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

APR 08 1994

0324 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

ENTERED

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

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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

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

LESH:7JM-114

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FFCO Report 1999

AR 100
ANNUAL REPORT

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 annual report (AR 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 AR 100 in Appendix B of the FFCA. This annual report details and evaluates LANL's success in implementing and accomplishing the goals and requirements of the FFCA during fiscal year (FY) 93.

The annual report discusses the following elements:

1. The annual update of Attachment A of Appendix B of the FFCA (as specified in section II. B. 1 of Appendix B of the FFCA)

2. The current status of the implementation of the Waste Minimization Plan and the accomplishment of its goal (as specified in Section II. C. 1. d of Appendix B of the FFCA)

3. The evaluation of the availability and/or applicability of off-site treatment of low level mixed waste (LLMW) (as specified in Section II. D. 1 of Appendix B of the FFCA)

4. The status of skid development, design, and construction, with progress measured against ATS 100, the *Program Management Plan for Generic Skid Design* (as specified in Section II. D. 3 of Appendix B of the FFCA)

Another two sections were added to this report to facilitate the readers' understanding of all FFCA requirements at LANL. These sections are not spelled out in the agreement as a requirement and are for informational purposes only. The first of these documents the progress of all other FFCA milestones before their required completion dates. The second is a table of all LDR FFCA milestones and the nature of their interrelationships.

The following summary discusses the LDR FFCA milestones that relate to AR 100 and the nature of their inter-relationship.

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTER-RELATIONSHIP
AR 100	ALL	The annual report on the waste minimization plan for mixed and hazardous waste, the LDR waste minimization work plan, the annual action plan for off site shipment of wastes, the annual update of off-site facilities capable and available for treatment of LLMW, the annual report on skid development and a brief report of the status of all other milestones will be included in the FFCA Annual Report.

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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

AR 100
ANNUAL REPORT

1.0 INTRODUCTION

This annual report details and evaluates LANL's success in implementing and accomplishing the goals and requirements of the FFCA during fiscal year (FY) 93. This annual report follows the format outlined in the FFCA and is divided into five sections: "Waste Minimization," "Off-Site Treatment," "Treatment Skids," "Status of Other FFCA Milestones," and the annual update of Attachment A of Appendix B of the FFCA. "Waste Minimization," Section 2.0, documents the implementation of the Waste Minimization Plan and accomplishment of its goals. "Off-Site Treatment," Section 3.0, documents and updates off-site facilities capable and available for treatment of low-level mixed waste (LLMW). "Treatment Skids," Section 4.0, details skid development progress. "Status of Other FFCA Milestones," Section 5.0, is not required as part of AR 100 by the FFCA, but is provided to document the progress of other FFCA milestones before their required completion dates. Attachment A documents and updates waste types, estimated volume, category, waste codes, and other information that was reported in the original Attachment A of FFCA. In addition, Attachment B summarizes the interrelationships among the FFCA milestones.

2.0 WASTE MINIMIZATION

This section details and evaluates the success of the Waste Minimization Program in implementing and accomplishing the goals of the *Waste Minimization Plan* (WM 100) for mixed and hazardous waste at LANL during FY92 and FY93. The *Waste Minimization Plan* was transmitted to the EPA in fulfillment of Milestone WM 100 of the FFCA. This annual report conforms to the format outlined in the *Waste Minimization Plan* and the FFCA (Section II. C.1.d of Appendix B of FFCA). It outlines the process used to analyze waste generation problems, identifies possible solutions, discusses the support efforts that augment the basic program, and addresses proposed funding solutions to facilitate the implementation of the program's goals. This section also details the specific waste minimization actions that occurred in FY92 and FY93. The status and accomplishments for the period are 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 LANL Waste Minimization Program takes a process systems approach to identifying problems, identifying possible technically and economically sound solutions, implementing solutions, and evaluating results. Waste minimization is a cooperative effort between the LANL Waste Minimization Program Office (WMPO) and LANL's waste generators.

2.1 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.

The following table summarizes the mixed waste generation rates for FY92 and FY93 in cubic meters (Cu.m.) The listings are for Transuranic Mixed Waste (TRU) and LLWM.

WASTE GENERATION BY TYPE (m^3)	FY92	FY93	% CHANGE
LLMW	102.8	57.2	(44.36)
TRU	27	247.4	816.3

Most of the decrease in the waste generation rate for LLMW from FY92 to FY93 is due to the moratorium on mixed waste generation imposed by LANL in May of 1992 in response to the May 8, 1992, LLMW capacity variance deadline. If there was no moratorium, the generation rates would be higher. New generation rate projections will be developed subsequent to the signing of the FFCA since previous years' generation rates do not reflect typical waste generation rates.

The other principal causes for the decrease are enhanced administrative controls through waste segregation and the implementation of PWA recommendations at generating facilities. Waste generation rates for TRU waste from FY92 to FY93 appeared to increase because of an increase in waste shipments, as waste generators began to meet the established *Waste Acceptance Criteria* (WAC) for TA-54, Area G. One hundred twenty cubic meters of the TRU waste for FY93 was composed of glove boxes shipped from TA-55.

2.1.1 Program Management

Control and authority for the Waste Minimization Program is derived from LANL's Director's Policy (DP) 105 statement . This policy statement identifies the program goals and assigns responsibilities for each phase of the program. Program requirement documents (PRDs) and LANL procedures (LPs) 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 LANL director.

The effectiveness of the program is evaluated through the Project Tracking System (PTS), which provides for assessment of the waste minimization program under the direction of the LANL Assessment Office. Data from the PTS is 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 by WMPO to complete a self evaluation that results in corrective action reports. In FY93, 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 are sent to DOE's Albuquerque Operations Office (DOE/AL) 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 Waste Minimization Program's actual vs. estimated progress is tracked through the DOE PTS and is summarized in the quarterly reports.

Implementing project management tools and approaches has enabled the WMPO to make the following improvements in FY92 and FY93:

- External factors for use in normalizing project baselines were identified:
- The New Waste Reduction Technologies/Solutions Database was evaluated:
- Waste generation data were included in the LANL project tracking system as a reporting and evaluation tool:
- The Routine "Waste Billing" Effort, a pollution awareness tool that the WMPO uses to quantify the total cost associated with waste generation rates to the waste generators was implemented:
- Waste management unit cost by waste type was defined by applying waste minimization data to the process of disposal.

2.1.2 Process Waste Assessments

PWAs are detailed site surveys to identify storage, operation and process concerns; waste stream characterization; and waste minimization opportunities. PWAs provide an overall view of waste generation problems. Reasonable technical solutions are implemented and the resulting waste minimization successes are tracked by the PWA database and other databases at LANL. They are evaluated through PTS. A graphical interface and waste-tracking algorithms are being tested on current waste stream data.

A LANL-designed, computer model that analyzes waste generating processes, based on mass balances, has been developed to support the PWAs. The model manipulates the data in several different modes to evaluate processes, manage data, and track waste. The PWA model, combined with walk-throughs of waste generator sites, will provide a detailed picture of waste generation and minimization problems. The PWA model methodically analyzes each waste-generating function as a system and pinpoints where generation problems exist and where minimization opportunities can best be implemented.

The PWAs that have been completed during FY92 and FY93 include

1. Advanced Testing Line for Actinide Separations (ATLAS) and Uranium Line for Special Separation Science (ULISSES): Both are designed to address more efficient ways of processing plutonium and uranium, respectively, through material recovery technologies being developed primarily at LANL. Both are pilot studies that will be used to assess competing technologies for waste minimization and process efficiency potential. When the pilot studies have been completed and systems are designed for full-scale use, these new processes would replace the existing plutonium and uranium processing operations at LANL and DOE production plants.

2. Photography processes: A LANL-wide photography waste minimization committee was formed to address photographic waste generation problems and identify potential solutions. Most important, this particular process waste assessment includes all major photographic facilities. The committee considered whether it is more cost effective to have each facility address waste minimization projects through individual PWAs or to have a LANL-wide photography PWA to evaluate LANL-wide waste minimization options, and determined that one LANL-wide PWA would be more practical. The committee has identified specific waste minimization options, such as silver recovery systems.

3. 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, using an aqueous cleaner instead of the vapor degreaser. This change eliminated the mixed waste generation at the electroplating facility.

4. High explosives: This PWA focused on waste associated with high-explosives development and testing operations. Waste minimization options identified included materials/products substitution, recovery/recycle technologies, and waste segregation. Many of these options focused on hazardous wastes generated by these high-explosives operations. Several waste treatment options were also identified and reviewed, including supercritical water oxidation and base hydrolysis.

5. Pyrochemical processes at TA-55: Pyrochemical processes are used to produce pure plutonium metal from impure plutonium metal and pure and impure plutonium oxide. Waste minimization options identified include modifying a direct oxide-reduction process to a multiple cycle direct oxide-reduction process, to reduce material usage and using reusable crucibles.

6. Solvents: A LANL-wide solvent substitution committee was formed to test and evaluate replacement solvents and processes for chlorofluorocarbons (CFCs) and chlorinated solvents . The committee has evaluated many different solvents for a variety of applications and has recommended specific non hazardous solvents to LANL. Many of the operations occur in controlled areas that previously have generated mixed waste by using of CFCs and other hazardous materials. Using non hazardous materials in these areas will eliminate the mixed waste generation at these sites. The progress of solvent substitution will be reported on in the next annual report. The committee will continue to evaluate alternative solvents and technologies, and other potential material substitutes for commonly used hazardous materials as needed.

7. Tritium operations: A PWA was performed on 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 is 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.

8. Construction materials: A PWA was conducted which characterized construction material waste types and identified candidate items and materials for recovery and recycle/re-use within construction projects at LANL.

The 39 LLMW PWAs that were started during FY93 and will be completed in FY94 are

1. Analysis of TA-55 Plutonium and other samples
2. Waste Isolation Pilot Plant related programs (Bin-scale testing, development of mixed waste LANL standards)
3. Plutonium compounds chemistry
4. Magnetic plutonium separation
5. Metals separation
6. Surface contamination recovery on process residue
7. Firesafe pit process
8. Residues from scrap leaching, etc.
9. Metal forming
10. Metal from a vessel recovery campaign
11. Analyses of plutonium and Special Nuclear Material samples from the Processing Engineering Group
12. Analyses of Uranium samples from the Materials Research and Processing Science Group
13. Analyses of SP-100 (space reactor) samples
14. Toxicity Leaching Characteristic Procedure of compositional/environmental samples

15. Analyses of waste management samples
16. Analyses of Waste Isolation Pilot Plant (WIPP) waste from TA-54 and other storage areas
17. Analyses of samples from Environmental Restoration programs
18. Mixed waste analyses Research and Development (R&D)
19. R&D on hazardous waste treatment options
20. R&D on alternative methods of analyses
21. Plutonium-238 programs
22. Radiochemistry analyses of actinide samples
23. Analysis of tritium containing samples
24. Analysis of Production and Surveillance samples for uranium program
25. Differential thermal analysis
26. Evaporator waste metal
27. Plutonium fluoride reduction
28. Plutonium oxide dissolution with nitric acid
29. Off-gas treatment
30. Volume reduction
31. Hot cells
32. Non aqueous chemistry
33. Plutonium chlorination
34. Aqueous chloride recovery
35. Thermochemistry
36. Hydroxide precipitation of chloride waste streams
37. Gas-solid reaction
38. Diagnostics development
39. Automated Retirement and Integrated Extraction System support

As the PWAs are completed and the minimization problems are identified, existing technical and administrative solutions are identified through a best available technology (BAT) database. For identified problems with no existing technical solution, R&D requirements are identified and pursued through LANL R&D functions. Specific technical solutions include, but are not limited to, the following:

- Abating or preventing waste generation, including material substitution and process and program modifications. 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

- Segregating waste materials to reduce specific waste forms

- Reusing and recycling wastes whose generation could not 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, cost of implementing minimization, cost of continuing minimization operations, administrative costs, and potential regulatory liability. Costs and benefits will be considered across LANL. This means that all appropriate minimization projects will be given equal consideration in terms of their minimization benefits regardless of the host organization's funding level. This provides for a maximum return on minimization dollars and avoids the problem of diminishing returns. The cost/benefit evaluation process is being improved by

- Merging outfall mapping and regulatory information with the PWA software through Infocad
- Developing improved liquid waste tracking systems for input to the PWA program

The WMPO will continue its ongoing efforts to apply administrative controls to 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 chemical (hazardous waste) generators. They will be used to develop SSPs for implementing mixed waste minimization at LANL.

2.1.3 Site Specific Plans

The final product of a PWA is an SSP that identifies problems, technical and administrative solutions, and means of implementing minimization. SSPs detail possible improvements to the waste stream generation process and opportunities and strategies for waste minimization activities. The SSPs apply the principles and technologies of waste minimization that are of most benefit to a particular operation. The SSP specifies the funding status for that implementation plan, the cost/benefit justification for implementation, and serves as the basis for funding request.

The SSPs are written by the waste generator. It is the waste generator's responsibility to fund and implement the SSP. The WMPO has developed a standard format to assist waste generators with SSPs. During FY94, the WMPO will conduct one-on-one site visits with waste generators to provide site-specific technical assistance towards planning and preparing SSPs.

The Waste Minimization Program has completed 20 SSPs to date and has another 50 in progress. The 50 will be completed in FY94. The initial SSPs were reviewed against each other and the WMPO criteria to create a comment matrix. The comment matrix is available for review at the WMPO office.

2.1.4 Miscellaneous Technical Issues

This section will address technologies and activities that do not specifically fit into the current technology schemes. These are technology transfer, administrative approaches, and specific activities.

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. These procedures 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:

- WMPO review of standard operating procedures (SOPs) for waste minimization practices.

- WMPO review of new projects, and of substantial changes to existing projects, through the LANL Environment, Safety and Health Questionnaire Committee, which reviews these projects for all regulatory and procedural concerns. The ES&H questionnaire is currently being revised to provide a mechanism to ensure that the project proponent has diligently pursued waste minimization opportunities.

- Purchasing discipline and good housekeeping to prevent mismanagement of materials. The LANL purchasing office has already implemented controls to ensure waste minimization is incorporated into operations; e.g. the Automated Chemical Inventory System (ACIS).

Specific Activities - The current status of specific activities is presented below:

- A new process for dry machining of plutonium was completed in August of 1993. Dry machining eliminates the use of cutting oil, which reduces the amount of mixed waste generated and facilitates the recovery of chips and filings.

- The Radioactive Material Management Area Plan is being revised. Interim procedures are in place LANL-wide.

- Hazardous waste-generating scintillation fluid has been substituted for, and all current scintillation work at LANL uses alternative nonhazardous fluids.

- Electroplating waste minimization is being implemented at a plutonium facility with emphasis on plutonium recovery and reuse of acids.

- Photographic waste is being minimized throughout LANL by recovering silver and reusing rinse water.

- A waste minimization working group has been established to address tritium and accelerator produced isotopes.

- The Solvent/Materials Substitution Committee's first report was completed in FY92 and was made available to all LANL and DOE.

2.2 Recycling

LANL has established many recycling activities throughout its facilities. These activities focus on areas where the greatest return can be obtained with the least amount of resources. The recycling activities are

- Recycling all industrial metals through the Johnson Control Incorporated (JCI) Redistribution and Marketing Center (R&M).

- Recycling all precious metals through precious metal banks.

- Recycling 75 percent of white paper through the JCI R&M Center.

- Recycling all lead-acid batteries through of the JCI R&M Center.

- Offering excess laboratory and industrial chemicals 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).

- Developing procedures and contract mechanisms for economically recycling LANL chemicals outside of the facility. Recycling will be in compliance with EPA and DOT regulatory requirements and has the potential of recycling 65 percent of the hazardous waste stream.

- Recycling all used motor oil through General Services Administration (GSA).

- Recycling other oils through the JCI Environmental Division, which contracts with a local (off-site) recycling facility. The facility is routinely audited for compliance with EPA, Department of Transportation (DOT), and DOE requirements.

- Lead brick and shielding recycling, which includes a moratorium on purchasing new lead.

2.3 Training and Pollution Prevention Awareness

The WMPO established a pollution prevention awareness campaign (PPAC) that provides general waste minimization information to LANL employees and provides training support to the LANL Training Office. Initially, all employees receive waste minimization training as part of the LANL Training Office's General Employee Training course. WMPO also provides waste minimization training to all waste management coordinators (WMC) and provides updates during quarterly WMC meetings. The WMPO has completed a waste minimization training package that has been sent to all group offices and provides manager training per DOE Order 5480.20, "Personnel Selection, Qualifications, Training and Staffing Requirements at DOE Reactor and Non-Reactor Facilities."

The WMPO also provides a staff member who participates on the JCI Waste Minimization Committee to assist with technical direction and funding issues related to JCI waste minimization activities. The LANL-wide waste oil recycling program was initiated out of this committee and is recycling 50,000 gallons per year.

The PPAC also includes monthly articles in the LANL Employee News bulletin, informational bills to the generators on their quarterly waste generation rates, and an incentive program that provides cash awards for employee suggestions on minimizing waste. Suggestions are separated into large and small projects and then judged on creativity, applicability, cost savings, and minimization potential.

2.4 Evaluation of New Waste Generation Activities

The WMPO reviews approximately 10 potential waste-generating programs each week through the LANL ES&H Questionnaire Committee and approximately 15 new and revised SOPs each week. All new potential waste generating projects, major modifications to existing projects, and SOPs are evaluated for waste minimization 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 accurate numbers on the cost of waste management

- Waste generation normalization that provides data comparing waste generation to the dynamic level of effort at LANL

2.5 Waste Minimization Work Plan

The LDR *Waste Minimization Work Plan* (milestone WM 200) will be prepared annually. The first such Work Plan is submitted concurrently with this annual report. The Work Plan provides details on how LANL's *Waste Minimization Plan* (milestone WM 100, provided concurrently with this report) will be implemented for the upcoming fiscal year. It identifies how waste minimization and pollution prevention priorities are developed and implemented to ensure that mixed waste streams are promptly identified, their PWAs and SSPs are completed on a timely basis, and corrective actions are completed or the necessary R&D activities are initiated to resolve identified problems.

3.0 OFF-SITE TREATMENT

The first annual report to update information regarding off-site facilities capable of and available for treating LLMW will be submitted to the EPA on 7/30/94, as specified by the FFCA in Appendix B (Section II. D. 1). The annual update will evaluate, identify, and determine the capabilities of available commercial and DOE facilities for treating LANL LLMW.

LANL's initial efforts to identify and evaluate off-site facilities under the terms of the FFCA are described in the report on the feasibility of using Diversified Scientific Services Incorporated (DSSI) to treat and dispose of LANL LLMW (milestone OSS 100), submitted to the EPA concurrently with this report. Additional facilities were reviewed in the gas cylinder work-off plan (milestone GAS 100). LANL's efforts to identify appropriate facilities are ongoing, and results of these efforts will be reported to the EPA annually.

4.0 TREATMENT SKIDS

This section details the status of skid development, design, and construction, and evaluates the success of implementing and accomplishing the goals of ATS 100 the *Program Management Plan for Generic Skid Design* provided concurrently for treatment skid development at LANL during FY 93. This portion of the annual report conforms to the format outlined in the program management plan and the FFCA Appendix B (Section II. D. 3). It outlines how the program analyzes LDR requirements through characterizing and prioritizing of waste, identifies the methodology of developing treatment technologies and equipment, and discusses the support efforts that augment the basic program. The status and accomplishments for the period are compiled under the general headings of "Treatment Skids Under Development" and "Development of Additional Treatment Skids."

4.1 Treatment Skids Under Development

The development of treatment processes, pilot studies, and design of several skids are currently under way. The following section summarizes the status of the development effort.

4.1.1 Reactive Metals Skid

The bench-scale testing development is eighty-percent complete for the skid that will treat reactive metals. This represents an eight-month slip in the schedule, due to the need for additional operational information, not design information. The design requirement, the original scope of work, was complete on schedule.

Consequently, skid development will not be hindered by this delay. During FY94, the skid design will be completed and permitting will be initiated. The skid will treat reactive metal waste, including lithium hydride, sodium metal, and calcium metal, by reacting the waste with water in an inert atmosphere. The resulting hydroxide will then be neutralized. Depending on the concentration of the neutralized solution, the residual will either be solidified for disposal as low-level waste or discharged to the radioactive waste-water treatment plant. The bench-scale testing will be completed in FY94.

4.1.2 Plating Waste, Acids, and Bases Skid

The skid for treating plating waste, acids, and bases has been designed, and the National Environmental Policy Act (NEPA) documentation is in progress. A RCRA Part B Permit application was submitted to the State of New Mexico on October 12, 1993. Safety documentation, operational documentation, and permitting documentation will be completed, and construction and cold testing of equipment with modifications will be initiated in FY94 when permits are received. The skid is capable of treating the following waste categories as given in FFCA Appendix A:

- Acids
- Bases
- Cyanide solutions including electroplating solutions
- Solutions contaminated with heavy metals
- Some nonwaste water contaminated with cyanide and heavy metals

The plating and pickling waste contains various acids, or cyanide and bases, and various metals. It is typically contaminated with low concentrations of depleted uranium (<1 g/L). The best demonstrated available technology (BDAT) for electroplating waste includes one or more of the following:

1. Neutralization of acids
2. Oxidation of cyanide and ammonia
3. Reduction and precipitation of chromium
4. Precipitation of metals

The skid is also potentially applicable to analytical laboratory wastes and other solutions contaminated with arsenic, cadmium, selenium, and any heavy metal that can be precipitated as a hydroxide or a sulfate, as well as contaminated photographic fixer. Treatment to BDAT levels may require substantial quantities of treatment reagents that will increase the residual volume of solution, which must be solidified if the waste is listed. A pretreatment step using an electrode position technique is being bench-scale tested. It deposits as much metal as possible and oxidizes some cyanide before the conventional treatment step. If successful, the electrolytic approach will be combined with the established treatment scheme to reduce the final waste volume. This treatment skid will also be available to perform neutralization and metals precipitation for other liquid waste. Use of the skid to treat wastes it is potentially applicable to will be determined during bench-scale testing. Stabilization processes, including cementation and encapsulation, will be investigated as methods of treating the sludges and residues from the skid to prepare them for disposal.

4.1.3 DETOX Process Skid

The bench-scale test for the DETOX skid is currently in progress. The slip in the skid schedule is due to a change in scope of work. Information gained during the waste characterization plan for historical LLMW (HLL 100) and the formal plan for prioritizing LLMW treatment (HLL 200) identified the need for a batch processing scheme. The DETOX skid was originally designed for a continuous processing scheme of the waste streams identified below. The redesign effort has resulted in a nine-month slip in the schedule. During FY94, the bench-scale test and the Title I design will be completed. The DETOX process is a liquid phase, iron-catalyzed, oxidation process being developed as a alternative to incineration for some wastes and as a treatment process for certain wastes that cannot be processed in the controlled air incinerator (CAI). In the latter category, waste includes vermiculite contaminated with organics and solvents containing elevated tritium and carbon-14. Candidate wastes include ignitable liquids, metal-contaminated oils, and used solvents including chlorinated and fluorinated solvents. Reaction times for oxidizing rags and cellulose materials are too long to be practical. The process does not oxidize rubber or plastics.

The DETOX process uses Fe^{+3} in an acid solution as the primary oxidant, and the Fe^{+2} formed in the oxidation process is converted back to Fe^{+3} by a second, catalyzed reaction with oxygen. The primary benefit of the DETOX process is that it can oxidize organic constituents in a contained reactor up to 250°C and 40 psig. Bench-scale testing will be used to determine whether the process is a viable alternative to incineration, and is applicable to LANL waste. Further development of the process will be performed in accordance with the *Program Management Plan for Generic Skid Design* (AT5100) for treatment skid development, as appropriate.

4.2 Development of Additional Treatment Skids

The total number of processes needed to treat LANL's LLMW using treatment skids cannot be defined at present because of the incompleteness of the waste characterization needed for process evaluation and design. In some cases, one skid may process more than one waste stream, while in other cases, more than one skid may be required for different waste properties or contaminant concentrations. The LDR requirements established and outlined in the *Characterization Plan for Historical LLMW* (HLL 100) and the *Formal Plan for Prioritizing LLMW Treatment* (HLL 200) will be used to plan and schedule skid development for wastes with no established treatment techniques.

The methodology for the development of treatment technologies and equipment was established in parallel with the preparation of HLL 100. As stated in ATS 100 (*Program Management Plan for Generic Skid Design*), the following activities will be completed:

1. Waste characterization
2. Identification of available technologies (literature search)
3. Evaluation of available technologies
4. Selection of applicable technologies
5. Bench-scale testing
6. Preconceptual design
7. Environmental permitting
8. Treatment skid design (Title I and Title II)
9. Document preparation (safety and operational)
10. Nonradioactive testing
11. Waste treatment

Cost/benefit analysis and risk analysis are addressed before skid development as part of HLL 200. Bench-scale testing will precede skid design to confirm that the treatment is appropriate and to generate design data. While the hazardous components can be treated with available technologies identified in Attachment A of Appendix B in the FFCA, the varying quantities of radionuclides and the physical characteristics of individual waste streams may render standard techniques impractical. Every attempt will be made to use existing techniques as much as possible. However, safety concerns associated with the radioactive portion of the waste may require different approaches, even between wastes or in the same waste category in the matrix. While knowledge of process (KOP) is available, a more detailed analysis of both the radioactive and chemical contamination of the waste is needed before a safe and effective treatment option is determined. If bench-scale testing of a treatment process proves the approach unworkable, the remaining alternatives will be reevaluated and an alternate method selected. If no alternative is available, R&D will be applied.

As stipulated in Appendix B of the FFCA, two new treatment processes will be selected each year. Compressed gases is one of the two new treatment processes that will be initiated in FY94. The second process will be selected by January 1, 1994. The selection of the treatment processes to be undertaken uses the requirements established and outlined in the *Characterization Plan for Historical LLMW* (HLL 100) and the *Formal Plan for Prioritizing LLMW Treatment* (HLL 200). The waste categories for which treatment skid technologies have not yet been selected include

- Oxidizers
- Contaminated debris
- Contaminated scrap metal

- Process residues
- Decontamination waste
- Dewatered treatment sludges
- Gas cylinders
- Contaminated metal
- Contaminated chemical products

5.0 STATUS OF OTHER FFCA MILESTONES

This section details the status of all milestones that are not specifically addressed in "Waste Minimization," "Off-Site Treatment," and "Treatment Skids" of this report. The information provided here is not a requirement of AR 100, but is provided to document the progress of other FFCA milestones before their required completion dates. Some FFCA projects and milestones represent stand-alone projects, while others strongly depend upon each other for successful completion. A table summarizing the interrelationships among the FFCA milestones is provided as Attachment B to this report.

5.1 IFLL 100

The preconceptual study to identify options for interim LLMW storage facilities/upgrades is being submitted to the EPA concurrently with this report. The preconceptual study presents options for modifying current LLMW storage facilities to meet 40 CFR Part 264 requirements for permitted storage facilities in the near term. The information developed in the preconceptual study will be used in the RCRA Part B permit application for the facilities. The implementation schedule for final upgrades to the facilities will be provided to the EPA as deliverable IFLL 200, as specified in Appendix B of the FFCA.

5.2 IFLL 200

The implementation schedule for the final upgrades to the interim LLMW storage facilities will be submitted to the EPA one hundred and eighty (180) days after the FFCA effective date. The implementation schedule identifies upgrades and proposes a schedule for their implementation and for submitting any required notifications or permit applications to the New Mexico Environment Department (NMED).

5.3 STRU 100

The preconceptual study will identify any short- and long-term storage facility modifications required to conform with 40 CFR Part 264 Subpart I requirements for the waste contained in TRU Pads 1, 2, and 4 and will be submitted to the EPA on 9/30/94. The preconceptual study will also identify target dates for any new facilities that are required. Certification of compliance with 40 CFR Part 264 Subpart I will be provided to the EPA upon completion of the stipulated upgrades as deliverable STRU 200 in Appendix B of the FFCA.

5.4 STRU 200

Upon completing the upgrades specified in the STRU 100 report and in the Compliance Plan incorporated into the NMED consent agreement, a Certification of Compliance with RCRA's storage requirements under 40 CFR Part 264 Subpart I will be submitted to EPA. The due date is December 17, 2003, or the date specified by the NMED in its final consent agreement as amended with DOE and LANL.

5.5 HLL 100

The characterization plan for historical LLMW is submitted to the EPA concurrently with this report. The characterization plan presents both the methodology and the schedule for characterizing LANL's legacy LLMW. The characterization plan identifies available analytical resources and how they will be used to characterize the wastes. Analytical capacities are limited because the wastes have both hazardous and radioactive components. As of this writing, approximately twenty-seven percent of the wastes have been characterized sufficiently to permit appropriate treatment methods to be selected.

Additional characterization may identify components, either hazardous or radioactive, in subsets of the waste categories that may preclude selected treatment processes. New treatment processes will be developed for these wastes. The formal procedure and plan to set priorities for treatment development and implementation will be provided to the EPA as deliverable HLL 200 of Appendix B of the FFCA.

5.6 HLL 200

The formal procedure to set priorities for treatment development and implementation will be submitted to the EPA on 5/31/94. LANL will use the formal procedure to evaluate waste on three criteria: 1) the risk associated with storage, 2) the volume of the waste stream, and 3) the availability of applicable treatment facilities. LANL will evaluate the hazards associated with long-term storage and the health and environmental impacts associated with loss of storage control. The prioritization plan will be used to determine the order in which wastes will be treated as they are fully characterized.

The programs for development of the CAI Work-Off Plan (CAI 300) and the *Hazardous Waste Treatment Facility (HWTF) Work-Off Plan* (HW 600), the program for future treatment skid development, and the program for off-site treatment facility evaluation (OSS 200) will use the prioritization scheme as the basis of how waste treatment initiatives are undertaken and which of these treatment alternatives will be selected for a given waste stream.

5.7 CAI 100

Hiring and training of CAI operating personnel continued throughout FY 93. They have assisted with completion of facility upgrades and development of operating procedures in preparation for the trial burn. The notice that the operating personnel have been hired for the CAI was submitted to the EPA on 2/1/94.

5.8 CAI 200

CAI system upgrades, testing, staff checkout, and preparation of NEPA and safety documentation continued during FY93 in preparation for a trial burn. The notice that the specified system upgrades, the safety documentation, and the RCRA Part B permit application trial burn have been completed will be submitted to the EPA on 2/13/95.

5.9 CAI 300

The CAI work-off plan for applicable LLMW will be submitted to the EPA on 9/30/95. Hazardous waste treatment can be initiated after the RCRA trial burn under the existing RCRA Part B permit. LLMW can be treated when the LLMW permit modification is received, provided additional regulatory requirements are not imposed by NMED air quality regulations currently being developed for the incineration of radioactive waste. The CAI work-off plan will incorporate the prioritization of waste for treatment developed in HLL 200.

5.10 HW 100

The Preliminary Design Summary Report (Title I) for the HWTF was completed in December, 1992. Development of definitive design (Title II) continued during FY 93, and a RCRA Part B permit application for the HWTF was submitted to the NMED on October 12, 1993. The notice that Title I design was completed is being submitted to the EPA concurrently with this report.

5.11 HW 200

Detailed designs for the HWTF are currently being developed. The notice that the definitive design (Title II) for the HWTF will be submitted to the EPA on 1/30/95.

5.12 HW 300

The RCRA Part B permit application for the HWTF was submitted to the NMED on October 12, 1993. The notice that the RCRA Part B application based on a preliminary design report was submitted is provided concurrently with this report.

5.13 HW 400

This milestone calls for submission of a construction schedule for the HWTF. The definitive schedule for HW 500, HW 600, and HW 700 will be completed and submitted to the EPA on 4/30/95, assuming NMED approves of the RCRA Part B permit for this facility in time.

5.14 HW 500

The beginning of the HWTF construction is dependent on NMED approval of the RCRA Part B permit. A notice will be submitted to the EPA that construction has begun within three months after the effective date of the RCRA Part B permit.

5.15 HW 600

The LLMW work-off plan for the HWTF will be submitted to the EPA eleven months after construction begins.

5.16 HW 700

This milestone date is dependent on NMED approval of the RCRA Part B permit. The notice that construction on the HWTF has been completed will be submitted to the EPA within 20 months after construction begins.

5.17 HW 800

This milestone date is dependent on NMED approval of the RCRA Part B permit. The notice that treatment operations have begun at the HWTF will be submitted to the EPA within 12 months after construction is completed.

5.18 HW 900

Development of this work-off plan will depend on data obtained from LLMW characterization and prioritization (HLL 100 and HLL 200) and the operating schedules for treatment skids constructed and operational at the time of HWTF startup. This milestone date is dependent on NMED approval of the RCRA Part B permit. The notice that the HWTF waste work-off plan has been completed will be submitted to the EPA within 48 months after operations begin.

5.19 LD 100

This milestone called for commencement of LANL's project to use a mobile unit to decontaminate lead bricks previously used for shielding in various projects at LANL. Earlier drafts of the FFCA specified a due date of April 8, 1993. Although the FFCA was not in effect, DOE and LANL were complying with all milestones specified in the draft FFCA at that time.

Before April 8, preparatory activities included preparing and approving of standard operating procedures, completing medical surveillance of all personnel directly participating in the operation, and reviewing the database information for the current inventory of lead bricks in storage to identify and prioritize containers for the decontamination process. All personnel involved with the process completed familiarization with the processing equipment during dry runs initiated on April 8 using non-contaminated material.

The EPA Hazardous Waste Management Division was notified on April 15, 1993, and the Air, Pesticides, and Toxics Division was notified on April 21, 1993 that operations of the lead decontamination trailer began.

On January 8, 1993, EPA Region 6 provided its preconstruction approval of the lead decontamination trailer operation pursuant to 40 CFR Part 261, National Emissions Standards for Hazardous Air Pollutants (NESHAPs). EPA Region 6 received 30-day notification of start-up pursuant to the NEHSAPs requirements on March 8, 1993. Therefore, operations of the trailer before to the start-up date necessarily were limited to the activities previously discussed.

Beginning on April 12, containers of lead bricks were retrieved from storage at Technical Area (TA) 54, Area G a few at a time, and maintained just before processing in an interim status container storage area at TA-50-114, near the decontamination operation. (Using such a "just-in-time" inventory approach at the decontamination facility minimizes radiation exposure potential to site workers.) Following decontamination, the lead bricks are being returned to service throughout LANL. Lead bricks are currently being processed in the decontamination unit at the rate of approximately 4 tons per month. As of this writing, approximately 20.4 tons have been processed and are being returned to service.

5.20 LD 200

LANL established an interim milestone of processing 10 tons of lead bricks by October 8, 1993. As of this writing, 20.4 tons have been processed. The applicable inventory remaining to be processed is approximately 59.6 tons. The notice of completion of treatment of the remaining applicable lead inventory will be submitted to the EPA on October 8, 1994.

5.21 TRU 100

The TRU waste work-off plan will be submitted to the EPA within 26 months of issuing the WIPP waste acceptance criteria (WAC) for the operational phase. The date the WIPP operational phase will begin has not yet been established by EPA and DOE.

5.22 GAS 100

The gas cylinder work-off plan is being submitted to the EPA concurrently with this report. The gas cylinder work-off plan defines the approach and schedule for treatment of gas cylinders. A quality assurance procedure has been developed for the gas cylinders listed in Attachment A, Table II of the FFCA, to ensure that the cylinders that originated from radiation control areas do not contain radiation above background levels. In the interim, these gas cylinders are managed as a mixed waste. The gas cylinders are being evaluated, and the gas cylinders found not to contain radioactive waste are being shipped off site for treatment. Approximately 275 gas cylinders have been shipped off site for treatment, disposal, or recycling during FY 93.

5.23 CNC 100

Certification will be submitted to the EPA within 90 days of the completion of all identified milestones and activities of the FFCA. The certification report will document that all milestones and activities outlined in the compliance plan have been completed and submitted for review.

Appendix A

Appendix A

The first AR 100 to update information regarding Attachment A of Appendix B of the FFCA will be submitted to the EPA on 7/30/94 per Appendix B of FFCA (section II. B. 1). The annual update will address Table I, Low-Level Solid Waste; Table II, Low-Level Liquid and Gaseous Mixed Waste; and Table III, TRU Solid Mixed Waste. The waste types, estimated volumes, category, waste codes, and other information that is currently included in the tables will be updated to reflect new information as it becomes available to DOE and LANL.

Appendix B

Appendix B
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
IFLL 100:	HLL 100	Waste characterization data developed from the characterization plan for historical LLMW will impact storage area types and storage area volumes in the required interim LLMW storage facilities/upgrades.
	HLL 200	The formal plan for prioritizing LLMW treatment will influence the length of time waste is stored and waste segregation configurations in the interim LLMW storage facilities/upgrades.
	IFLL 200	The LLMW storage facilities/upgrades must be included in the schedule.
IFLL 200	HLL 100	The schedule sequence must incorporate the information developed in the characterization plan pertaining to storage areas and storage volumes.
	HLL 200	The schedule must accommodate storage periods and segregation configurations required to meet the LLMW treatment prioritization scheme for LLMW storage facilities/upgrades.
	IFLL 100	The schedule will address the facilities/upgrades identified in the preconceptual study as approved by EPA.
STRU 100	HW 300	The RCRA MW permit application addressed the requirements of the NMED Compliance Order for remediating TRU Pads 1, 2, and 4. These requirements will be incorporated into the preconceptual study for short and long-term storage of TRU MW.
	TRU 100	Any waste characterization and segregation information developed for the preconceptual study will be used in the TRU work-off plan.
	STRU 200	Implementing recommendations from the preconceptual study will ensure compliance with 40 CFR Part 264 Subpart I for TRU MW for TRU Pads 1, 2, and 4 .
STRU 200	STRU 100	The preconceptual study will identify the activities necessary to bring storage of TRU Pads 1, 2, and 4 into compliance with 40 CFR Part 264 Subpart I.
WM 100	WM 200	Information developed from the waste minimization plan will provide the framework for developing and annually updating the LDR waste minimization work plan.

Appendix B
(Continued)
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	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.
	OSS 100	The report on the feasibility of treatment 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.
WM 200	OSS 100	Information developed from the report on the feasibility of treatment of LANL LLMW at off-site facilities 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.
	OSS 200	Information developed from the annual report on off-site shipment of wastes 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.
	CAI 300	Information developed from the CAI work -off plan will be reviewed to ensure that treatment problems created by generating of particular LDR or MW waste streams are used as lessons learned for waste streams currently being generated and new waste streams.

Appendix B
(Continued)
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	TRU 100	Information developed from 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.
HLL 100	OSS 200	Information developed from the waste characterization plan will be reviewed for its applicability to selecting 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 used to further develop and refine LLMW treatment skids and to support the selection of new skids for development (reported in AR 100).
	HW 200	Applicable information developed from the waste characterization plan will be incorporated into the definitive design (Title II) for the HWTF.
	HW 300	Information developed from the waste characterization plan will be reviewed to determine whether any modifications to the RCRA 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 affect 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.

Appendix B
(Continued)
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	HW 900	Applicable information developed from the waste 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 developing the formal plan for prioritizing LLMW treatment.
HLL 200	OSS 200	The formal plan for prioritizing LLMW treatment will incorporate applicable off-site treatment/disposal facilities and will be used to develop action plans for off-site shipment of wastes..
	CAI 200	The formal plan for prioritizing LLMW treatment will be reviewed to support selection of wastes to be used for the RCRA trial burn.
	CAI 300	The formal plan for prioritizing LLMW treatment will be reviewed for its applicability to the CAI work-off plan.
	ATS 100	The formal plan for prioritizing LLMW treatment will be used to further develop and refine LLMW treatment skids and to support the selection of new skids for development (reported in AR 100).
	HW 200	Applicable information from the waste characterization plan will be incorporated into the definitive design (Title II) for the HWTF.
	HW 300	The formal plan for prioritizing LLMW treatment will be reviewed for its applicability to the RCRA MW permit application to the NMED.
	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 affect 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 treatment operations at the HWTF.
	HW 800	Applicable information developed from the waste characterization plan will affect treatment operations at the HWTF.

Appendix B
(Continued)
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	HW 900	Applicable information developed from the waste characterization plan will affect information compiled for the LLMW work-off plan for the HWTF.
	GAS 100	The schedule and sequence for treatment of certain gas cylinders identified in the gas cylinder work-off plan may need to be included in the LLMW prioritization plan.
	HLL 100	Information developed from the waste characterization plan will be the basis for developing the formal plan for prioritizing LLMW treatment.
OSS 100	HLL 100	Decisions on waste shipments to the off-site treatment/disposal facilities identified in this report will use applicable information collected pursuant to the waste characterization plan.
	HLL 200	Information developed in the feasibility report will be reviewed for applicability to prioritizing LLMW treatment.
	HW 300	Information developed in the report on the feasibility of treatment of waste at off-site treatment/disposal facilities will be reviewed to determine whether any modifications to the RCRA MW permit application are required.
	OSS 200	The report on the feasibility of treatment of waste at off-site treatment/disposal facilities will provide the basis for developing the annual action plan for off-site shipment of wastes.
OSS 200	HLL 100	Action plans for off-site shipment of wastes will incorporate information developed from the implementation of the waste characterization plan.
	HLL 200	Action plans for off-site shipment of wastes will incorporate applicable information from this formal plan for prioritizing LLMW treatment.
	HW 300	Action plans for off-site shipment of wastes will provide valuable information on required storage periods of waste, potential problem waste streams, untreatable waste streams, etc., to determine if modifications to the RCRA MW permit application are required.
	HW 600	Wastes not addressed in action plans for off-site shipment of wastes must be addressed in the LLMW work-off plan for the HWTF and/or the CAI.
	OSS 100	The annual action plans for off-site shipment of wastes will use the information developed in the report on the feasibility of treatment of waste at off-site treatment/disposal facilities.

Appendix B
(Continued)
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	CAI 300	Wastes not addressed in action plans for off-site shipment of wastes must be addressed in the LLMW work-off plan for the CAI and /or the HWTF.
CAI 100	CAI 200	Staffing must be completed for the CAI operations before beginning work on the RCRA trial burn.
	CAI 300	Staffing must be completed for the CAI operations before beginning work on the work-off plan for applicable LLMW.
CAI 200	HLL 100	During preparations for the CAI's RCRA trial burn, information developed from the waste characterization plan will be reviewed.
	HLL 200	During preparations for the CAI's RCRA trial burn, the formal plan for prioritizing LLMW treatment will be reviewed.
	TRU 100	Information developed during the CAI's RCRA trial burn will be incorporated into the TRU waste work-off plan specifically for combustible TRU waste.
	CAI 100	The CAI's RCRA trial burn will not be completed until the staffing of the CAI is completed.
	CAI 300	The CAI's RCRA trial burn will be completed before developing the work-off plan for applicable LLMW .
CAI 300	HLL 100	Developing the CAI work-off plan will include reviewing the information developed from the waste characterization plan for its applicability to the CAI plan.
	HLL 200	Development of the CAI work-off plan will include reviewing the information developed for the formal plan for prioritizing LLMW treatment for its applicability to the CAI work-off plan.
	HW 600	Applicable information developed for the CAI work-off plan for applicable LLMW will be reviewed during developing the LLMW work-off plan for the HWTF.
	CAI 100	Developing the CAI work-off plan will not be completed until the staffing is completed for the CAI.
	CAI 200	Developing the CAI work-off plan will not be begun until the RCRA trial burn is completed.
	OSS 200	Wastes not addressed in action plans for off-site shipment of wastes must be addressed in the LLMW work-off plan for the CAI and /or the HWTF.

Appendix B
(Continued)
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
ATS 100 (need copy of report to verify)	HLL 100	The program management plan for the LLMW treatment skids will address developing additional information from the waste characterization plan that will likely be applicable to the development of future treatment skids.
	HLL 200	The program management plan for the LLMW treatment skids will address developing additional information from the formal plan for prioritizing LLMW treatment that will likely be applicable to developing future treatment skids.
	HW 100	The program management plan for the LLMW treatment skids will provide information necessary to completing the Preliminary Design Summary Report (Title I) for the HWTF.
	HW 200	The program management plan for the LLMW treatment skids will provide information necessary to completing the definitive design (Title II).
	HW 300	The program management plan for the LLMW treatment skids will provide information to be incorporated into the RCRA MW permit application.
	HW 400	The program management plan for the LLMW treatment skids will provide information to be incorporated into the time line for completing the HWTF.
	HW 500	The program management plan for the LLMW treatment skids will provide information to be used in the construction of the HWTF.
	HW 600	The program management plan for the LLMW treatment skids will provide information to be incorporated in the LLMW work-off plan for the HWTF.
	HW 700	The program management plan for the LLMW treatment skids will provide information to be used in the construction of the HWTF.
	HW 800	The program management plan for the LLMW treatment skids will provide information to be incorporated in the plans for operating the HWTF.
	HW 900	The program management plan for the LLMW treatment skids will provide information to be used during the implementation of the LLMW work-off plan for the HWTF.
HW 100	HLL 200	Applicable information developed from the waste characterization plan will be incorporated into the definitive design (Title II) for the HWTF.

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	ATS 100	The program management plan for the LLMW treatment skids will address developing additional information from the waste characterization plan that will likely be applicable to the development of future treatment skids.
	HW 200	The definitive design (Title II) will incorporate the Preliminary Design Summary Report (Title I).
	HW 300	Information from the Title I report will be incorporated into the RCRA mixed waste permit application or subsequent modifications of the application.
	HW 400	Information from the Title I report will contribute to developing the schedule for completion of subsequent milestones.
	HW 500	Information developed for the Title I report will be incorporated in the construction of the HWTF.
	HW 700	Information developed for the Title I report will be incorporated in the construction of the HWTF.
HW 200	HLL 200	Applicable information developed from the waste characterization plan will be incorporated into the definitive design (Title II) for the HWTF.
	ATS 100	Information developed from the program management plan for the LLMW treatment skids will be reviewed for applicability to the Title II design elements.
	HW 100	The definitive design (Title II) will incorporate information developed in the Preliminary Design Summary Report (Title I).
	HW 300	Information from the Title I report will be incorporated into the RCRA mixed waste permit application or subsequent modifications of the application.
	HW 400	Information from the Title I report will contribute to developing the schedule for completion of subsequent milestones.
	HW 500	Information developed for the Title II report will be used in the construction of the HWTF.
	HW 700	Information developed for the Title II report will be used in the construction of the HWTF.
HW 300	STRU 100	The RCRA MW permit application addressed the requirements of the NMED Compliance Order for remediating TRU Pads 1, 2, and 4. These requirements will be incorporated into the preconceptual study for short and long-term storage of TRU MW.

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	HLL 100	Information developed from the waste characterization plan will be reviewed to determine whether any modifications to the RCRA MW permit application to the NMED are required.
	HLL 200	The formal plan for prioritizing LLMW treatment will be reviewed for its applicability to the RCRA MW permit application to the NMED.
	OSS 100	Action plans for off-site shipment of wastes will incorporate applicable information from the formal plan for prioritizing LLMW treatment.
	OSS 200	Action plans for off-site shipment of wastes will provide valuable information on required storage periods of waste, potential problem waste streams, untreatable waste streams, etc., to determine if modifications to the RCRA MW permit application are required.
	ATS 100	The program management plan for the LLMW treatment skids will provide information to be incorporated into the RCRA MW permit application.
	HW 100	Information from the Title I report will be incorporated into the RCRA MW permit application or subsequent modifications of the application.
	HW 200	Information from the Title I report will be incorporated into the RCRA MW permit application or subsequent modifications of the application.
	HW 500	The RCRA MW permit application must be approved and a permit issued before activities beginning construction.
	HW 800	The RCRA mixed waste permit must be approved before beginning treatment.
HW 400	HLL 100	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.
	HLL 200	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.
	ATS 100	The program management plan for the LLMW treatment skids will provide information to be incorporated into the time line for completing the HWTF.
	HW 100	Information from the Title I report will contribute to developing the schedule for completing subsequent milestones.

Appendix B
(Continued)
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	HW 200	Information from the Title I report will contribute to developing the schedule for completing subsequent milestones.
	HW 500	The schedule has a definitive time line for beginning construction.
	HW 600	The schedule has a definitive time line for completing the LLMW work-off plan for the HWTF.
	HW 700	The schedule has a definitive time line for completing construction.
HW 500	HLL 100	Applicable information developed from the waste characterization plan, such as waste segregation information, will affect construction components of the HWTF.
	HLL 200	Applicable information developed from the waste characterization plan, such as waste segregation information, will affect construction components of the HWTF.
	ATS 100	The program management plan for the LLMW treatment skids will provide information to be used in constructing the HWTF.
	HW 100	Information developed for the Title I report will be used in constructing the HWTF.
	HW 200	Information developed for the Title II report will be used in constructing the HWTF.
	HW 300	The RCRA mixed waste permit application must be approved and a permit issued before construction begins.
	HW 400	The schedule has a definitive time line for starting construction.
	HW 700	The construction must begin before it can be completed.
	HW 800	The construction of the facility must be completed before treatment can begin.
HW 600	HLL 100	Applicable information developed from the waste characterization plan will affect the LLMW work-off plan for the HWTF.
	HLL 200	Applicable information developed from the waste characterization plan will affect the LLMW work-off plan for the HWTF.
	OSS 200	Wastes not addressed in action plans for off-site shipment of wastes must be addressed in the LLMW work-off plan for the HWTF and/or the CAI.

Appendix B
(Continued)
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	CAI 300	Applicable information developed from the CAI work-off plan for applicable LLMW will be reviewed while developing the LLMW work-off plan for the HWTF.
	ATS 100	The program management plan for the LLMW treatment skids will provide information to be incorporated in the LLMW work-off plan for the HWTF.
	HW 400	The schedule has a definitive time line for completing the LLMW work-off plan for the HWTF.
	HW 800	The LLMW work-off plan for the HWTF must be completed before beginning treatment of the waste.
	HW 900	The LLMW work-off plan must be completed before the waste can be worked off.
	GAS 100	Information developed from implementing the gas cylinder work-off plan may need to be incorporated into the LLMW work-off plan for the HWTF.
HW 700	HLL 100	Applicable information developed from the waste characterization plan, such as waste segregation information, will affect construction components of the HWTF.
	HLL 200	Applicable information developed from the waste characterization plan, such as waste segregation information, will affect construction components of the HWTF.
	ATS 100	The program management plan for the LLMW treatment skids will provide information to be used in constructing the HWTF.
	HW 100	Information developed for the Title I report will be used in constructing the HWTF.
	HW 200	Information developed for the Title II report will be used in constructing the HWTF.
	HW 400	The schedule has a definitive time line for completing construction.
	HW 500	The construction must begin before it can be completed.
	HW 800	The construction must be completed before operation may begin.
HW 800	HLL 100	Applicable information developed from the waste characterization plan will affect treatment operations at the HWTF.

Appendix B
(Continued)
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	HLL 200	Applicable information developed from the waste characterization plan will affect treatment operations at the HWTF.
	ATS 100	The program management plan for the LLMW treatment skids will provide information to be incorporated in the plans for operation of the HWTF.
	HW 300	The RCRA MW permit must be approved before beginning treatment.
	HW 500	The facility must be constructed before treatment can begin.
	HW 600	The LLMW work-off plan for the HWTF must be completed before beginning treatment of the waste.
	HW 700	The construction must be completed before operation may begin.
	HW 900	Treatment operations must begin before waste work-off may be completed.
HW 900	HLL 100	Applicable information developed from the waste characterization plan will affect information compiled for the LLMW work-off plan for the HWTF.
	HLL 200	Applicable information developed from the waste characterization plan will affect information compiled for the LLMW work-off plan for the HWTF.
	ATS 100	The program management plan for the LLMW treatment skids will provide information to be incorporated while implementing the LLMW work-off plan for the HWTF.
	HW 800	Treatment operations must begin before waste work-off may be completed.
LD 100	LD 200	Operation of the lead decontamination trailer must be begun before it can be completed.
LD 200	LD 100	Operation of the lead decontamination trailer must be begun before it can be completed.
TRU 100	STRU 100	Any waste characterization and segregation information developed for the preconceptual study will be used in the TRU work-off plan.

Appendix B
(Continued)
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	CAI 200	Information developed during the CAI's RCRA trial burn will be incorporated into the TRU waste work-off plan specifically for combustible TRU waste.
GAS 100	HLL 100	The schedule and sequence for treatment of certain gas cylinders identified in the gas cylinder work-off plan may need to be included in the LLMW work-off plan.
	HLL 200	The schedule and sequence for treatment of certain gas cylinders identified in the gas cylinder work-off plan may need to be included in the LLMW prioritization plan.
	HW 600	Information developed from the implementation of the gas cylinder work-off plan may be incorporated into the LLMW work-off plan for the HWTF.
AR 100	ALL	The annual report on waste minimization plan for mixed and hazardous waste, the LDR waste minimization work plan, the annual action plan for off-site shipment of wastes, the annual update of off-site facilities capable of and available for treating LLMW, the annual report on skid development, and a brief report of the status of all other milestones will be included in the FFCA annual report.
CNC	ALL	The certification of compliance will be completed and submitted when all other milestones have been completed.