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**Department of Energy**  
Los Alamos Area Office  
Albuquerque Operations Office  
Los Alamos, New Mexico 87544

**APR 08 1994**

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  |
| <u>WM 100</u> | <u>Waste Minimization Plan</u>   |
| 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.

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

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Joel Dougherty

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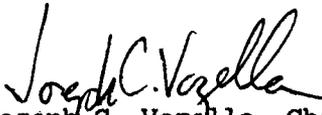
the status of all other FFCA milestones, as well as an explanation of the interrelationships among milestones. It is our expectation that this format would be used for all future annual reports.

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, Chief  
Environment, Safety, and Health  
Branch

LESH:7JM-114

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General  
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**WM 100**  
**WASTE MINIMIZATION 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 *Waste Minimization Plan* (WM 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 report is provided in compliance with Milestone WM 100 in Appendix B of the FFCA.

The purpose of this Waste Minimization Plan is to provide an overall framework for waste minimization activities at LANL. It describes the details of the Waste Minimization Program and identifies the organizations that will be tasked to accomplish each phase of the program at LANL. The Waste Minimization Plan consists of the following elements:

1. **Prioritization:** The prioritization of the waste streams at LANL is the first step in implementing waste minimization and pollution prevention to solve waste generation problems.
2. **Process Waste Assessments (PWAs):** PWAs provide an overall view of the waste generation problems.
3. **Site Specific Plans (SSPs):** PWAs will result in the writing of SSPs that identify problems, technical and administrative solutions, and means of implementing solutions for each waste generating process at LANL.
4. **Defining Solutions:** Once problems are identified, existing technical and administrative solutions will be identified. For problems with no existing technical solutions, research and development (R&D) requirements will be identified and pursued through LANL R&D functions.
5. **Specific Activities and Accomplishments:** The Waste Minimization Plan activities and accomplishments at LANL will be evaluated and reported in the *Annual Report* (AR 100). They will be compiled under the general headings of "Reporting," "Recycling," "Training and Pollution Prevention Awareness," "Evaluation of New Waste Generation Activities, and Waste Minimization Work Plan."

The following table discusses the LDR FFCA milestones that relate to WM 100 and the nature of that interrelationship.

<b>PRIMARY MILESTONE</b>	<b>RELATED MILESTONE</b>	<b>NATURE OF INTERRELATIONSHIP</b>
WM 100	WM 200	Information developed from the waste minimization plan will provide the framework for the developing and annually updating the LDR waste minimization work plan.
	HLL 100	The LLMW characterization plan will be used to ensure that disposal and treatment problems created by the generation of particular LDR or MW waste streams in the past are used as lessons learned for waste streams currently being generated and new waste streams.

<b>PRIMARY MILESTONE</b>	<b>RELATED MILESTONE</b>	<b>NATURE OF INTER-RELATIONSHIP</b>
	OSS 100	The report on the feasibility of treating of LANL LLMW at off-site facilities will be reviewed to ensure that treatment and disposal problems created by the generation of particular LDR or MW waste streams are used as lessons learned for waste streams currently being generated and new waste streams.
	OSS 200	The annual report on off-site shipment of wastes will be reviewed to ensure that treatment and disposal problems created by the generation of particular LDR or MW waste streams are used as lessons learned for waste streams currently being generated and new waste streams.
	CAI 300	The CAI work-off plan will be reviewed to ensure that treatment problems created by generating particular LDR or MW waste streams are used as lessons learned for waste streams currently being generated and new waste streams.
	TRU 100	The TRU waste work-off plan will be reviewed to ensure that treatment and disposal problems created by generating particular LDR or MW waste streams are used as lessons learned for waste streams currently being generated and new waste streams.

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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 Cylinder 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

**WM 100**  
**WASTE MINIMIZATION PLAN**

**1.0 INTRODUCTION**

This Waste Minimization Plan provides an overall framework for waste minimization activities responsive to the Federal Facility Compliance Agreement (FFCA). It describes the details of the Waste Minimization Program, and identifies the organizations that will be tasked to accomplish each phase of the program at Los Alamos National Laboratory (LANL). In the process of addressing these objectives, this Plan specifies how the program analyzes waste generating problems, identifies possible solutions, discusses the support efforts that augment the basic program, and addresses proposed funding solutions that will facilitate the implementation of the program goals.

A Waste Minimization Program is mandated by DOE Order 5400.1, *General Environmental Protection Program* and the special conditions pursuant to 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA contained within the November 8, 1989 LANL Hazardous Waste Facility Permit ("HSWA Permit Special Conditions").

DOE Order 5400.1 specifies that the waste minimization program will contain goals for minimizing the volume and toxicity of all wastes that are generated, with annual reductions if programmatic requirements allow. The plan must

- Report changes in waste quantity, volume and toxicity, comparing the changes in quantities generated with the previous year
- Report on proposed methods of treatment, storage, and disposal that are technically and economically practical and accomplish the waste minimization goals
- Include all waste minimization plans required by specific legislation, such as RCRA
- Identify the Pollution Prevention Awareness Program in each environmental protection statement
- Recognize a requirement for pollution prevention in all mission statements and project plans
- Include elements for employee awareness through specific training, special awareness campaigns, and incentives and award programs.

The Hazardous Solid Waste Amendments (HSWA) Permit Special Conditions require LANL to submit a certified plan annually, by December 1 for the previous year ending September 30th, verifying that LANL has a program in place to reduce the volume and toxicity of all hazardous wastes generated to the degree determined to be economically practicable. They also require that the proposed method of treatment, storage or disposal is a practicable method currently available to LANL that minimizes the present and future threat to human health and the environment. The plan must address

- LANL's goals, objectives, and/or methods for source reduction and recycling of hazardous waste
- Employee training or incentive programs designed to identify and implement source reduction and recycling opportunities for all hazardous/mixed wastes
- Source reduction and recycling measures implemented in the last five years or planned for the near future
- An itemized list of the dollar amounts of capital expenditures and operation costs devoted to source reducing and recycling hazardous waste

- Factors that have prevented implementing reduction and/or recycling; sources of information on source reduction and/or recycling received at LANL
- An investigation of additional waste minimization efforts that could be implemented at LANL; a flow chart or matrix detailing all hazardous waste produced by quantity and type, including mixed waste, and by building/area and program if consistent with security considerations
- A demonstration of the need to use those processes that produce a particular hazardous waste because of a lack of alternative processes, available technology, or available alternative processes that would produce less volume of toxic waste
- A demonstration of the applicability/inapplicability of specified waste minimization techniques including contaminated lead inventory, lead substitution program, bench scale method for decontamination of contaminated lead, use of non-hazardous scintillation cocktail solution, and a program to prevent commingling of radioactive waste

The regulatory drivers that support and necessitate compliance are: the RCRA, Solid Waste Disposal Act (SWDA), and HSWA. The Implementation Guidance in DOE Order 5400.1 details the program configuration.

The waste minimization effort at LANL uses this model and the HSWA Special Conditions as the basis of its program. The LANL Waste Minimization Program takes a process systems approach to identify problems, technically and economically sound solutions, implement solutions, and evaluate results. Waste minimization is a cooperative effort between the LANL Waste Minimization Program Office (WMPO) and the waste generators. Section 2.0 details the prioritization of waste minimization activities, and discusses PWA, SSPs, and the defining of solutions at LANL. Section 3.0 of this plan discusses how specific Waste Minimization Program activities and accomplishments at LANL will be evaluated and reported in the *Annual Report* (AR 100). The first *Annual Report* will be delivered 30 days subsequent to the signing of the FFCA and every July 30 thereafter.

## 2.0 WASTE MINIMIZATION PLAN

Operational waste minimization at LANL is accomplished by the Waste Minimization Program Office (WMPO) and by the individual waste generators throughout LANL. The WMPO provides the following support to the waste generators:

- Oversight, policy, guidance, technical support, training, and management of implementation
- Administration of the program and of budgets from diverse funding sources
- Management of the implementation of the PWA process and the SSP development process
- Support to the waste generators in the implementation of the final SSP, including funding requests
- Evaluation and reporting of implementation efforts by the waste generators
- Continuation of tool development efforts in PWAs, SSPs, training, recycling, and data management
- Development of a normalized database for waste minimization information and progress tracking

Waste generators are responsible for implementing PWAs and SSPs, which include funding, detailed planning, and the reporting of results to the WMPO. Funding for waste minimization activities will be obtained through a budget requests and a recharge system. The budget requests are currently being made to DOE Defense Programs through the Stockpile Surveillance Program. The waste generator funding will be obtained through a recharge system to waste generators that is based on waste generation rates.

The LANL Waste Minimization Plan consists of the following elements: prioritizations, process waste assessments, site specific plans, and defining solutions, as specified in the FFCA. Each element of the plan presents details of how its activities are accomplished at LANL, as follows:

- Prioritization - identifies the order in which waste minimization and pollution prevention problems are to be handled
- PWA - identifies waste minimization and pollution prevention opportunities
- Defining Solutions - identifies solutions through the use of the best available technology (BAT) database. The most economically feasible means of implementing the solution will be defined and selected through cost/benefit analysis
- SSP - identifies the means of implementing the minimization and pollution prevention process

To implement the LANL Waste Minimization Plan, WMPO will form support teams to visit each waste generating site. To complete the two phases of the waste minimization and pollution prevention objectives, the support team will follow these steps:

1. Set priorities based on overall LANL priorities as part of the initial phase of activities
2. Perform PWAs to identify waste minimization and pollution prevention opportunities
3. Use BAT databases and cost/benefit analysis to determine the best technically and economically sound solutions
4. Write a SSP for the site that details the possible improvements, opportunities, and strategies for waste minimization and pollution prevention
5. Design a site specific training program through the Pollution Prevention Awareness Campaign that addresses waste generation problems for the generator site while specifically addressing the needs of that generator site
6. Identify research and development (R&D) needs to the appropriate line organizations
7. Provide technology transfer of useful data to appropriate users
8. Support the generators in requesting and pursuing funding for the second phase of implementation of the SSP through capital and administrative changes (see Figure 2-1)

## 2.1 Prioritization

The first step in effectively minimizing the waste generated at a facility is prioritizing waste streams that exist. Approximately 300 separate waste streams are currently generated at LANL, of which 39 are mixed waste and the remaining 261 are low-level radioactive waste (LLW), transuranic, or chemical. The nature of these waste streams differs from a production environment or industrial processes, in that the waste may be small volume, short-lived, intermittent or pulsed, and may vary in composition with time. For example, decontamination and decommissioning wastes vary in volume, can be short-lived, and vary in composition with time. This type of operating environment exacerbates the problems associated with implementing effective waste management and waste minimization programs, including on and off-site treatment, storage, and disposal. Based on this operating environment, the WMPO developed the following general criteria for prioritizing waste streams:

- The risk to the public and environment
- Volume and toxicity of waste streams
- Cost of existing treatment vs. minimization implementation
- Regulatory drivers
- The continuous or periodic nature of the waste stream

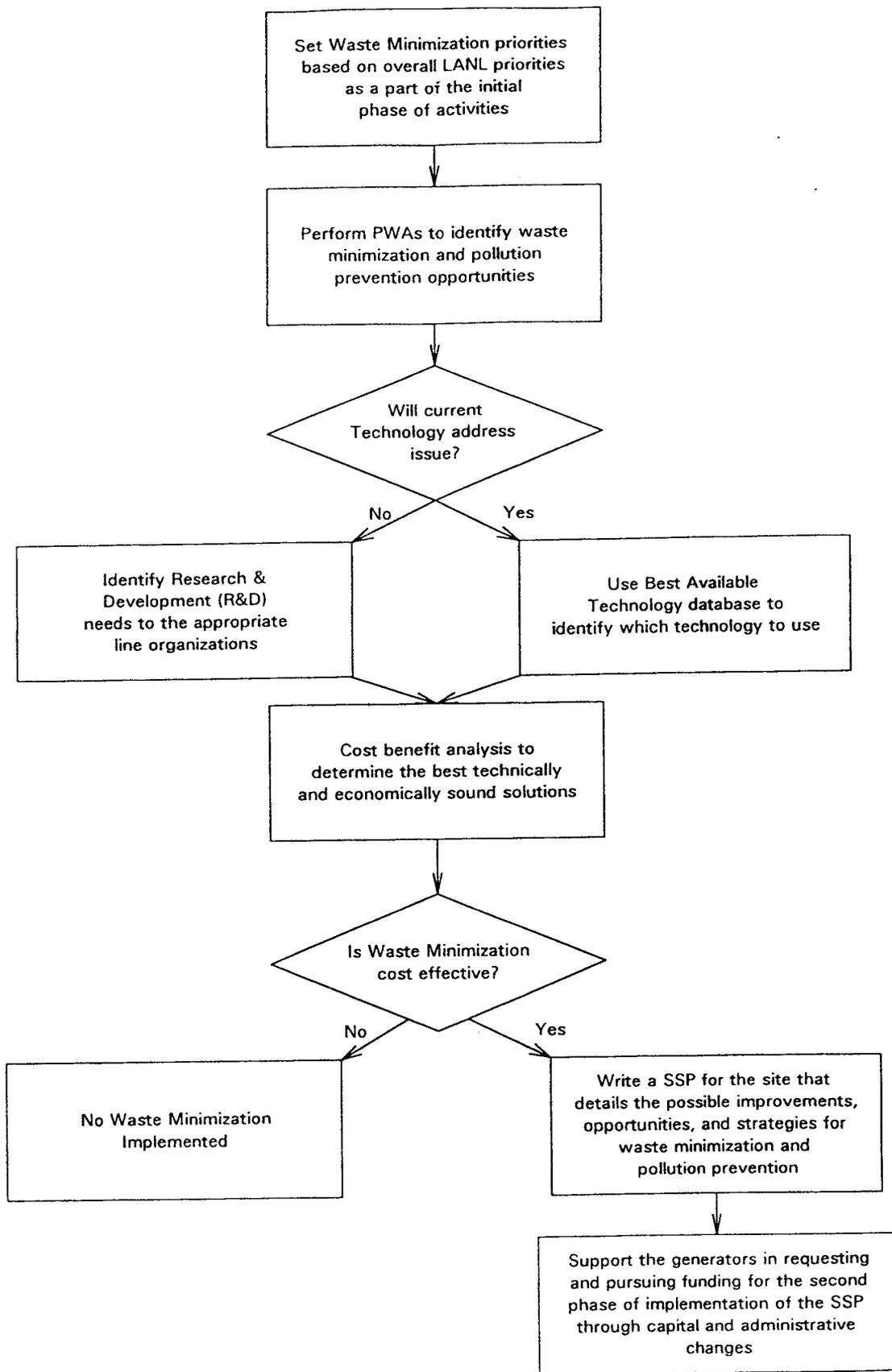


Fig. 2-1 Process for Identifying Waste Minimization Opportunities

The priority and rationales for addressing the implementation of Waste Minimization Program activities at LANL are as follows:

- The highest priority is mixed waste, because of the current lack of treatment capabilities, the cost effectiveness of using inexpensive administrative controls, the ease of preventing generation by segregation, and the mixed waste moratorium;
- The second priority is wastes that are included on the EPA's 33/50 Program. The 33/50 Program is designed to reduce the generation of 17 high-priority industrial toxic wastes by 33 percent in 1992 and by 50 percent in 1995
- The third priority is hazardous chemicals, due to the large volumes generated at LANL (approximately 1,713,623 kg. in calendar year 1992)
- The fourth priority is (LLW), due to the large volumes generated and the difficulty in identifying suspect waste as LLW or sanitary waste

It is important to note that these priorities are applied only to classes of wastes. The 39 mixed waste generating functions at LANL will receive the program's primary focus through FY94. This focus will not preclude the LANL Waste Minimization Program addressing the other waste streams on its priority list. For instance, the waste streams identified in EPA's 33/50 Program, (hazardous and LLW) will be minimized through process modification, materials substitution, and recycling hazardous waste.

LANL has committed to reducing waste output by 20 percent each year for FY94 and FY95 as cited in the Mixed Waste Annual Report submitted to the EPA. The schedule for completion of waste minimization implementation for the 261 non-mixed waste streams will be determined based on the prioritization criteria discussed in this work plan and on DOE out year funding priorities. After addressing the largest waste generation problems requiring the least expense and level of effort, waste minimization efforts will move to waste generation problems of smaller volume having more complex and costly remedies. In these cases, waste minimization is best accomplished initially through best management practices (see Defining Solutions, Administrative Practices, and Evaluation of New Waste Generation Activities in this report for details) and recycling.

## **2.2 Process Waste Assessment**

PWAs are detailed site surveys used to identify waste minimization and pollution prevention opportunities in the generator's operation and process and conduct waste stream characterization. More specifically PWAs are a systematic, planned approach used to

- Evaluate input materials and parameters of a process
- Identify pollutants and waste exiting the process

PWAs provide an overall view of waste generation problems and use a LANL-designed, computer based model that analyzes systems using mass balances. The computer model then manipulates the data in several different modes to allow process evaluation, data management, and tracking. The PWA model, combined with a walk-through of the process, provides a thorough, detailed and comprehensive picture of waste generation and pollution problems. The PWA model methodically analyzes each generating function on a system basis and pinpoints where generation problems exist and where minimization opportunities can best be implemented. Using a PWA enables the WMPO to

- Identify pollution prevention support
- Baseline and trend pollution prevention
- Obtain a continuous process improvement tool

- Increases process characterization and control knowledge
- Provide employee hazard data

The WMPO will assist waste generators in completing PWA's according to the prioritization scheme established in section 2.1. The WMPO will use three PWA methodologies: process flow diagram alternative methodologies, DOE plant profiles, and where appropriate, walk-through site surveys. These PWA methodologies will provide detailed data on waste generating processes and generating problems. Solutions will then be identified through the use of the BAT database, and the most economically feasible means of implementing the solution will be identified through cost/benefit analysis. The WMPO will then work with the waste generators to write SSPs that will provide data on waste-generating activities, BAT and administrative solutions; cost/benefit analysis of solutions to provide economic efficiency; and an implementation plan for these waste streams. A sample of the information contained in a typical PWA is provided in Appendix A.

### 2.3 Site Specific Plan

The final product of an PWA will be an SSP that identifies problems, technical and administrative solutions, and means of implementing the minimization and pollution prevention solutions. SSPs detail possible improvements to the waste stream generation process and opportunities and strategies for waste minimization and pollution prevention activities. The SSP applies the principles and technology of waste minimization that are of greatest benefit to a particular operation. The SSP specify the status of funding for that implementation plan and the cost/benefit justification for implementation.

### 2.4 Defining Solutions

Once problems and opportunities are identified through the PWA's, existing technical and administrative solutions will be identified for inclusion in the SSP through a BAT database. For problems with no existing technical solution, requirements will be identified and pursued through LANL R&D functions. Specific technical solutions are

- Abating or preventing waste generation, including using substitution and modifying processes and programs. This will include rethinking and redesigning generating systems to close loops and capture lost product; and consolidating all effluents (air, liquid, solid, stack), as much as possible, by characterizing outfalls, closing the loop for recovery, combining like loops, and eliminating unnecessary outfalls
- Evaluating procurement
- Segregating materials to prevent excess generation
- Reusing and recycling wastes whose generation cannot be prevented by the first two approaches

Once specific solutions are identified, a cost/benefit analysis is completed to provide the most economically feasible solutions to waste generation problems. Cost/benefit analysis criteria include cost of treatment without minimization, cost of treatment after minimization implementation, cost of minimization implementation, cost of continuing minimization operations, administrative costs, product substitution, and potential regulatory liability. Costs and benefits will be considered across LANL. This means that the benefits of all appropriate minimization projects will be equally considered regardless of the host organization's funding level. This equal consideration provides for a maximum return on minimization dollars and avoids the problem of diminishing returns.

The PWAs and SSPs will be written by a trained team of personnel from the WMPO, the waste generators, other LANL personnel, and subcontractors who have previously developed and validated the alternative PWA methodology. This team approach will make the best use of personnel familiar with

programs and processes; the PWA methodology; the line organizations versed in waste generating process; and the personnel who will carry out the SSPs.

The Waste Minimization Program is currently evaluating different funding schemes that would facilitate implementation of the goals and objectives outlined in section 2.1 of this plan. One proposed charge-back approach would provide direct financial incentives to waste generators that incorporated waste minimization schemes.

### **3.0 SPECIFIC ACTIVITIES AND ACCOMPLISHMENTS**

This section discusses how the Waste Minimization Program specific activities and accomplishments at LANL will be evaluated and reported in the *Annual Report* (AR 100). Accomplishments will be compiled under the general headings of "Reporting," "Recycling," "Training and Pollution Prevention Awareness," "Evaluation of New Waste Generation Activities," and "Waste Minimization Work Plan."

#### **3.1 Reporting**

The WMPO collects, analyzes, and collates relevant data on waste generation rates, process waste assessments (PWAs) and site-specific plans (SSPs), successes and problems with individual waste minimization efforts, and new program starts. The WMPO also facilitates PWAs. The WMPO reports monthly to LANL management and DOE on waste minimization program activities, as stated in the FFCA. In addition, WMPO summarizes this information in an annual report that it provides to the DOE and *Waste Minimization Work Plan* (WM 200) is prepared annually, as discussed in Section 2.5 of this report.

##### **3.1.1 Program Management**

Control and authority for the Waste Minimization Program is derived from the LANL Director Policy (DP) Statement DP105. This policy statement identifies the program goals and assigns responsibility for each phase of the program. Program requirement documents (PRDs) and LANL procedures (LP) provide detailed guidance information on how different phases of the program are implemented. DP105 has been approved by LANL's Environment Safety and Health (ES&H) Council and the director of LANL.

The effectiveness of the program is evaluated through the DOE Project Tracking System (PTS), which provides for assessment of the waste minimization program under the direction of the LANL Assessment Office (LAO). Data from the PTS will be supplied to the DOE and federal and state regulatory agencies.

The WMPO has developed performance evaluation procedures to identify strengths and weakness of the Waste Minimization Program in meeting FY objectives. The performance evaluation procedures are used to complete a self-evaluation that results in corrective action reports. In FY93, the completion of corrective action reports resulted in the finalization of the PWA, SSP, and recycling development processes.

The Waste Management Program currently issues quarterly reports on the progress of WMPO and waste generators in performing waste minimization projects. The reports coincide with calendar year PTS reporting and is sent to DOE's Albuquerque Operations Office (DOE/AL). The reports have been issued since calendar year 92.

The WMPO work efforts and budgets are managed through DOE-approved and reviewed estimating and budget methodologies. For each project, the WMPO develops a detailed technical scope of work, work breakdown structure (WBS), cost estimate, and schedule to evaluate and track performance. The WMPO actual vs. estimated progress is tracked through the DOE PTS.

### 3.1.2 Process Waste Assessment

Reasonable technical solutions will be implemented and the resulting waste minimization and pollution prevention successes tracked by the PWA database and evaluated through the PTS. Of the approximately 300 waste generating functions at LANL, 39 are mixed waste generators. FY94 efforts will focus on these 39 generators.

Mixed waste is typically minimized by administrative controls that include segregating waste, preventing waste from mixing, and substituting nonhazardous components in waste generation processes. Reviewing the 39 mixed waste-generating functions indicate that most generating processes will benefit from applying administrative controls.

The WMPO will continue its ongoing efforts to apply administrative controls to these waste-generating functions. Budget requests to perform 54 PWAs have been made for FY94. These PWAs will address the 39 mixed waste generators and 15 large-quantity chemical generators. They will be used to develop SSPs for implementing minimization and elimination of mixed waste at LANL. For example, some of the PWAs that were completed in FY93 were as follows.

- **Electroplating:** The main electroplating facility has undergone a PWA to address several significant waste stream problems, including vapor degreasers used to clean parts before plating. The PWA identified waste minimization options, some of which have already been implemented, including an aqueous cleaner to replace the vapor degreaser. This change eliminated the mixed waste generation at the electroplating facility.
- **Solvent substitution:** A LANL-wide solvent substitution committee was formed to test and evaluate replacement solvents and processes for chlorofluorocarbons and chlorinate solvents (CFCs). Many of the operations occur in controlled areas that previously have generated mixed waste by using CFCs and other hazardous materials. Using nonhazardous materials in these areas will eliminate the mixed-waste generations at these sites.
- **Tritium Operations:** A PWA was written for particular operations at the Los Alamos Meson Physics Facility (LAMPF). One of the most significant waste minimization options that was identified was to use laboratory equipment and materials when the beam line was not operational, which would eliminate the need to classify the waste as radioactive. This change in procedure alone will dramatically reduce the amount of radioactive and mixed waste being generated at the facility.

### 3.1.3 Site Specific Plans

The SSPs are written by the waste generator, providing specific information and description of their process(es) to aid in identifying waste minimization and pollution prevention opportunities and implementation activities. It is the waste generator's responsibility to fund and implement the SSP. The SSP will serve as the basis for funding requests and planned resource requirements.

### 3.1.4 Miscellaneous Activities

This section will address aspects of the Waste Minimization Program that do not specifically fit into the PWA and SSP process scheme. Currently two technical approaches do not fit into the PWA and SSP process. They are technology transfer and administrative approaches.

**Technology Transfer** - LANL procedures are in place to exchange technical information through EPA/DOE-sponsored databases on waste minimization and pollution prevention technologies with other DOE sites, industrial and trade associations, educational institutions, private corporations and government

agencies. The procedures or databases are being developed through the LANL Applied Environmental Technologies (AET) and Industrial Partnership Center (IPC), DOE waste reduction workshops, and private companies.

**Administrative Approaches** - Administrative approaches to waste minimization include the following:

- Specification of procedures and methodologies for controlling materials and tracking through standard operating procedures (SOP)
- WMPO review of new projects and proposed substantial changes to existing projects through the ES&H Questionnaire Committee, which reviews these projects for all regulatory and procedural concerns
- Purchasing discipline and housekeeping to prevent mismanagement of materials.

### **3.2 Recycling**

LANL has established a number of recycling activities throughout its facilities. These activities focus on areas where the greatest return can be obtained for the least amount of waste minimization resources. For example the some of the recycling activities that have been initiated are

- Excess laboratory and industrial chemicals are offered for exchange by distributing a list of available chemicals to potential end users within LANL. This chemical exchange process is being formalized and will be computer-automated in conjunction with the Automated Chemical Inventory System (ACIS)
- Procedures and contract mechanisms are being developed for the economic recycling of LANL chemicals outside of the facility. Recycling will be done in compliance with EPA and DOT regulatory requirements and has the potential of recycling 65 percent of the hazardous waste stream
- All industrial metals are recycled through the JCI Redistribution and Marketing Center (R&M)

### **3.3 Training and Pollution Prevention Awareness**

The WMPO established a Pollution Prevention Awareness Campaign that provides general waste minimization information to LANL, and provides training support to the LANL Training Office, which trains all employees as part of their ongoing General Employee Training. WMPO also provides waste minimization training to all Waste Management Coordinators (WMC) and provides updates during regular coordinator meetings.

The Awareness Campaign consists of bimonthly articles in the LANL Employee News bulletin, and informational bills to the generators on their quarterly waste generation rates. Purchasing discipline training will become part of the requirement for acquiring authority to purchase chemicals.

LANL also has an incentive program that provides cash awards for employee suggestions for minimizing waste. Suggestions are separated into large and small projects and then judged on creativity, applicability, and minimization and pollution prevention potential.

### 3.4 Evaluation of New Waste Generation Activities

The WMPO reviews approximately 10 potential waste generating programs each week through the LANL ES&H Questionnaire Committee. The WMPO also reviews approximately 15 new SOPs each week and evaluates all new potential waste generating projects and major modifications to existing projects for waste minimization and pollution prevention requirements. The WMPO data management efforts facilitate

- Waste generation tracking, particularly to provide generators with a quarterly report on their generation rates
- Cost accounting that provides real numbers on the cost of waste management
- Waste generation normalization that provides data that compares waste generation to the dynamic level of effort at the LANL

### 3.5 Waste Minimization Work Plan

An LDR *Waste Minimization Work Plan* (WM 200) will be prepared annually. The first such work plan is submitted concurrently with this waste minimization plan. The work plan will describe specific activities to be performed in support of this waste minimization plan during the coming fiscal year. It will identify how waste minimization and pollution prevention priorities are updated and implemented for the fiscal year to ensure that mixed waste streams are promptly identified; which PWAs and SSPs are to be completed on a timely basis; and how corrective actions are completed or the necessary R&D activities that will be initiated to resolve the identified problem.

**Appendix A**  
**Process Waste Assessment Facility Profile**  
**Los Alamos Meson Physics Facility**

PROCESS WASTE ASSESSMENT  
FACILITY PROFILE  
LOS ALAMOS MESON PHYSICS FACILITY

ABSTRACT

This report serves as a reference to the typical waste forms expected to be associated with operation of the high intensity proton accelerator at Los Alamos National Laboratory supporting experimental areas using proton irradiation or neutron production in subatomic particle research, accelerator technology development, solid-state physics research, isotope production, and radiochemistry at the Los Alamos Meson Physics Facility (Clinton P. Anderson Meson Physics Facility - LAMPF). The Technical Area (TA) covered in this report is the TA-53 complex, and principally includes the activities of the Medium-Energy Physics (MP) group who support the Laboratory's mission in basic research by operating and maintaining the 800-MeV proton accelerator and proton storage ring (PSR) providing beams for LAMPF, the Manuel Lujan Jr. Neutron Scattering Center (LANSCE), and the Weapons Neutron Research (WNR) Center. The report contains a compilation of waste-form characterizations for the principal processes and operational activities carried out in the TA-53 facilities: high energy proton beam production and acceleration; experimental activities; experimental support and prototype building/repair and maintenance; chemical receiving and shelved storage; radioactive materials handling; data acquisition and analyses; radioisotope generation; and facilities wastes handling, treatment and disposal. The waste-form characterizations were obtained from site visits and were supplemented by additional waste generator interviews, site visits, and background data reviews of the International Technology (IT) Corporation 1990 waste stream characterization survey reports. A detailed facility profile has been established within this report outlining the production processes and operations to facilitate site waste coordinator waste minimization activities. Waste streams from all the major technical activities generating wastes have been identified, and a generic process description has been provided to assist in performing more detailed analyses. A compilation of potential source reduction strategies and technology approaches have been included in the later sections of this report.

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EXECUTIVE SUMMARY

A summary of the typical waste forms associated with the Los Alamos Meson Physics Facility (LAMPF) high energy proton accelerator facility is presented in this report. The technical areas (TAs) covered in this report include those within the TA-53 complex. TA-53 supports the research activities of the Physics and Life Sciences Directorates at LANL. The principal activities are conducted through the Medium-Energy Physics (MP), Physics (P), and Accelerator Technology (AT) Divisions including their Groups and other Organizational Units. Other unrelated TA-53 on-site groups conducting activities include the Facilities Engineering-Division Office (ENG-DO), Isotope and Nuclear Chemistry (INC), the Health and Safety-Division Office (HS-DO), and Johnson Controls World Services, Inc. (JCI). The facilities mainly supported by the MP- and P-Groups are the focus of this waste stream characterization study and facility profiling.

A facility profile has been prepared outlining the primary production processes, operations, and waste streams for all the major technical activities generating wastes. A preliminary process description is provided for the LAMPF accelerator/experiment production operations, together with operational parameters that influence the tracking of materials usage in basic research throughout the TA. The waste-form characterizations were obtained from site visits and waste generator information, supplemented by additional waste generator interviews and site visits. All of the LAMPF technical areas and laboratory operations generating wastes have been reviewed. The background for the reported waste generation rates includes the IT Corporation waste stream characterization survey reports, information gathered in 1990 from site visits and discussions with the waste generators and field investigations. These data were subject to review and update by the LAMPF waste generators. The information was electronically recorded and tabulated in volume supplements to this report to facilitate computer archiving for future use in more detailed process waste assessments (PWAs). A summary of recommendations for combining and eliminating drains made by Santa Fe Engineering in their Wastewater Stream Characterization Reports is also presented.

The results of these data reviews and updates, together with the information provided by waste generators and from supplemental site visits, have provided a comprehensive view of the more significant waste streams in the LAMPF technical areas. The primary waste forms of concern are the hazardous, radioactive, and mixed wastes produced onsite; and radioactive air emissions. The waste forms include: both radioactive/nonradioactive cooling and process water, oils and lubricants, spent solvents, and contaminated protective clothing/articles and tools, maintenance/construction debris, machine shop wastes, and activated air emissions. Spent solvent wastes and spent solvent contaminated cloth rags/paper wipes are produced by the over 80 shops (electronic and machine) and workbenches operated onsite in the TA-53 complex.

Other waste forms established from the assessments include: paper office trash and sanitary wastes.

The data presented in this summary are sufficiently detailed to be used as a baseline guidance for more comprehensive data collection in support of the detailed process waste assessments being required of all LANL waste generators in support of the waste minimization effort.

VOLUME I: PROCESS WASTE ASSESSMENT FACILITY PROFILE  
LOS ALAMOS MESON PHYSICS FACILITY

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