, sheets, or unique components. These materials should be readily decontaminated.	
7210	Non-Activated Lead	Lead bricks, shipping casks, or shielding materials. The lead should only be surface-contaminated.	Recycling of the materials
7220	Activated Lead	Lead activated from its use in radiation fields (e.g., in reactors or accelerators).	Radiation levels are generally sufficient to require shielding and remote handling
7230	Lead with Other Materials	Lead bricks or shapes in drums of waste with other inorganic- or organic-type materials. The lead should be a shape that can be decontaminated and can be easily separated from the other wastes.	
7300	Beryllium Wastes	Beryllium metal chips or materials contaminated with beryllium, classified as RCRA P015 waste.	BDAT specifies recycling

Code Number	Title	Description	Treatment Concern
7400	Batteries	Generally lead and cadmium type batteries, but will include other types as well.	BDAT specifies recycling of the metals
7410	Lead Acid Batteries	Lead acid batteries.	
7420	Cadmium Batteries	Cadmium type batteries.	
7490	Uncategorized Batteries	Other types of batteries or unclassifiable batteries.	
8000	Unknown	Waste materials that cannot reasonably be classified into one of the above categories based on available information or streams for which the available information is conflicting.	Inadequate information to allow classification
8100	Unknown Liquids	Liquid wastes that cannot be categorized as aqueous or organic liquids.	
8200	Unknown Solids	Solid materials that can be categorized.	
8900	Uncategorized Unknown	Materials that cannot be categorized.	
9000	Treated Wastes	Wastes that have been treated to meet the Land Disposal Restrictions (LDRs).	
9100	Cement	Cement waste forms, including grouts and cements of various types.	
9200	Glass	Wastes that have been converted to a vitreous waste form.	
9300	Metal	Metal waste forms that have been consolidated or decontaminated and are ready for disposal or recycling.	
9400	Polymer	Organic waste forms including polyethylene, bitumen, resins, and other organic binders.	
9900	Other Forms	Final waste forms that are not classed as either a cement, glass, metal, or polymer (e.g., amalgamated mercury and microencapsulated lead).	

Appendix G
Accident Prevention and Safety Plan

This accident prevention safety plan (APSP) provides information and establishes policy, responsibilities, and procedures for the safe conduct of activities to be performed by the LLMW Characterization Team during the characterization of low-level mixed wastes (mixed wastes) at LANL.

This APSP is an appendix (Appendix G) to the Waste Characterization Plan for LANL. The Quality Assurance Plan (Appendix A), which has also been prepared as an appendix to the Waste Characterization Plan, guides the process knowledge characterization of mixed wastes at LANL.

I. GENERAL

The work associated with characterizing mixed wastes at LANL involves gathering information on the contents of approximately 4997 waste containers, a process that primarily involves reviewing pertinent documentation and conducting in-person and telephone interviews with generators as necessary.

The team is gathering the necessary information from LANL personnel to characterize the stored mixed wastes, including visiting the site to obtain existing waste management records that document the history of each waste container. The LLMW Characterization Plan describes the types of available records and the methodology used in characterizing the mixed wastes based on process knowledge.

If possible, the waste generator interviews will be conducted in administrative areas of LANL that do not require specific training or monitoring. Should visits be necessary to production areas, experimental laboratories or treatment, storage, or disposal areas, applicable laboratory training, and monitoring requirements will be followed.

It is unlikely that the team will need to enter any drum storage areas. If they do, certain requirements apply.

1.0 EMERGENCY INFORMATION

An emergency situation is considered to be unlikely because of the nature of the work to be done. However, the following numbers should be used as necessary:

Emergencies: 9-911 or 911

Medical Assistance: 7-0660

2.0 APPLICABLE STANDARDS AND REGULATIONS

Adherence to applicable federal and/or state health and safety standards, regulations, and guidance manuals is required during field operations. These include, but may not be limited to, the following:

- Title 29, Code of Federal Regulations, Part 1910 (29 CFR 1910), Occupational Safety and Health Standards, General Industry
- Title 40, Code of Federal Regulations, Parts 260-276 (40 CFR 260-276), Hazardous Waste Management
- Occupational Safety and Health Guidance for Hazardous Waste Site Activities, U.S. Department of Health and Human Services et al., October 1985
- American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices

II. HEALTH AND SAFETY PERSONNEL RESPONSIBILITIES

1.0 LLMW CHARACTERIZATION TEAM PRINCIPAL INVESTIGATOR

- Has the overall responsibility for the health and safety of site personnel
- Ensures that adequate resources are provided to the field health and safety staff to carry out their responsibilities

2.0 LLMW TEAM SAFETY AND INDUSTRIAL HYGIENE REPRESENTATIVE

- Oversees the development of this APSP
- Acts as the primary consultant in any health and safety matters that may arise
- Serves as the primary contact to review health and safety matters that may arise
- Provides consultation when health and safety procedures need to be modified
- Approves new or revised safety protocols for field operations
- Issues revisions of this APSP to field personnel and LANL when necessary

3.0 FIELD CREW PERSONNEL

- Report any unsafe or potentially hazardous conditions that occur during field activities to the safety and industrial hygiene representative (SIHR)
- Maintain knowledge of the information instructions and emergency response actions contained in this APSP
- Comply with rules, regulations, and accident/incident reporting procedures as set forth in this APSP, as well as any revisions or addenda that are instituted

III. SITE HISTORY

Since its inception in 1943, LANL's primary mission has been nuclear weapons research and development. Programs include weapons development, magnetic and inertial fusion, nuclear fission, and nuclear safeguards and security. Basic research is also performed in physics, chemistry, and engineering.

In August 1977, LANL was dedicated as a National Environmental Research Park. The goal of programs associated with this regional facility is to encourage environmental research that will contribute understanding of how people can best live in balance with nature while enjoying the benefits of technology.

IV. HAZARD ASSESSMENT

LANL produces many low-level radioactive wastes that contain components defined as hazardous under RCRA and are therefore defined as mixed wastes. The potential for encountering these hazards is very low because of the nature of the work being performed: personnel should not need to enter any of the drum storage areas. If infrequent visits to the areas are necessary, however, personnel will comply with visitor requirements that may include safety briefings and the use of escorts.

V. SITE REQUIREMENTS

1.0 TRAINING

Table G-1 outlines the training requirements for personnel working in the drum storage areas at LANL.

2.0 PERSONNEL MONITORING

Personal dosimetry may be required for personnel working in the drum storage areas on the facility (see Table G-l).

Exposure to potentially hazardous chemicals is not expected during this work. Illumination and noise levels will be monitored as necessary by the SIHR.

3.0 MEDICAL SURVEILLANCE REQUIREMENTS

Medical surveillance may be required for personnel working in the drum storage areas on the facility (see Table G-1).

Table G-1 Health and Safety Requirements

Specific Area	Training Requirements	Medical Requirements	Dosimetry Requirements	Point of Contact
G	Low-level radiation worker training	Hazardous waste site worker annual examination	Film Badge	Area G site safty officer LANL
L	Low-level radiation worker training	Hazardous waste site worker annual examination	None	Area L site saftey officer LANL
L	Chemical hazards training	None	None	

VI. HEALTH AND SAFETY RECORDS

If an accident or an incident requiring medical attention occurs, the team SIHR shall complete an accident/incident report and notify the proper LANL personnel. Personnel working on the project shall notify the SIHR immediately after an accident or incident. The SIHR will follow up with a completed report within 24 hours of occurrence and file the original report in the project files.

VII. EMERGENCY RESPONSE PLAN

Exposure to health hazards is considered unlikely because of the work to be performed. However, LANL has in place an emergency contingency plan that will be reviewed by all personnel before work begins on site.

VIII. FIELD TEAM REVIEW

Each field team member shall sign this section after reviewing the APSP, before being permitted to work on site. A copy of this form will be kept in the project files.

I have read and reviewed or have been verbally advised of the APSP for the Los Alamos National Laboratory Low-Level Mixed Waste Characterization Project. I understand the information contained therein and will comply with its requirements.

Name: _____

Signature: _____

Date: _____