Los Alamos National Laboratory

ENVIRONMENTAL RESTORATION

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Date: February 15, 1996
Refer to: EM/ER:96-058

Mr. David Neleigh
NM Federal Facilities Section
EPA, Region 6, 6PD-N
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

SUBJECT: ANNUAL SUBMITTAL OF THE WASTE MINIMIZATION AND POLLUTION PREVENTION AWARENESS PLAN

Dear Mr. Neleigh:

Enclosed is the annual submittal of the Waste Minimization and Pollution Prevention Awareness Plan for the Los Alamos National Laboratory. This deliverable is required under the specific condition B.1. within Module VIII of the Resource Conservation and Recovery Act Operating Permit. A request for an extension of the submittal date from December 1, 1995 to February 15, 1996, was granted by the EPA in a letter dated December 5, 1995.

If you have any questions, please feel free to contact David McInroy at (505) 667-0819 or Ted Taylor at (505) 665-7203.

Sincerely,

Jorg Jansen, Program Manager
Environmental Restoration

Sincerely,

Theodore J. Taylor, Program Manager
Los Alamos Area Office

JJ/TT/bp

Enclosure: Waste Minimization and Pollution Prevention Aware

15472

EM/ER:96- 058

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CERTIFICATION

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

Document Title: Waste Minimization and Pollution Prevention Awareness Plan

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WASTE MINIMIZATION AND POLLUTION PREVENTION AWARENESS PLAN

LOS ALAMOS NATIONAL LABORATORY

27 MAY 1994

EXECUTIVE SUMMARY

This Waste Minimization and Pollution Prevention Awareness Plan addresses the basic elements and funding requirements for the Pollution Prevention Program at Los Alamos National Laboratory.

Discussion of elements include the Process Waste Assessment methodology, recycling methodology, awareness and training methodology, waste minimization goals and the methodology to meet those goals. Discussion of funding includes Site Coordinator funding, productivity increase funding, Return on Investment funding and an implementation recharge funding mechanisms.

Important companion documentation to this plan include plans for:

- Oil recycling
- Coolant recycling
- Integrated material substitution
- Chemical exchange facility
- Revamped Pollution Prevention Awareness
- Case studies
- External recycling
- Customer service and technical assistance

These additional plans will be finished by 30 September 94.

1.0 INTRODUCTION

1.1 PURPOSE OF PLAN

The purpose of this plan is to establish the Los Alamos National Laboratory (LANL) Waste Minimization and Pollution Prevention Awareness Program. The plan discusses those activities and methods that will be employed to prevent the quantity and toxicity of waste generated at the site. This plan will be in accordance with all federal, state, and Department of Energy (DOE) requirements. The Pollution Prevention Awareness Program is included with the Waste Minimization Program as permitted by DOE Order 5400.1.

This plan will be used to define the mandates and requirements for waste minimization, to define the resources and specific methodologies to implement waste minimization, and to provide a plan to accommodate the specific issues for site wide and generator specific implementation at Los Alamos National Laboratory.

1.2 SCOPE OF PROGRAM

This plan addresses these waste streams:

RCRA hazardous chemicals
Non-RCRA, State regulated waste
Low Level radioactive waste
TRU waste
Low Level and TRU mixed waste
Air emissions and water releases
Sanitary waste

Particular problem areas include mixed waste based on Federal Facilities Compliance Agreement requirements for minimization of mixed waste and water releases based on NPDES requirements. These problem areas are addressed in this plan.

2.0 POLICY

2.1 POLICY STATEMENT

The Laboratory Leadership Counsel and the Pollution Prevention Program Office (P^3O) are committed to minimizing the generation of waste, by giving preference to source reduction, material substitution, and environmentally sound recycling over treatment, control and disposal of such wastes. Laboratory Leadership Counsel will take appropriate action to provide adequate personnel, funding, training, and material on a continuing basis to ensure that the objectives of the Waste Minimization and Pollution Prevention Awareness Program are met. Evidence of this commitment is a written Director's Policy

(DP105) that establishes the Waste Minimization Program at LANL. DP105 as presently approved is shown in Appendix A.

2.2 STATEMENT OF MANAGEMENT COMMITMENT

Laboratory Leadership Counsel will soon implement a much more aggressive, comprehensive, and detailed Waste Minimization Policy that will provide for a specific set of actions that will require all Laboratory functions to implement Waste Minimization in a prescribed manner. This policy will include a mandated preference for source reduction over recycling and a mandated preference of pollution prevention over treatment, storage, and disposal. Adequate resources for pollution prevention will be developed through DOE line item funding and through Laboratory recharge system funding and indirect funding. The Laboratory recharge program will directly pull in implementation funds from the generators.

In addition, the Environmental Management Program Directorate (EM) and the Pollution Prevention Program Office (P^3O) are committed to waste minimization . The EM mission statement is shown in Appendix B, and the (P^3O) mission statement is shown in Appendix C.

3.0 ORGANIZATION AND STAFF RESPONSIBILITIES

The Pollution Prevention Program organization is shown in Appendix D and includes:

The Laboratory Director who has general oversight and implementation responsibilities and provide annual review of the program goals and performance;

The Environmental Management Office (EM) which is the Office of Primary Responsibility for Pollution Prevention (P^3O) program;

The Pollution Prevention Program Office (P^3O) works to provide every generating group with a base of technical knowledge in waste minimization, appropriate procedures to identify applicable problems, and appropriate procedures to identify applicable problems, and appropriate solutions in waste reduction.

The (P^3O) also interfaces with generators to anticipate changes that arise from program changes, emerging technologies, changing disposal requirements, and regulatory changes. From this proactive position, the (P^3O) will continue to identify waste minimization opportunities. The (P^3O) charter includes oversight of administrative and technical methods for waste minimization, segregation, and education. Team members take the necessary steps to change procedures and policy, when required.

The (P^3O) develops educational and training materials and teaches some of the waste management and minimization courses. This educational process includes formal classroom settings, informal briefings to generating groups and Waste Management

Coordinators, and individual sessions for solving specific problems. Team members also develop and distribute technical bulletins on waste minimization and other pertinent information. The (P^3O) maintains the electronic data base required to supply the technical information needed for process changes and substitutions.

The responsibilities of the (P^3O) include:

Provide oversight and guidance for waste minimization implementation of generating functions;
Help generators to identify potential technical and administrative solutions for waste generating problems and assist in preparation of site specific plans;
Set waste minimization goals and track and report waste minimization data;
Serve as the Site Waste Minimization coordinator for EM and DP;
Obtain waste generator support and input for the program;
Establish waste minimization goals and objectives;
Sponsor ongoing employee awareness and training;
Coordinate program participation by represented areas;
Prioritize waste streams or facility areas for assessment; and
Assist teams to conduct process waste assessments;
Recommend and rank options for management implementation;
Monitor performance of waste minimization options that have been implemented and evaluating performance accordance to success criteria;
Monitor and report progress of the waste minimization program, utilizing audits and monthly reviews;
Recommend personnel for achievement and incentive awards, and
Facilitate technology transfer and pollution prevention awareness.

Laboratory Managers and Waste Management Coordinators. A Waste Management Coordinator will be appointed by Laboratory managers for each generating group. The Coordinator is the focal point of waste minimization and waste management within the group. Generators will be accountable for waste minimization implementation through the recharge funding mechanism.

Waste management coordinators need to know the processes and systems that generate waste within their groups. The Laboratory provides training to coordinators to enhance their ability to minimize and manage waste. Coordinators are encouraged to review their operations in detail and find specific ways to reduce waste on an ongoing basis.

4.0 GOALS

4.1 SPECIFIC GOALS

This plan sets forth the following goals. All baseline years are for FY91.

WASTE CLASS	FY91 LEVEL	FY99 REDUCTION GOAL
Hazardous RCRA	215,353 KG[a]	50%
Non-RCRA, State regulated waste	886,253 KG	50%
Low Level radioactive waste	5769 M^3	50%
TRU Waste	114 M^3	50%
Low Level and TRU mixed waste	301 M^3	50%
Air emissions	1200 POINTS	50%
Water releases	123 SOURCES	50%
Sanitary waste	4,800 TONS	50%
Ozone depletors	1076 KG	50%

[a]It is important to note that EPCRA chemicals are tracked with hazardous chemicals and are therefore included in the Hazardous RCRA category.

33/50 CHEMICALS

Reduction of these 33/50 chemicals will be addressed from 1991 baseline:

TARGET CHEMICAL	FY99 REDUCTION GOAL
Toluene	50%
Lead and Compounds	50%
Chlorofluorocarbons	50%
Sulfuric Acid	50%

4.2 ACTIVITY FLOW CHARTS

Flow charts for these activities are shown in Appendix G.

4.2a HAZARDOUS RCRA

1. Perform Process Waste Assessments on all major waste streams (20 per year for three years)
Perform system walkthroughs on all minor waste streams (20 per year for three years)
2. Use process data and Best Available Technology to define a Site Specific Plan for the implementation of process and administrative changes for waste minimization.
3. Use special project funding to address particularly difficult and large waste streams.
4. Further develop external recycling as a cost effective and environmentally sound alternative to disposal.
5. Milestones include addressing the major processes that generate chemical waste including analytical chemistry, photographic processing, machining, explosives processing, and laser processes.

These activities are flagged in Sections 6 and 7 as requirements to meeting these goals.

4.2b EPCRA CHEMICALS

Reduction of EPCRA chemicals are addressed as part of the hazardous RCRA class of chemicals and are included in the PWA and recycling processes defined in section 4.2a.

4.2c NON-RCRA STATE REGULATED

Non-RCRA regulated wastes include oil and other non-RCRA chemicals. These chemicals will be reduced through recycling efforts and substitution where possible. Current efforts include recycling of all oils, oil contaminated water and other hydrocarbons through an external recycler.

4.2d LOW LEVEL RADIOACTIVE

1. Perform Process Waste Assessments on all major waste streams (15 per year for three years)
Perform system walkthroughs on all minor waste streams (15 per year for three years)
2. Use process data and Best Available Technology to define a Site Specific Plan for the implementation of process and administrative changes for waste minimization including segregation and substitution.
3. Use special project funding to address particularly difficult and large waste streams.
4. Use the Waste Acceptance for Non-nuclear Disposal (WAND) project to eliminate suspect waste, which is estimated at approximately 50% of the LLW stream.
5. Milestones include addressing the major processes that generate LLW waste including actinide processing, analytical chemistry, and machining.

These activities are flagged in Sections 6 and 7 as requirements to meeting these goals.

4.2e TRU

1. Perform Process Waste Assessments on the major waste streams.

2. Use process data and Best Available Technology to define a Site Specific Plan for the implementation of process and administrative changes for waste minimization including segregation and substitution.
5. Milestones include addressing the major process that generates TRU waste at TA-55.

These activities are flagged in Sections 6 and 7 as requirements to meeting these goals.

4.2f MIXED WASTES
Mixed wastes are addressed in the same way that RCRA hazardous and Low Level Wastes are in Sections 4.2a & d. In addition, because of the FFCA, mixed wastes will be addressed first. PWAs for the 40 mixed waste generators have already been initiated and will be finalized in the first part of FY95.

4.2g AIR EMISSIONS
These releases are addressed as part of the PWA process on any system with these releases as part of their mass balance.

4.2h WATER RELEASES
These releases are addressed as part of the PWA process on any system with these releases as part of their mass balance.

4.2i SANITARY WASTE
Sanitary waste is addressed by source reduction and by recycling. Source reduction will be included in the forthcoming Green Facilities Program which will include procurement of recycled materials and energy and water conservation. Recycling programs for sanitary waste at the Laboratory currently include the recycling of paper, industrial and precious metals, electrical and mechanical equipment, and office equipment. Future recycling plans include cardboard recycling through the Site Coordinator Program.

4.2j OZONE DEPLETORS
Ozone depletors at the Laboratory fall into two categories, refrigerants and cleaning solvents. Both of these waste streams will be eliminated by substitution.

4.2k 33/50 CHEMICALS
Toluene, lead, Chlorofluorocarbons, and sulfuric acid waste streams will be eliminated through recycling efforts.

4.3 TOTAL PWAs REQUIRED
We estimate that a total of 210 PWAs and walkthroughs will be required to address all of the Laboratory's waste generating processes. These 210 PWAs and walkthroughs required are estimated based on the list of waste generating groups.

4.4 PROCUREMENT OF RECYCLED MATERIALS

The Laboratory, through the purchasing department, is currently in the process of upgrading its procurement of recycled materials. The Laboratory does purchase a large amount of recycled paper goods.

4.5 NON-ROUTINE QUALITATIVE GOALS

Waste minimization considerations will be incorporated into Environmental Restoration Program site characterization and site remediation activities to minimize waste generation from these ER activities. Waste minimization methodology will be built into Decontamination and Decommissioning (D&D) procedures to ensure that environmental restoration is accomplished in a manner that provides for least amount of waste generated possible form these activities. Waste minimization will also be built into spill cleanup procedures to also ensure that the least amount of waste is generated from that activity.

4.6 ES&H ADS

ES&H ADS, as submitted to DOE, to support these planning efforts, are shown in Appendix E.

4.7 TECHNOLOGY DEVELOPMENT

The Laboratory uses Laboratory Directed Research and Development funding and DOE Return on Investment funding to develop bench, pilot and full scale technologies for waste minimization. These technologies address specific Laboratory problems and are ultimately transferable. Specific projects are discussed in Appendix F.

5.0 SITUATION ANALYSIS

5.1 CURRENT SITUATION

The Waste Minimization program at LANL is in a transition phase. Previous effort was directed towards setting up systems to support the implementation of waste minimization. This effort is complete and implementation efforts have begun. Baseline site coordinator efforts will be ongoing. The implementation phases will be funded through recharge on waste generation rates. Recharge implementation funding will be used to fund projects within the CSO that provided the recharge funds. Special project will continue under EM funding.

5.2 PROGRAM DIRECTIVES

This program is driven by the following directives:

- Resource Conservation and Recovery Act
- New Mexico State Hazardous Waste Management Regulations
- Federal Facilities Compliance Act
- Emergency Planning and Right to Know Act
- Pollution Prevention Act
- DOE Order 5400.1
- DOE Order 5820.2A
- Executive Order 12856

5.3 RELEVANT SITE DIRECTIVES AND GUIDANCE

Waste minimization is required by the following Laboratory directives and procedures:

- DP-105, Director's policy
- Federal Facilities Compliance Agreement
- 10-1 Radioactive Liquid Waste
- 10-2 Low-Level Radioactive Solid Waste
- 10-3 Chemical, Hazardous, and Mixed Waste
- 10-4 Polychlorinated Biphenyls
- 10-5 Transuranic (TRU) Solid Waste
- 10-6 Excess Government Personal Property
- 10-8 Waste Minimization

5.4 BARRIERS ANALYSIS

Potential problems exist from the lack of a multi-year, long term overall DOE implementation strategy. This problem will be partially addressed at the Laboratory by the use of recharge funding and EM special projects funding.

5.5 PLANNING ASSUMPTIONS

P^3O assumes the acceptance of the recharge funding system by both the generators and their funding organizations, as well as assuming the continued support of DOE and the Laboratory.

6.0 SITE WIDE PROGRAM ELEMENTS

NARRATIVE DESCRIPTION

6.1 ORGANIZATION AND INFRASTRUCTURE

This element covers both EM and DP efforts and provides for the site coordinator activities for the EM coordinator, and includes management and oversight of implementation efforts.

Milestones: Annual report

6.2 PROGRAM DEVELOPMENT

Program development includes program leadership, strategic planning and direction, guidance and procedures, procurement of funding, including developing and operating a recharge system for implementation, and visitor support. Program management includes personnel management, Activity Datasheet System management, Work Authorization Directive management, FFCA deliverables, Tiger Team Action Plans deliverables. The scope of this work package also includes coordination of the interactions between LANL and DOE and other outside stakeholders. It includes providing performance evaluation procedures and QA, and includes providing technical support and data to other Laboratory functions. Clerical and secretarial support for the entire program are included in this work element.

Milestones: Internal Laboratory Strategic Plan
Recharge system finalized

6.3 EMPLOYEE INVOLVEMENT

This work element includes the Pollution Prevention Awareness Campaign, an employee awareness effort; writing training materials and Newsbulletin articles. This effort also includes SOP review to implement waste minimization. It also includes support of non-Laboratory education programs. This work element also includes the employee suggestion program, an annual contest that collects and judges suggestions and provides cash incentives for suggestions. Implementation of suggestions is not included in this element.

Milestones: Monthly waste coordinator meetings
Annual Incentive Award Competition

6.4 TRACKING

This work element provides for the oversight of waste generating data and trends and may include the development of a fence to fence tracking system. This element also provides for the development of a normalized waste generating baseline that takes into account off-normal generation from D&D and spills.

Milestones: Normalized data base system established

6.5 REPORTING

This work element provides for all reporting to Headquarters and Operational offices including Program Tracking System reporting requirements, and the Annual report deliverable. This element also provides support to other Laboratory reporting requirements that have a waste minimization component.

Milestones: Annual report to DOE
Annual report to EPA and New Mexico Environment Department

6.6a REDUCTION PROGRAMS

This work element provides for the continuing development and implementation support of the Process Waste Assessment system. This includes testing and maintenance of the software model, performing walkthroughs with the generator, developing and providing Best Available Technology databases to provide the best technical solutions, developing and providing a Cost/Benefit model to provide the best economic solutions, supporting applicable funding development efforts, collating data, and writing reports.

This work element also includes using PWA data and contractor support to support the development of Site Specific Waste Minimization Plans for generators implementation efforts. This effort also includes development support of SSPs that do not require an initial PWA effort.

This work element also includes development of funding and oversight management of implementation efforts by the generators. This element also includes the initial design elements of Green Facilities programs and Environmentally Conscious Manufacturing programs and development of the funding for these programs.

This work element also includes special projects that address particular problems. These projects are described in Appendix F "Specific Research and Development Projects of Note".

Milestones: Support 70 PWAs, walkthroughs and SSP efforts per year for three years
Support Return on Investment and Productivity Increase funded projects on major waste streams.

6.6b RECYCLING PROGRAMS

This work element includes both internal and external recycling efforts. Internal recycling includes distribution of a list of reusable chemicals to interested Laboratory personnel. External recycling includes development of technical and contractual relationships to recycle chemicals through commercial users. Actual recycling implementation costs are not included in this element.

Milestones: Expand external recycling efforts to address all major chemical waste streams

Expand internal recycling efforts to address all specific chemical waste streams

6.6c SANITARY WASTE

Sanitary waste is addressed by source reduction and by recycling. Source reduction will be included in the forthcoming Green Facilities Program which will include procurement of recycled materials and energy and water conservation. Recycling programs for sanitary waste at the Laboratory currently include the recycling of paper, industrial and precious metals, electrical and mechanical equipment, and office equipment. Future recycling plans include cardboard recycling through the Site Coordinator Program.

Milestones: Develop Recycling Program Implementation Plan
Expand external recycling efforts on all commercially viable waste streams

6.7 TECHNICAL ASSISTANCE

This work element includes the review of all new projects by the ES&H Questionnaire Committee to ensure that waste minimization is included in the design phase of the program.

Milestones: Review every new Laboratory project that has a waste minimization potential

6.8 INFORMATION AND TECHNOLOGY EXCHANGE

This work element includes transfer and coordination of R&D needs to appropriate technical groups for further development. It also includes the transfer and coordination of technology that is developed in the PWA process and is of commercial benefit through Laboratory tech transfer organizations.

Milestones: Ongoing transfer of all technologies that are commercially viable.

6.9 PROGRAM EVALUATION

This work element includes evaluation of employee participation and overall program performance. It also provides for oversight of the generators waste minimization implementation efforts.

TABLE 6.1 Required resources for the site wide WMin/PP program for FY94-FY96

	FY94 BUDGETED $K	FY95 ESTIMATED $K	FY96 ESTIMATED $K
6.1 ORGANIZATION AND INFRASTRUCTURE	100[a]	105[a]	110[a]
6.2 PROGRAM DEVELOPMENT	250[a]	262[a]	275[a]
6.3 EMPLOYEE INVOLVEMENT	50[a]	52[a]	55[a]
6.4 TRACKING	90	95	99
6.5 REPORTING	50	52	55
6.6a REDUCTION PROGRAMS	500[a]	525[a]	551[a]
6.6b RECYCLING PROGRAMS	100[a]	350[a]	350[a]
6.6c SANITARY WASTE	0	0	0
6.7 TECHNICAL ASSISTANCE	50	52	55
6.8 INFORMATION AND TECHNOLOGY EXCHANGE	50	52	55
6.9 PROGRAM EVALUATION	50	52	55
TOTAL	1,290	1597	1660

[a]THESE ACTIVITIES ARE DIRECTLY REQUIRED TO MEET THE GOALS LISTED IN SECTION 4.

TABLE 6.2 Estimated resources for the site wide WMin/PP program for FY97-FY99

	FY97 ESTIMATED $K	FY98 ESTIMATED $K	FY99 ESTIMATED $K
6.1 ORGANIZATION AND INFRASTRUCTURE	116[a]	121[a]	128[a]
6.2 PROGRAM DEVELOPMENT	289[a]	304[a]	319[a]
6.3 EMPLOYEE INVOLVEMENT	58[a]	61[a]	64[a]
6.4 TRACKING	104	109	115
6.5 REPORTING	58	61	64
6.6a REDUCTION PROGRAMS	579[a]	608[a]	638[a]
6.6b RECYCLING PROGRAMS	350[a]	350[a]	350[a]
6.6c SANITARY WASTE	100	100	100
6.7 TECHNICAL ASSISTANCE	58	61	64
6.8 INFORMATION AND TECHNOLOGY EXCHANGE	58	61	64
6.9 PROGRAM EVALUATION	58	61	64
TOTAL	1828	1902	1980

[a]THESE ACTIVITIES ARE DIRECTLY REQUIRED TO MEET THE GOALS LISTED IN SECTION 4.

7.0 GENERATOR PROGRAM ELEMENTS

NARRATIVE DESCRIPTION

7.1 ORGANIZATION AND INFRASTRUCTURE
This work element provides for the support of the DP site coordinator.

7.2 PROGRAM DEVELOPMENT
At LANL, this work element is a site wide activity and therefore not included in generator activities.

7.3 PROGRAM PARTICIPATION
This work element provides for generator participation in information exchange activities, provides for generator effort in fence to fence tracking systems, and provides for generator input into data collection activities.

Milestones: Finalize the development of the fence to fence tracking system

7.4 FACILITY TRAINING
This work element provides for generator participation in training activities.

Milestones: Ongoing generator participation in training activities.

7.5 OPPORTUNITY ASSESSMENTS
This work element provides for the continuing implementation by the generators of the Process Waste Assessment system. This includes performing walkthroughs with the Pollution Prevention Program Office support and operating the PWA software. This element includes performing 45 PWAs per year.

Milestones: Perform 45 PWAs, walkthroughs and SSP per year for three years
Use Return on Investment and Productivity Increase funded projects on major waste streams.

7.6a REDUCTION PROGRAMS
This work element includes using PWA data and contractor support to support the development of Site Specific Waste Minimization Plans (SSP) for DP generators implementation efforts. This effort also includes development of SSPs that do not require an initial PWA effort. This element includes implementing 70 SSPs per year.

Milestones: Implement 70 SSPs per year for three years

7.6b RECYCLING PROGRAMS
This work element includes both internal and external recycling efforts. Internal recycling includes distribution of a list of reusable chemicals to interested Laboratory personnel.

External recycling includes development of technical and contractual relationships to recycle chemicals through commercial users.

Milestones: Ongoing reuse of internally recycled chemicals
Ongoing segregation of chemicals into recyclable streams.

7.6c SANITARY WASTE

Sanitary waste is addressed by source reduction and by recycling. Source reduction will be included in the forthcoming Green Facilities Program which will include procurement of recycled materials and energy and water conservation. Recycling programs for sanitary waste at the Laboratory currently include the recycling of paper, industrial and precious metals, electrical and mechanical equipment, and office equipment. Future recycling plans include cardboard recycling.

Milestones: Expand external recycling efforts on all commercially viable waste streams

7.7 DESIGN CONSIDERATIONS

At LANL, this work element is a site wide activity and therefore not included in generator activities.

7.8 PROGRAM EVALUATION

At LANL, this work element is a site wide activity and therefore not included in generator activities.

TABLE 7.1 Required resources for the generator WMin/PP program for FY94-FY96

	FY94 BUDGETED $K	FY95 ESTIMATED $K	FY96 ESTIMATED $K
7.1 ORGANIZATION AND INFRASTRUCTURE	36	36	36
7.3 PROGRAM PARTICIPATION	60[a]	60[a]	60[a]
7.4 FACILITY TRAINING	50	50	50
7.5 OPPORTUNITY ASSESSMENTS	407[a]	407[a]	407[a]
7.6a REDUCTION PROGRAMS	407[a]	407[a]	407[a]
7.6b RECYCLING PROGRAMS	0	160[a]	160[a]
7.6c SANITARY WASTE	0	0	0
TOTAL	960[b]	1920[b]	1920[b]

[a]THESE ACTIVITIES ARE DIRECTLY REQUIRED TO MEET THE GOALS LISTED IN SECTION 4.
[b]THESE BUDGETS ARE BASED ON ESTIMATES OF REVENUE RECEIVED FROM THE NEW RECHARGE SYSTEM FOR THE IMPLEMENTATION OF WASTE MINIMIZATION.

Note that these budgets do not escalate because these funds are derived from a recharge system based on generation rates and generation is expected to go down, not escalate.

TABLE 7.2 Estimated resources for the generator WMin/PP program for FY97-FY99

	FY97 ESTIMATED $K	FY98 ESTIMATED $K	FY99 ESTIMATED $K
7.1 ORGANIZATION AND INFRASTRUCTURE	36	36	36
7.3 PROGRAM PARTICIPATION	60[a]	60[a]	60[a]
7.4 FACILITY TRAINING	50	50	50
7.5 OPPORTUNITY ASSESSMENTS	757[a]	757[a]	757[a]
7.6a REDUCTION PROGRAMS	757[a]	757[a]	757[a]
7.6b RECYCLING PROGRAMS	160[a]	160[a]	160[a]
7.6c SANITARY WASTE	100[a]	100[a]	100[a]
TOTAL	1920[b]	1920[b]	1920[b]

[a]THESE ACTIVITIES ARE DIRECTLY REQUIRED TO MEET THE GOALS LISTED IN SECTION 4.
[b]THESE BUDGETS ARE BASED ON ESTIMATES OF REVENUE RECEIVED FROM THE NEW RECHARGE SYSTEM FOR THE IMPLEMENTATION OF WASTE MINIMIZATION.

Note that these budgets do not escalate because these funds are [illegible] recharge system based on generation rates and generation is expected to go down, not escalate.

Los Alamos National Laboratory

ENVIRONMENTAL RESTORATION PROJECT
WASTE MINIMIZATION AWARENESS PLAN

1996 Submittal

15 February 1996

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Los Alamos National Laboratory
Environmental Restoration Project

WASTE MINIMIZATION AWARENESS PLAN

15 February 1996

1.0 INTRODUCTION

Waste minimization is an inherent goal within all the operating procedures of the Los Alamos National Laboratory (the Laboratory). The U.S. Department of Energy (DOE) and the Laboratory are required by the U.S. Environmental Protection Agency (EPA) to submit annually a waste minimization plan, as part of the Laboratory's operating permit under the Hazardous and Solid Waste Amendments Act (HSWA). This document represents the waste minimization and pollution prevention (WMin/PP) awareness plan for the Laboratory's Environmental Restoration (ER) Project.

This plan demonstrates that the Laboratory's ER Project supports WMin/PP as a goal and that there is an active and ongoing program in place to incorporate waste reduction practices into ER activities and procedures. The plan was prepared by the Environmental Restoration Project, Program Office, in the Environmental Management Directorate, and it supports the requirements of module VIII, Section B.1 of the Laboratory's HSWA operating permit. This plan is specific to the ER Project and should be considered a companion document to the Laboratory's site-wide plan, *The Los Alamos National Laboratory Waste Minimization and Pollution Prevention Awareness Plan,* dated May 27, 1994.

1.1 Background

The mission of the Laboratory's ER Project is to protect human health and the environment from risks posed by inactive and surplus DOE facilities and contaminated areas, by remediating sites and facilities in the most cost efficient and responsible manner possible in order to provide for potential future beneficial use. In completing this mission, ER activities[1] have the potential to result in large volumes of waste that will require special handling,

[1] Throughout the text of this document, "ER" refers to both the clean-up of environmental media and the safe decontamination and decommissioning of inactive facilities.

treatment, storage, and disposal. Because the contamination is already present in the environmental media or facility (as a result of past DOE activities), the ER Project is not the original generator of the waste, in the traditional sense. However, the ER Project is faced with the responsibility and the challenge to minimize the amounts of waste that will require subsequent management or disposal. Minimization is necessary because of the high cost of waste management, the limited capacity for on-site or off-site waste treatment, storage, or disposal, and the need to protect the environment from future off-site releases caused by current waste management practices.

In 1990, Congress passed the Pollution Prevention Act (PPA) which changed the focus of environmental policy from "end-of-pipe" regulation to encouraging source reduction or eliminating waste prior to treatment, storage, or disposal. Under the PPA, all waste generators must certify that they have a waste minimization "program in place" as specified in 40 CFR 265.75(h). The elements of this program are further defined in the May 1993 EPA interim final guidance, "Elements of a Resource Conservation and Recovery Act (RCRA) Waste Minimization Program in Place." The program guidance lists what EPA considers the minimum level of infrastructure and effort which must be expended to have an acceptable program. This includes top management support, process evaluation, technology exchange, waste minimization employee training, and waste generation tracking and projections.

DOE also requires a pollution prevention program as outlined in the 1994 Waste Minimization/Pollution Prevention Crosscut Plan (DOE/FM-0145). The DOE program has specific program requirements for every waste generator which includes evaluating waste minimization options as early in the planning process as possible. The DOE Program also places responsibility for WMin/P2 implementation with the waste generating program.

1.2 Purpose and Scope

The purpose of this plan is to establish an approach for minimizing the wastes generated by the Laboratory's ER Project. This plan discusses the methods and activities that will be routinely employed to prevent or reduce waste generation in FY 1996; and it reports historical waste generation quantities and significant waste minimization accomplishments for FY 1995. It also discusses the ER Project Director's commitment to WMin/P2 and provides a discussion of specific program elements for the ER WMin/P2 program, and a presentation of the barriers to implementation of further significant reductions.

This plan is designed to fulfill the requirements of the Laboratory's Hazardous and Solid Waste Amendments Act Permit, Module VIII, Section B.1, and the generator requirements within the Resource Conservation and Recovery Act, 40 CFR 265.75(h).

The scope of this plan addresses all waste types generated by the ER Project during the course of planning and conducting the investigation and clean-up of environmental media and the decontamination and decommissioning of DOE facilities. Wastes generated by ER include "primary" and "secondary" waste streams: primary waste consists of contaminated material or media that was present in the environment or facility as a result of past DOE activities prior to any containment and restoration activities such as contaminated building debris, or contaminated groundwater or soil from a removal action; secondary waste streams consist of materials that were added to the investigative or remedial process or utilized in the process of remediation, such as investigative derived waste (e.g., personal protective equipment [PPE], sampling waste, drilling cuttings), wastes resulting from treatment, storage or handling operations, and additives used to stabilize waste, etc. Waste types generated vary on a case-by-case basis and may include: low-level radioactive (LLW), low-level mixed radioactive mixed (LLM), transuranic radioactive (TRU), chemical wastes (which includes RCRA hazardous, Toxic Substances Control Act (TSCA) hazardous, and New Mexico Special Waste), and commercial waste.

The scope of a WMin/P2 effort for an individual ER Project will be dependent on the primary and secondary wastes expected and the feasibility of waste reduction for those waste types.

1.3 Requirements of the Operating Permit

The Laboratory's Operating Permit, (Hazardous and Solid Waste Amendments Act Permit, Module VIII, Section B.1) requires a waste minimization program in place; and the submittal of an annual submittal of an awareness plan. The specific requirements of the permit are listed in Table 1.3.1 along with the corresponding section of the plan that addresses the requirement.

Table 1.3.1

Los Alamos National Laboratory HSWA Permit Module VIII, Section B.1

Permit Requirement	Topic	Refer to Report Section
Section B.1.a.1	Policy Statement	Section 2.0
Section B.1.a.2	Employee Training	Section 6.3
Section B.1.a.2	Incentives	Section 6.11
Section B.1.a.3	Past Source Reduction and Recycling	Section 5.4
Section B.1.a.4	Itemized Capital Expenditures	Section 5.4
Section B.1.a.5	Barriers to Implementation	Section 7.0
Section B.1.a.6	Sources of Information	Section 6.4
Section B.1.a.7	Investigation of Additional WMin Efforts	Section 6.2
Section B.1.a.8	Utilization of Hazardous Materials	Section 5.2
Section B.1.a.9	Justification of Waste Generation	Section 5.0
Section B.1.a.10.a	Site Lead Inventory Program	Section 6.12
Section B.1.a.10.b	Steel for Lead Substitution Program	Section 6.12
Section B.1.a.10.c	Lead Shielding Coating Program	Section 6.12
Section B.1.a.10.d	Lead Decontamination Program	Section 6.6
Section B.1.a.10.e	Scintillation Cocktail Substitution Program	Section 5.2
Section B.1.a.10.f	Radioactive Waste Segregation Program	Section 6.6

2.0 PROGRAM DIRECTOR POLICY STATEMENT AND MANAGEMENT COMMITMENT

The Laboratory's ER Project Director, Program Managers, Field Project Leaders, and other project personnel are committed to preventing or reducing the generation of waste from ER Project activities, as much as is technically and economically feasible and consistent with the ER project mission.

The Laboratory's support for pollution prevention and waste minimization programs is documented in the Laboratory's Administrative Requirements ("Waste Minimization," Administrative Requirement 10-8 in *Environment, Safety, and Health Manual,* Los Alamos National Laboratory Manual, Chapter 1) and in a Director's Policy Statement, DP 105, Waste Minimization. In addition, the Environmental Management Directorate (EM), of which ER is a part, is committed to WMin/P2.

The ER Project fully supports the Laboratory's and EM's written WMin/P2 policies and commitments. The ER Project will support the goal of waste reduction by giving preference to source reduction, improved segregation and characterization, and environmentally and regulatory sound recycling practices over waste treatment and disposal techniques. Evidence of the ER Project commitment is demonstrated by this plan, as well as the documentation of past waste reduction efforts within the ER Project (Section 5.4 and Attachment B) and the ER Waste Minimization Awareness Strategy/Action Plan (see attachment A). The ER Project will allocate sufficient resources necessary to pursue the goals and approaches established by this plan and will coordinate with the EM Directorate and the Pollution Prevention Program Office (P3O), as necessary.

3.0 ORGANIZATIONAL STRUCTURE AND STAFF RESPONSIBILITIES

The ER project is part of the Environmental Management Directorate at the Laboratory, and is subject to all Laboratory and EM policies and requirements. The organizational structure of the ER Project is shown in Figure 3.0.1.

Los Alamos National Laboratory
Environmental Restoration Project
Waste Minimization Organization Chart

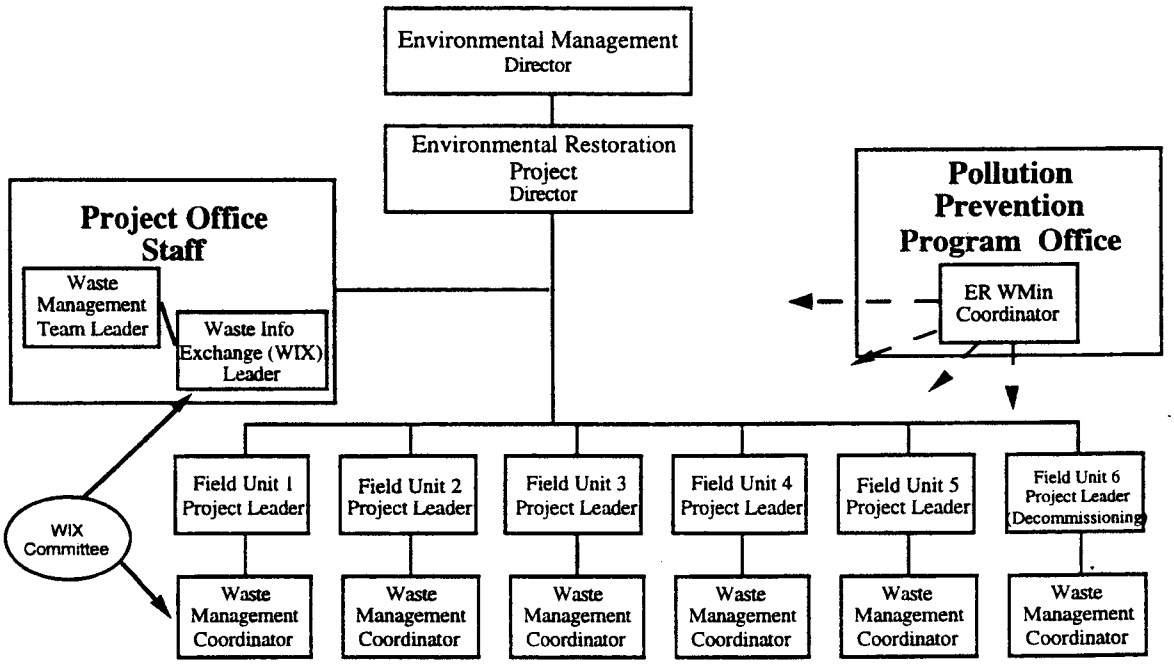

Figure 3.0.1

The organizational structure for developing and implementing WMin/PP programs in ER are outlined below:

- The Laboratory Director and the Associate Director for Operations have oversight responsibilities and provide annual review of the Laboratory wide WMin/PP program goals and performance.

- The Environmental Management Directorate (EM Project Office) has primary responsibility for the Laboratory-wide WMin/PP program and the ER Project.

- The EM/Pollution Prevention Program Office (P3O) has been delegated by the EM Directorate to develop and manage the Laboratory-wide WMin/PP program. The P3O provides oversight for WMin/PP implementation; a base of technical knowledge and resources for WMin/PP practices; assistance with identifying waste generation trends and WMin/PP opportunities; recommendations for WMin/PP solutions and applications; support in tracking and reporting waste generation trends and WMin/PP successes; assistance in preparing funding applications and proposals for WMin/PP projects; and facilitation of actions to overcome WMin/PP implementation barriers. For FY 1996, the P3O has taken the responsibility to designate P3O resources as WMin/P2 coordinators for the ER Project.

- The ER Project Director has primary responsibility for developing and implementing WMin/PP programs and strategies for all ER projects that result in waste generation, as described in this plan. The ER Project must allocate sufficient resources to facilitate the successful attainment of the goals and approaches identified in this plan. The ER project is responsible for establishing and submitting an annual WMin/PP plan to EPA, establishing WMin/PP goals and performance measures, and coordinating with the P3O, as necessary, to implement WMin/PP activities and to report success stories.

- The ER Project - Waste Management (WM) Team Leader, is the focal point for planning and implementing waste minimization activities and reporting of waste minimization successes for the ER Project. The ER WM Team Leader is the primary liaison between the P3O and the ER WMin/PP program. For FY 1996, the WM Team Leader will coordinate directly with the WMin/P2 coordinators.

- ER Project Field Project Leaders (FPLs) report to the ER Director. The FPLs have the responsibility to identify and incorporate WMin/PP practices into project plans, and field activities, as much as technically and economically feasible.

- The Waste Information Exchange Team (WIX) Leader, reports to the Waste Management Team Leader. The WIX assists with overseeing and implementing the WMin/PP responsibilities and facilitates WMin/PP information exchange and the tracking and reporting of WMin/PP successes. The WIX includes waste coordinators for each of the field units who are responsible for maintaining competence in the field on waste management and waste minimization.

4.0 GOALS AND PERFORMANCE MEASURES

The overall goal of the ER's WMin/PP strategy is to increase the routine implementation of WMin/PP practices in the planning and execution of ER activities so as to avoid or reduce waste requiring subsequent handling or disposal. Performance measures for the WMin/PP effort include:

- Increased cognizance of WMin/P2 within the ER Project,
- Volume of waste reduced or avoided,
- Volume of material recycled or reused,
- Documentation of WMin/P2 successes.

Specific metrics and reporting requirements will be determined during the second quarter of FY 1996, through interaction with the ER Project Office, the ER FPLs, the P3O, and the DOE Albuquerque Operations Office. Because of the non-routine nature of ER waste, it is not possible to provide measurable waste reduction goals for specific waste types.

The ER WMin/PP approach will focus on:

- First, avoiding or reducing LLW, LLM, TRU or TRU-Mixed that requires handling or disposal at the on-site waste management facility (TA 54);
- Second, avoiding or reducing hazardous waste that requires handling at TA-54 or off-site shipments for treatment or disposal;
- Finally,
  - avoiding or reducing material going into any other waste stream requiring on- or off-site waste management,
  - reducing the volume of waste from ER treatment operations,
  - increasing the recovery of material for reuse or recycle.

Figure 4.1 shows the environmental hierarchy for ER wastes. The ER WMin/PP approach promotes source reduction and environmentally sound recycling practices, in place of waste

treatment and disposal techniques, when economically and technically feasible. Although source reduction is preferred, the ER WMin/PP approach recognizes that there may be limited opportunity for source reduction of primary wastes because much of the waste already exists and environmental and health concerns may require removal. When appropriate, source reduction of primary wastes will be accomplished through the application of risk based clean-up criteria, land-use scenarios, and the consideration of in-situ or non-intrusive remediation technologies during project planning and negotiation stages, and improved characterization and segregation during the execution of field activities. Source reduction of secondary wastes will be accomplished through proper planning; improved housekeeping, segregation and characterization; and application of WMin/PP criteria during technology selection, design and construction activities. Recycling and reuse practices will be considered for all primary and secondary wastes. Volume reduction, including size reduction, compaction, and optimal packaging, will be considered for all primary and secondary wastes that can not be avoided or recycled.

ENVIRONMENTAL MANAGEMENT HIERARCHY WITHIN ENVIRONMENTAL RESTORATION

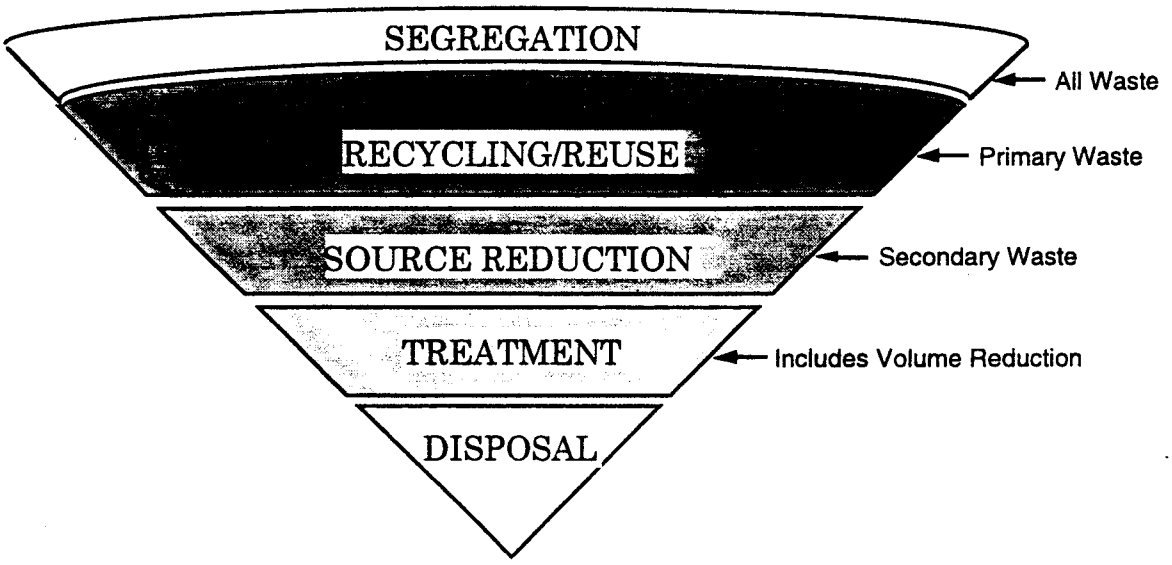

Figure 4.1

The WMin/PP approaches outlined above are consistent with the waste reduction priorities established by the Laboratory's site-wide waste minimization plan, which recognizes the severe limitations of on-site disposal capacity for LLW and on-site storage capacity for LLM. In addition, the approach was adopted to address the variable and non-recurring nature of wastes coming from ER activities.

5.0 SITUATION ANALYSIS

The Laboratory's ER Project originally consisted of approximately 2,100 potential release sites (PRSs). Currently, there are approximately 1,100 PRSs remaining which require investigation and/or remediation, and 140 structures identified for decommissioning in the project plan. The Laboratory's ER Project is scheduled for completion in the year 2011.

In FY 1995, the LANL ER Project activities which resulted in waste generation included remedial site assessment, site remediation, and the decommissioning of surplus facilities.

The assessment portion of the ER project included submission of 16 RCRA Facility Investigation (RFI) reports to EPA, conducted RCRA Facility Investigation field work on 470 sites, submittal of two work plans, and development of a canyon work plan in cooperation with the San Ildefonso Pueblo.

The remedial activities conducted in FY1995 included eight sites remediated under the Expedited Cleanup process and 37 sites remediated under the Voluntary Cleanup process. In addition, during the evaluation of other potential remedial sites 576 sites were determined by risk assessment to not require remedial action. These 576 sites were then proposed for removal from the site Hazardous and Solid Waste Amendment Act Permit Module VIII through a permit modification requests.

The decommissioning activities demolished 12 contaminated facilities, including radioactively contaminated facilities from Technical Area (TA)-21 and high explosive contaminated facilities from TA-16.

The FY1996 planned activities include the remediation of approximately 40 PRSs. In addition a large number of sites will be investigated and considered for no further action (NFA). The estimated waste generation for FY 1996 is listed in table 5.3.2.

5.1 Applicable Regulations

The LANL ER project is subject to many environmental regulations. The key drivers for the WMin/P2 program are listed below. A complete description of these regulations may be found in the LANL Waste Minimization Awareness Plan or the "Waste Minimization and Pollution Prevention Regulations and Orders, Requirements and Identification List." DOE/EM, May 1995.

Federal Regulations and Executive Orders

- Resource Conservation and Recovery Act (RCRA)
- Pollution Prevention Act (PPA)
- Executive Order 12873 - Federal Acquisition, Recycling, and Waste Prevention
- Executive Order 12856 - Federal Compliance With Right-to-Know Laws and Pollution Prevention

State of New Mexico Regulations

- New Mexico Solid Waste Regulations
- New Mexico State Hazardous Waste Management Regulations

DOE Policy

- DOE Order 5400.1, General Environmental Protection Program
- DOE Order 5400.3, Hazardous and Radioactive Mixed Waste Program
- DOE Order 5400.5, Radiation Protection of the Public and the Environment
- DOE Order 5820.2A, Radioactive Waste Management
- Secretary of Energy Notice 37-92, Waste Minimization Policy Statement
- DOE Waste Minimization/Pollution Prevention Cross-Cut Plan, 1994

Los Alamos National Laboratory Directives and Policies

- Director's Policy Statement, DP 105, *Waste Minimization*
- "Waste Minimization," Administrative Requirement 10-8 in *Environment, Safety, and Health Manual,* Los Alamos National Laboratory Manual, Chapter 1).

5.2 Justification for the Usage of Hazardous Materials

ER Project activities currently introduce only small amounts of hazardous materials into field and support operations. During the past years, most usage of hazardous material has

substituted less hazardous alternatives in an effort to reduce the generation of secondary hazardous or mixed waste. These efforts include the following:

- Decontamination Solvents - In isolated instances, site conditions may warrant the addition of methanol or ethanol into decontamination fluids to aid in the removal of heavy organic compounds from sampling equipment. However, in most cases the methanol and ethanol have been replaced by a non-toxic soap product. The use of the hazardous solvents is unlikely in future years.

- Scintillation Cocktails - The routine usage of scintillation cocktails media which results in a RCRA hazardous waste has been discontinued at the Laboratory. The scintillation media was substituted by a media which generates a non-regulated hazardous media. In rare instances where substitutes are not available, a small amount of scintillation cocktail media may be generated from ER characterization, where sample analysis procedures dictate the usage of a substance which results in a RCRA regulated waste.

- Analytical Processes - Some of the sample analysis required for site characterization may involve the usage of hazardous substances as prescribed by EPA analytical procedures, SW-846. These analysis processes have been evaluated by both EPA and private companies and universities for potential alternative processes and material substitution. The usage of hazardous substances in the analysis is currently viewed as necessary. However, ER field units are making efforts to minimize the number of samples requiring laboratory analysis, through the use of field screening. Thus reducing the use of laboratory solvents.

5.3 FY 1995 Waste Generation Summary and FY 1996 Projections

The ER Project Fiscal Year 1995 waste generation summary is listed in Table 5.3.1. Listed in Table 5.3.2 is the estimated generation volume for Fiscal Year 1996. A more accurate waste projection system is being developed for the outyears.

Table 5.3.1

Fiscal Year 1995 Waste Generation Summary

Waste Generation - Solid State	
Waste Type	Volume (Cubic Yards)
Chemical Waste*	738
Low-level Radioactive Waste	2445
Transuranic Radioactive Waste	0
Mixed Waste	13
Waste Generation - Liquid State	
Waste Type	Volume (Gallons)
Chemical Waste	2623
Low-level Radioactive	2925
Mixed Waste	0

* The chemical waste type includes RCRA, Toxic Substance Control Act (TSCA), and New Mexico Special regulated wastes.

Table 5.3.2

Fiscal Year 1996 Waste Volume Projections

Waste Projection - Solid State	
Waste Type	Volume (Cubic Yards)
Chemical Waste*	4378
Low-level Radioactive Waste	9264
Transuranic Radioactive Waste	20
Mixed Waste	27
Waste Projection - Liquid State	
Waste Type	Volume (Gallons)
Chemical Waste	20
Low-level Radioactive	311
Mixed Waste	29

* The chemical waste type includes RCRA, Toxic Substance Control Act (TSCA), and New Mexico Special regulated wastes.

5.4 Waste Minimization Accomplishments FY 1995

WMin/PP was an integral part of the FY 1995 ER field projects through recycling, reuse, contamination avoidance, risk-based clean-up strategies, and many other practices. However, there was limited tracking and reporting of WMin/PP successes on an ER Project-wide or field project basis. Waste reduction benefits are typically difficult to track and quantify because the data to measure the amount of waste reduced (as a direct result of a WMin/P2 activity) is often not available and is not easily extrapolated. Many waste reduction successes are attributed to best management practices or standard practices that are not identified or tracked as independent WMin/P2 practices. In January, 1996, the ER Project initiated efforts to collect and report WMin/PP efforts and successes during the previous year's projects. Similar tracking and reporting efforts will continue in the future.

The effectiveness of the 1995 ER WMin/P2 efforts (for reducing or avoiding) varied with the phase when WMin/P2 was applied and the waste types. For example, WMin/PP efforts that were integrated in the planning stages of a decommissioning project provided a high estimated volume reduction, where WMin/PP during assessment and characterization efforts produced relatively low volume reductions because the waste potential was lower. In addition, recycling potentials are greater for commercial waste streams, but LLW and LLMW streams provide lower opportunities for reuse and recycle.

High volume waste streams resulting from ER activities include contaminated soil and demolition debris such as metal and concrete. The WMin/PP techniques used in 1995 to reduce these high volume waste streams included the following:

- Contaminated soil
  - initiated negotiations to allow remedies that did not remove the soil (e.g., in-situ treatment or no-action);
  - used alternative drilling and sampling techniques to reduce investigative derived wastes;
  - used field screening techniques to allow better definition of contamination boundaries and improved characterization of materials;
  - improved segregation practices to avoid cross contamination;

- Demolition debris
  - included WMin/PP practices in decommissioning plans and specifications
  - used improved segregation techniques to allow staging of recyclables

- recycled metals and concrete
- surface scouring and surface decontamination of concrete and other materials

A summary of specific WMin/PP accomplishments for the ER field units during 1995 is presented below. Additional information is provided in Attachment B. (It should be noted that many of the practices identified below are used by all the field units; the list below highlights a cross section of practices and is not intended to be a comprehensive list of practices used by the Field Units.)

- **Field Unit #1** conducted investigation, characterization and remediation activities at several operable units. The projects avoided and reduced the generation of LLW, LLMW, HW, and commercial (non-hazardous, non-radioactive) wastes by using the following procedures.
  - Using a cone penetrometer test (CPT) in place of a drill rig to avoid the generation of drill cuttings and core.
  - Consolidating waste containers prior to shipment for disposal.
  - Conducting waste minimization planning prior to implementation of expedited cleanup removal actions.

- **Field Unit #2** conducted investigation and characterization activities at several operable units. The projects avoided and reduced the generation of LLW, LLMW, HW, and commercial (non-hazardous, non-radioactive) wastes by using the following procedures.
  - Using risk-based strategies and field screening to better define and limit the areas of contamination and removal actions.
  - Returning excess sample media to the site, in compliance with EPA and Laboratory procedures.
  - Maximizing the reuse of equipment and supplies, and limiting the use of disposable plastics except when necessary (e.g. for sampling of high explosives)
  - Controlling the personnel and equipment allowed into the contamination zones and screening, sorting, and segregating all material out of the contamination zones.
  - Limiting the number and size of samples sent for analysis and improved sample management (which has reduced the number of samples shipped for analysis by an estimated 50%).

- Returning drill cuttings to the borehole (avoiding an estimated 7 to 18 cubic yards of waste).
- Testing alternative drilling methods that reduce waste (e.g., vibratory drilling and hydropunch) although the techniques were determined to be not appropriate for the current applications.
- Use of launderable and reusable PPE in place of disposal coveralls and booties.

Purge water and decontamination fluids were returned to the site, in compliance with EPA and Laboratory procedures, avoiding over 400 gallons of liquid waste.

Volume reduction was also accomplished through manual compaction of materials in drums and size reduction, when possible.

The Field Unit has initiated negotiations to allow risk-based, in-situ remedies for the closure of waste lagoons (at TA-53) which could potentially avoid the handling and treatment of over 20 cubic yards of LLMW.

- **Field Unit #3** conducted investigation and characterization activities at TA-16 and 33. The projects avoided and reduced the generation of LLW, LLMW, HW, and commercial (non-hazardous, non-radioactive) wastes by an estimated 26 cubic yards using the following procedures.
  - Including WMin/PP in operating procedures and site specific waste management plans
  - Training personnel on site specific waste management and WMin procedures
  - Use of launderable and reusable PPE in place of disposal coveralls and booties, resulting in zero PPE waste during 1995;
  - Maximizing the reuse of other equipment and supplies, such as using high density plastic mats, in place of less-durable plastic sheeting;
  - Contamination avoidance such as reducing contact with samples, limiting personnel and equipment into potentially contaminated areas, protecting equipment that is carried into the contamination zones, and prohibiting leaning, kneeling, or sitting in the contaminated zones.

- Expanding the decontamination process to include the removal of obvious contamination while in the contamination zone before exiting or entering the decontamination area.
- Improved waste characterization and segregation, through the use of acceptable knowledge, radioactive analysis and segregation at the point of generation, and the implementation and use of the ER Waste Characterization Strategy Form.

Liquid wastes (an estimated 1180 gallons) were avoided by returning decontamination fluids to the sampling sites, in compliance with EPA and Laboratory procedures.

- **Field Unit #4** conducted investigation, characterization and remediation activities at locations within the canyons on Laboratory property. The projects avoided and reduced the generation of LLW, LLMW, HW, and commercial (non-hazardous, non-radioactive) wastes by using the following procedures.
  - Using a rotary hand auger in place of a drill rig to avoid the generation of drill cuttings and core.
  - Reusing personal protective equipment.
  - Utilizing borehole cuttings as backfill in boreholes.
  - Conducting dry decontamination of equipment prior to liquid decontamination.
  - Conducting a preliminary site survey to justify the need for personnel protective equipment.

Liquid wastes (an estimated 120 gallons) were avoided by returning decontamination fluids to the sampling sites, in compliance with EPA and Laboratory procedures.

- **Field Unit #5** conducted investigation and characterization activities and began remediation of a material disposal area (MDA). The field unit has successfully avoided and reduced the generation of LLW, LLMW, HW, and commercial (non-hazardous, non-radioactive) wastes by using the following procedures.

- Using preliminary site survey information and field screening to better define the contamination areas, limiting the areas requiring PPE use and refining the areas requiring further action.
- Including WMin/PP incentives and requirements in subcontractor documents.
- Improved segregation through field screening and proper characterization, which has reduced the volume of LLMW and HW originally projected.
- Segregating concrete, rubblizing and distributing concrete for reuse
- Segregating metal (non-contaminated) for recycle (estimated 150 cubic yards of metal waste avoided).
- Returning excess sample media and decontamination fluids to the site, in compliance with EPA and Laboratory procedures.
- Maximizing the reuse of equipment and supplies, and limiting the use of disposable plastics except when necessary (e.g., for sampling of high explosives).
- Controlling the personnel and equipment allowed into the contamination zones and screening, sorting, and segregating all material out of the contamination zones.

Volume reduction was also accomplished through manual compaction of materials for disposal and the use of direct shipment of waste materials for off-site disposal, which reduced the need for bulk containers and minimized the use of space in the disposal unit.

- **Field Unit #6 - Decommissioning** razed radioactively contaminated buildings at TA-21 and TA-35; and demolished high explosives contaminated facilities at TA-16. In addition planning activities were conducted for the TA-2 Omega West Reactor. The activities described below avoided the disposal of 1,200 Yd^3 of LLW, and 420 Yd^3 of commercial waste. The field unit dedicated over $200,000 of project funds to waste minimization activities in 1995.

- Recycling contaminated structural steel.
- Decontaminating structural steel and ductwork.
- Compacting PPE and plastics.
- Scabbling contaminated concrete surfaces.

- Removal of contaminated surface coatings.
- Bulk packaging of debris destined for disposal.

In addition the field unit evaluated several other waste minimization projects for future implementation.

6.0 WASTE MINIMIZATION PROGRAM ELEMENTS

Listed below are program elements of the Laboratory's ER waste minimization program for FY 1996. Several of the elements are currently in place; however, several are in the planning stages. The elements which are listed as planned will be implemented if economically and technical feasible.

6.1 WMin Coordinator

The WMin/PP coordinators will have a primary role in FY 1996 for developing and implementing programmatic elements of the ER WMin/PP program by conducting the following activities[2]:

- Improve WMin/P2 awareness and information exchange within the ER Project, as outlined in Attachment A.

- Provide technical reviews and WMin/P2 input to ER documents and procedures, such as Corrective Measure Studies, Sampling and Analysis Plans, or other project work plans and provide working examples of "model" documents that incorporate WMin/P2 elements.

- Assist with an ER Equipment Sharing Program to identify equipment needs that may be served by use of equipment that is currently available at other DOE facilities, thus reducing the purchase or lease of new equipment.

- Technical Assistance and Consistency Among Field Units to formalize standard approaches for WMin/PP in ER project plans and procedures and

[2] These activities are currently proposed and planned. Actual activities to be completed will be based on the FY 1996 project needs and funding levels

institutionalize the use of design reviews, WMin/PP checklists, or value engineering for WMin/P2 applications.

- Develop WMin/P2 language for ER subcontractor documents and project specifications so as to provide incentives and measurable goals for waste reduction.

- Pilot test or demonstrate a site specific waste reduction activity with a high potential for immediate return on investment.

The typical WMin/PP tools and practices that the WMin coordinator(s) will make available to the ER projects are summarized in Table 6.1. The specific application and waste reduction potential of a tool will be dependent of the specific ER project and left to the judgment of the Field Project Leader.

Table 6.1 - Common WMin Tools for use in the ER Project	
WMin/P2 tools for the *Negotiations and Planning Phases*	
-	Negotiate with regulators to recognize and implement WMin/P2 where appropriate
-	Write WMin/P2 into ER program documents
-	Include WMin/P2 in budgets and contracts
-	Integrate WMin/P2 into construction team activities
-	Train ER personnel on WMin/P2 and build WMin/P2 awareness
WMin/P2 tools for the *Assessment Phase* include	
-	Conduct efficient sample management and analysis
-	Consider alternative sampling techniques
-	Consider alternative drilling techniques
-	Segregate materials and waste through field screening
-	Utilize site control techniques
-	Use bulk waste packaging
-	Train ER personnel on WMin/P2 and build WMin/P2 awareness
WMin/P2 tools for the *Alternative Evaluation and Selection Phase* include	
-	Identify WMin/P2 as a criteria during treatment selection
-	Incorporate WMin/P2 in key decision making documents
-	Conduct treatability studies that support WMin/P2
-	Train ER personnel on WMin/P2 and build WMin/P2 awareness

Table 6.1 - Common WMin Tools for use in the ER Project (cont.)	
WMin/P2 tools for the *Implementation Phase* include	
-	Scour and decontaminate building materials
-	Recycle and reuse materials from decommissioning activities
-	Dedicate a person on ER projects to promote WMin/P2 (e.g. a WMin Coordinator)
-	Reuse equipment
-	Train ER personnel on WMin/P2 and build WMin/P2 awareness

6.2 WMin Planning and Cost Analysis

WMin is best integrated during the project planning, design, and engineering phases. To ensure that WMin is evaluated, and appropriately integrated in these phases, a WMin checklist will be designed for use by project managers and FPLs. The checklist tool will be used during project planning for all activities and in the operational readiness review for field activities. The checklist tool prompt planners and FPLs to ensure that the fundamentals of WMin are considered. Part of this process will include introducing unit costs for waste management, that can be used for evaluating the cost effectiveness of WMin ideas.

WMin/P2 strategies incorporated during the planning (and negotiations) phases are one of the few opportunities for "source reduction" because they have the potential to avoid or reduce the generation of contaminated soil, groundwater, and building debris, which represents a significant waste volume within the ER Project. Well defined agreements (with regulators and stakeholders) regarding land-use scenarios, cleanup performance standards, and risk and pathway scenarios have shown to be highly effective in avoiding or reducing these primary wastes (e.g. soil, building debris) and secondary wastes.

Other techniques that may be used (during the planning phases) to reduce waste may include: incorporating WMin/P2 practices into budgets; inserting WMin/P2 language into project plans, specifications, and contractor documents; coordinating with design engineers and construction teams during conceptual and preliminary design stages; negotiating with regulators to allow treatment options that generate little secondary waste; and developing sampling strategies that limit the number of samples.

6.3 Employee Training and Awareness Plan

Waste minimization implementation is most effective when all employees consider WMin/P2 part of their job responsibilities. To accomplish this, a planned approach to building waste minimization awareness has been developed (see attachment 2, Awareness Strategy for the Pollution Prevention/Waste Minimization in Environmental Restoration Project [FY 1996]). The goals of the awareness plan are to:

- Develop a value-added perception of P3O resources relative to ER activities
- Improve recognition among employees that WMin/P2 practices apply to ER activities
- Educate employees about successful implementation at the Laboratory and within DOE
- Improve documentation of WMin/P2 accomplishments

In addition to awareness activities, the following training is mandatory for ER waste handling personnel and addresses various topics including waste minimization:

- "Waste Management Coordinator Requirements"
- "Waste Generator Overview"
- "Waste Documentation Forms"
- "Waste Packaging, Shipping, and Materials Handling"

In addition to the above classes, Field Unit's Waste Management Coordinators (WMC) are required to attend quarterly WMC meetings as ongoing training in issues important to performing the duties of a WMC.

6.4 Information and Technology Introduction

The introduction of new technologies for WMin/P2 and waste management approaches are important to minimizing wastes. To support technology exchange the waste minimization coordinators will be available to research technologies or WMin/P2 tools for ER FPLs, necessary to attain information on technical or economic feasibility. They will also be available to train project personnel on the access and usage of several large information sources such as:

- DOE, Remedial Action Project Information Center, Oak Ridge, TN
- DOE, EPIC - the DOE Pollution Prevention Information Clearinghouse, Pacific Northwest Labs, Richland, WA
- EPA, Superfund Innovative Technology Evaluation (SITE) Database

Planed information and technology exchange activities are shown in attachment 2.

6.5 Tracking and Reporting

A uniform and routine collection of waste minimization accomplishments will be established in FY 1996, beginning with documentation of representative WMin/P2 successes from FY 1994 and FY 1995. Upon completion of the historical data collection, FPLs will be encouraged to participate in collection of accomplishments as they occur, with an semi-annual data consolidation effort project wide.

6.6 Sort, Decontaminate, and Segregate

This task is currently implemented and is designed to sort and decontaminate LLW materials from Decommissioning operations for the purpose of eliminating their disposal at TA-54 as low level radioactive waste. Typical sorting practices include collection of all metal debris in separate boxes destined for shipment to an off-site smelter for metals recovery. Decontamination work will involve the removal of surface radioactive contamination on equipment to allow for its reuse either at Los Alamos or other DOE facilities.

6.7 Compaction

This task has been employed by the Decommissioning operations at the Laboratory for the past year with great success. In the upcoming fiscal year, this technique will be employed by the ER Project to reduce low level radioactive waste volumes. By compacting low density solid wastes (e.g. PPE and plastic), the ER Project will realize a 30 to 1 waste volume reduction. The Project plans to implement this process either by purchasing and utilizing a mobile compaction unit from or by taking advantage of the current fixed unit at TA-21 and transporting suitable waste to it prior to final disposal.

6.8 Survey and Release

Where past practices have conservatively classified non-indigenous investigative-derived waste (PPE, sampling materials, decon water) as contaminated based on association with contaminated areas, the ER Project has developed procedures to survey and release these materials as non-radioactive. This will have a dramatic impact on volume of low level waste buried at Area G from ER activities.

6.9 Incineration

During this fiscal year, the ER Project will conduct a pilot program requiring workers at a predetermined site to wear specially designed incinerable PPE. This material will be collected in suitable waste bins and shipped directly to a commercial low level radioactive incinerator. By landfilling only the ash from the incinerator instead of the entire PPE drum, volume reductions on the order of 95-99% can be achieved.

6.10 Risk Assessment

Risk assessments are routinely conducted for ER projects. Risk assessments allow the ER Project to plan remediation activities on the basis of the future risk to health and the environment. Often the risk assessment may determine that it is appropriate or beneficial to leave the material in the ground, thus avoiding the generation of waste.

Properly designed land-use agreements and risk-based cleanup strategies can provide flexibility to select remedial actions (or other technical activities) that may avoid or reduce the need to excavate or conduct other actions that typically generate high volumes of contaminated soil, groundwater, or demolition debris. This is one of the few opportunities for source reduction. For example, if the community and regulators agree that the future land use of a site will be grazing and agriculture, then it would not be practicable to clean the site to levels established for future human residents. Similarly, contaminated sites that will remain under DOE administrative control or be slated for commercial use may be able to consider in-situ treatments that could reduce the need for excavation and disposal of contaminated soil and debris.

6.11 Incentives Programs

The ER Project participates in the Laboratory-wide "Waste Minimization Chargeback Tax" system. This system charges the ER Project based on the volumes and toxicity of wastes generated from the program. This financial burden is an incentive for ER project managers to reduce waste generation to lower total project costs. The ER Project will be actively soliciting proposals for WMin/P2 projects that are eligible for funding through this tax.

6.12 Lead Handling Procedures

The ER project does not routinely procure or use lead, or handle the generation of excess lead. The inventory and decontamination of existing lead at the Laboratory has been conducted as part of a milestone of the Laboratory's FFCA agreement, and is out of the scope of the ER project.

ER activities will manage and minimize the amount of lead contaminated waste using the following approaches:

- Projects will specify a preference to avoid the procurement or use of lead, when possible, giving preference to the use of steel in place of lead.

- Projects will specify the use of strippable or washable coatings for any lead materials that must be used and have the potential to become contaminated

- Projects will plan for the decontamination of lead materials, when economically feasible, using blast grit, carbon dioxide blast (or other non-destructive blast), or chemical decontamination techniques. Preference will be given to decontamination techniques that minimize the generation of secondary waste (from the treatment process.)

- Projects that handle non-contaminated lead waste as a primary waste from the removal action or decommissioning activity will make efforts to recover and redistribute the lead for use at the Laboratory or at another DOE facility, per Administrative Requirements, "Hazardous and Mixed Waste." Administrative Requirement No. 10-3, and "Excess government Personal Property", Administrative Requirement No. 10-6 .

- Projects will coordinate with the Laboratory's waste management group for the appropriate handling and disposition of radioactively contaminated lead that can not be decontaminated or redistributed.

6.13 Equipment Reuse

The reuse of equipment and materials such as plastic gloves, sampling scoops, plastic sheeting and PPE will produce significant waste reduction and cost savings in FY 1996. In addition, a cost benefit analysis is currently being conducted by P3O to look at using launderable PPE in the field to replace current disposable types. PPE from contaminated sites would be segregated and shipped to a laundry facility in Santa Fe where they would be cleaned and returned for reuse.

In addition LANL has initiated a equipment exchange program which attempts to identify surplus or inactive equipment for use at LANL. This saves capital equipment dollars by not purchasing the equipment, but it also avoids the eventual disposal of the equipment when no longer needed.

7.0 BARRIERS TO WASTE MINIMIZATION IMPLEMENTATION

Uniform Clean-up Levels - Failure to take into account site specific factors or risk assessments before establishing cleanup levels based on regulatory guidelines has proved to be a barrier in minimizing waste within the ER Project. At one particular site in FY 95, an initial expedited cleanup of 30 cubic yards of soil in a restricted access area escalated to 850 cubic yards based on cleanup levels mandated by EPA Region VI. The cleanup level (which was set at 1 ppm) was much lower than what was recommended based on both Human Health and Ecological Risk assessments.

Project Performance Measures - Performance requirements for the ER project, established under negotiated agreements with regulators or others, are not consistent with a WMin/P2 philosophy and may run counter to waste reduction efforts. For example, existing performance measures are based on the number of contaminated sites cleaned-up in a given time frame, regardless of risk or contamination levels, and no credit is given for a no-further-action decision. This creates an incentive to excavate and dispose, so as to show a high level of activity, without regard for waste generation.

As a alternative, performance requirements specific to WMin/PP can provide incentives, such as establishing numerical goals for recycling and recovery of material, setting limits on the volume of waste that can be generated, and including no-further-action determinations as a measure of progress. These type of performance measures are not yet standard in the ER project.

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Los Alamos National Laboratory. 1992. Director's Policy on Hazardous and Radioactive Waste Management and Minimization, DP-105, *The Laboratory Manual, Chapter 1, Environment, Safety, and Health.*[i]

"Guidance to Hazardous Waste Generators on the Elements of A Waste Minimization Program", Environmental Protection Agency, Federal Register Notice, Vol 58, No. 102, May 28, 1993.

ATTACHMENTS

Attachment A - Awareness strategy

Attachment B - 1995 Waste Minimization Accomplishments

Tool	Audiences[1]				Activities and Milestones		
	ER F&P WIET	ER PM, FPL DPL	DOE	P3O		Status/Frequency	Start
Designate P3O Contact for ER Program Objectives: Provide technical assistance Integrate with other P3O programs Assist with funding requests Networking and information exchange	XX	XX		X	- Identify P3O contact(s) for ER - Meet with ER Program Manager (PM) - Meet with WIET, Field Project Leaders (FPLs) - Meet with ER Project Consistency Team (PCT) and participate in routine meetings - Locate in ER program offices - Solicit CHIPs and ROI proposals and assist with proposals - Develop ER WMin plan - Review ER project plans, as requested	Completed In progress/as needed In progress/monthly Planned Planned Planned/as needed In progress Planned/as needed	 1/96 12/95 2/96 3/96 TBD 1/96 6/96
ER Program Colloquiums and Workshops Objectives: Educate on definition, scope and performance measures, economic benefits and regulations Inform on P2/WMin tools, strategies Inform of P3O role, services Demonstrate past successes	XX	XX			- Present WMin Module to ER Waste Mgmt Workshop - Present WMin Module at ER Program Colloq. (as part of Project Consist Team) - Participate in Monthly ER Program Colloq (as appropriate)	Planned Planned Planned/monthly	1/96 1/96 1/96
Fact Sheets on P2/WMin in ER Objectives: Educate on definition, scope and performance measures,economic benefits and regulations Identify waste stream specific P2/WMin opportunities. General information on P2/WMin tools, strategies Inform of P3O role, services, resources Publish successes	XX	X			- Publish FactSheet (FS) on a) P3O role and contacts for 96 b) CHIPs and ROI infor/assistance c) 1995 ER Task and Successes d) Waste Stream Specific Tools and opportunities (PPE, Decon water, drilling, etc) e) monthly fact sheets on appropriate topics - Put FS on HomePage	Planned In progress/monthly	1/96 2/96
P2/WMin module on ER Home Page Objectives: Same as above Notify of training, colloquiums Notify of P3O Contacts	XX	X			- Develop Homepage - Maintain Homepage	In progress Planned/monthly	1/96 2/96

Tool	Audiences[1]				Activities and Milestones		
	ER F&P WIET	ER PM, FPL DPL	DOE	P3O		Status/Frequency	Start
ER Quarterly Reports Objectives: Publish successes Inform on P2/WMin tools, strategies, P3O role, services	X	XX	X		Submit information to LANL ER Report	Planned/quarterly	1/96
P3O Education Colloquiums Objectives: Interface with other P3O programs Info exchange, tech demonstrations	XX				Announce P3O workshops in WIET meetings, HomePage, and direct contact	In progress/monthly as needed	12/95
Routine Tracking/Reporting Mechanism on ER P2/WMin Successes Objectives: Collect and publish successes	X	XX	XX	XX	- Meet with ER, DOE AL to establish performance measures - Meet with WIET and FPL on perf measures and reporting mechanisms - Develop tracking/reporting tool, test tool with FPLs - WIET Meetings to identify successes - Institutionalize tracking/reporting	Planned Planned In progress In progress/monthly Planned	1/96 1/96 1/96 12/95 4/96
Participate in regularly scheduled program meetings Objectives: Networking Technical assistance or referrals Information exchange Collect success stories	XX				- Participate in ER WIET meetings - Participate in ER monthly meetings - Set up one-to-one meetings with FPLs - Plan, participate in WMin/P2 project reviews (for specific projects)	In progress/monthly In progress/monthly Planned/quarterly TBD	12/95 12/95 2/96
ER Training Courses Objectives: Training	XX				- Evaluate existing ER courses for P2/WMin content; review with ER PM - Draft input for ER courses	TBD TBD	
ROD Database; EM-40 Success Database Objectives: Information Exchange	XX		XX		- Coordinate with L. Allmon - Publish success stories on Home page and Fact Sheets - Develop database of potentially applicable RODs,distribute on Home Page	In progress Planned Planned	1/96 2/96 2/96

Tool	Audiences[1]				Activities and Milestones		
	ER F&P WIET	ER PM, FPL DPL	DOE	P3O		Status/Frequency	Start
External Publications and Presentations Objectives: Publish successes Information exchange Networking			XX		- Present at ER 96 Workshop - Submit success story to DOE ER TIE Quarterly (Newsletter)	Planned Planned	8/96 9/96
PTS Reports Objectives: Publish successes Reporting			XX	XX	Complete PTS Reports	In progress/monthly	1/96
P3O quarterly Reports Objectives: Publish successes Reporting				XX	Complete P3O Reports	In progress/quarterly	1/96

1. Audiences include the following:
ER F&P, WIX = ER field and project personnel, Waste Information Exchange Team members
ER PM,FPL, DPL = ER program managers, field project leaders, and decommissioning field project leaders
DOE = Department of Energy ER programs
P3O = Laboratory Pollution Prevention Program Office

XX is a primary audience; X identifies a secondary audience.

Attachment B

Los Alamos National Laboratory
Environmental Restoration Project

1995 Waste Minimization Accomplishments

WMin/PP was an integral part of the FY 1995 ER projects through recycling, reuse, contamination avoidance, risk-based clean up strategies, and many other practices. However, there was limited tracking and reporting of WMin/PP successes on an ER Project-wide or field project basis. Waste reduction benefits are typically difficult to track and quantify because the data to measure the amount of waste reduced (as a direct result of a WMin/P2 activity) is often not available and is not easily extrapolated. Many waste reduction successes are attributed to best management practices or standard practices that are not identified or tracked as independent WMin/P2 practices. In January, 1996, the ER project initiated efforts to collect and report WMin/PP efforts and successes during the previous year's projects. Similar tracking and reporting efforts will continue in the future.

The effectiveness of the 1995 ER WMin/P2 efforts (for reducing or avoiding) varied with the phase when WMin/P2 was applied and the waste types. For example, WMin/PP efforts that were integrated in the planning stages of a decommissioning project provided an high estimated volume reduction, where WMin/PP during assessment and characterization efforts produced relatively low volume reductions because the waste potential was lower. In addition, recycling potentials are greater for commercial waste streams, but LLW and LLMW streams provided lower opportunities for reuse and recycle.

High volume waste streams produced from ER activities include contaminated soil and demolition debris such as metal and concrete. The WMin/PP techniques used (in 1995) to reduce these high volume waste streams included the following:

- Contaminated soil
  - initiated negotiations to allow remedies that did not remove the soil (e.g. in-situ treatment or no-action);
  - used alternative drilling and sampling techniques to reduce investigative derived wastes;
  - used field screening techniques to allow better definition of contamination boundaries and improved characterization of materials;
  - improved segregation practices to avoid cross contamination;

- Demolition debris
  - included WMin/PP practices in decommissioning plans and specifications
  - used improved segregation techniques to allow staging of recyclables
  - recycled metals and concrete
  - surface scouring and surface decontamination of concrete and other materials

A summary of specific WMin/PP accomplishments for the ER field units during 1995 is presented below.

Project Wide

Project: **Solvent Substitution**
Date of Implementation: FY1995
Location or Group: Project Wide

Description: During the past fiscal year, each ER Field Unit successfully substituted a decontamination rinse solution comprised of alconox and water for a methanol-based solution. By replacing the potentially hazardous methanol solution, The ER Project has reduced its overall liquid hazardous waste volumes by 98 percent.

Volume and Type Avoided:
Cost Savings:

Project: **Use of Characterization Strategy Form to improve waste characterization**
Date of Implementation: FY 1995
Location: Project Wide

Description: In cooperation with the Laboratory's waste management group, ER field units implemented the use of a Characterization Strategy Form to improve the characterization of waste materials from investigation activities. Use of the form allows analytical parameters to address site characterization as well as future waste characterization needs. This reduces the need to re-test waste materials for compliance with waste acceptance criteria and improves the ability to segregate materials and reduces the need for LLW and LLMW disposal.

Waste Avoidance Volume and Type
Cost Savings:

Field Unit 1

Project: **Cone Penetrometer Sampling**
Date of Implementation:
Location or Group:

Description: A cone penetrometer test (CPT) was used in place of a drill rig for boreholes with a depth up to 87 feet in depth. The CPT does not generate drill cutting and significantly reduces equipment requiring decontamination. This method was used on approximately 52 boreholes. The method avoided an estimated 4 drums of cuttings per borehole and half a drum of decon water per borehole.

Volume and Type Avoided: 200 drums cuttings, 25 drums decon fluid, Waste Analysis Pending.
Cost Savings:

Project: **Consolidation of Waste Containers**
Date of Implementation: FY1995
Location or Group: Field Unit 1

Description: Drums and other waste containers which were originally segregated by sampling location, were consolidated after waste characterization to optimize waste packaging efficiencies.

Volume and Type Avoided:
Cost Savings:

Project: **Waste Minimization Planning**
Date of Implementation: FY1995
Location or Group: Hillside 140, Field Unit 1

Description: A waste minimization plan was prepared to evaluate technologies and processes for removal of radioactively contaminated soils from a hillside expedited action cleanup project. The plan specifically addressed field screening and segregation techniques.

Volume and Type Avoided:
Cost Savings:

Field Unit 2

Project: **Risk based strategy for in-situ remedial actions.**
Date of Implementation: Planning initiated in FY 1995; Implementation 96-97
Location: FU #2, TA 53

Description: Field unit managers have initiated negotiations to allow an risk-based, in-situ remedy for the closure of waste lagoons. Allowing in place remedies will avoid excavation of primary waste that would be management as LLMW

Waste Avoidance Volume and Type LLMW; potential avoidance of 20 cubic yards
Cost Savings: Estimated avoided waste management costs are over $30 million

Project: **WMin/PP and waste projections included in procedures an operational readiness reviews**
Date of Implementation: FY 1995
Location: FU #2

Description: Waste implementation plans are written for all field activities. Plans include waste stream projections and disposition options and procedures are set for WMin/PP and waste management. Waste management, material control, segregation procedures, and the waste characterization strategy Form are reviewed during operational readiness reviews, which helps improve segregation and attention to WMin/PP practices.

Cost Savings:

Project: **Discharge of Decontamination Fluids**
Date of Implementation: FY 1995
Location: Operable units # 1085, 1086, 1093; FU #2

Description: Decontamination fluids have historically been collected and managed as waste, pending characterization and release as non-contaminated. This created high volumes of fluids that were staged, sampled, and required disposal. In 1995, field units prepared a notice of intent (under the New Mexico Environment Department, Water Quality Requirements) to discharge decontamination fluids known to be non-contaminated directly to the site. This reduced the need to handle and treat the decontamination fluids.

Waste Avoidance Volume and Type Over 100 gallons/year; liquid waste (non-contaminated)
Cost Savings: Not quantified at this time

Project: **Discharge of Groundwater purge fluids to the site**
Date of Implementation: FY 1995
Location: Operable units # 1093; FU #2

Description: Purge water from the sampling of monitoring wells have historically been collected and managed as waste, pending characterization and release as non-contaminated. This created high volumes of fluids that were staged, sampled, and required disposal. In 1995, field unit #2 received approval to discharge those purge fluids known to be non-contaminated to the site. This reduced the volumes of fluids that required handling and treatment.

Waste Avoidance Volume and Type: An estimated 480 gallons/year avoided of liquid waste (non-contaminated) (Based on avoided waste of 15 gallon/well/quarter and 8 wells sampled per quarter)
Cost Savings:

Project: **Return drilling cuttings as backfill for the borehole**
Date of Implementation: FY 1995
Location: All units, FU #2

Description: Cuttings generated from investigative drilling activities have been returned to the borehole. This is allowed if no groundwater is present, the backfill activity will not change the final remedy for the site, or increase potential for contaminant migration. This procedure avoids handling of the investigative derived soil waste, and allows the media to be handled during the final remedial action.

Waste Avoidance Volume and Type LLW avoided, estimated 7 to 18 cubic yards avoided
Cost Savings:

Project: **Return excess sample materials to site**
Date of Implementation: FY 1995
Location: All units, FU #2

Description: Excess sample materials that are not transported for off site analysis are returned to the site, for remediation during the final action. This is done if no additional contamination is added as a result of the sample material and if the action will not change the final remedy for the site, or increase potential for contaminant migration. This procedure avoids handling of the investigative derived wastes from the samples, and allows the media to be handled during the final remedial action.

Waste Avoidance Volume and Type
Cost Savings:

Project: **Improved sample management, reduced sample number and volume**
Date of Implementation: FY 1995
Location: All units, FU #2

Description: FU #2 implemented an pilot field sample shipment procedure and improved sample management strategy that reduced the volume and number of samples collected and shipped for analysis by 50 % from previous years. By reducing the number and volume of samples shipped for analysis, the pilot project has reduced the waste generated from analytical procedures. (Excess analytical samples are often required to be returned

to the generator for disposal). Under the pilot strategy, the FU uses private (off site) laboratory for sample analysis, and the FU negotiated reductions in the number and volume of sample for analysis while still meeting analytical requirements. In addition, the FU performs field screening of samples to limit the number of samples requiring analysis, targeting the samples that are shown by the field screening to be of concern. The FU directly handles the collection, screening, packaging, and shipment of the samples which reduced the handling time and costs.

Waste Avoidance Volume and Type Not estimated, but expected to be 50% of previous years waste from analytical processes

Cost Savings:

Project: **Vibratory Drilling, cone penetrometer sampling**

Date of Implementation: FY 1995

Location: FU #2

Description: Alternative drilling techniques of vibratory drilling and hydropuch (cone penetrometer) sampling were tested at FU #2 in an effort to reduce the generation of drilling wastes. The techniques were determined to be non-effective for the FU #2 applications, so the waste avoided benefits were considered moot.

Waste Avoidance Volume and Type

Cost Savings:

Project: **Acceptable knowledge and field screening to improve characterization**

Date of Implementation: FY 1995

Location: FU #2

Description: This technique is practiced concurrently to the improved sample management practice. Materials during investigation are screened, characterized and segregated using acceptable knowledge and radioactive analysis (scintillation gamma, alpha and gamma smears) and hazardous waste (photo and flame ionization detectors) field screening techniques at the point of generation. The field screening helps to better define the areas of concern and reduce the samples that require laboratory analysis. Field screening improves segregation, reducing the volumes of waste that requires analysis and management as LLW or HW.

Waste Avoidance Volume and Type
Cost Savings:

Project : **Maximize the reuse of PPE, supplies and equipment, and control and segregation of materials in/out of contamination zones**
Date of Implementation:
Location: FU #2

Description: Reusable equipment such as PPE and stainless steel sampling tools, are used in place of disposable equipment as much as possible. The use of plastic (disposable) sampling tools are limited to only high explosive sampling activities. Practices are written in the operating procedures to limit the materials and equipment allowed in the contamination areas and to screen, sort, and segregate materials exiting the contamination areas. Designated areas are established to segregate materials and avoid cross contamination. Personnel are trained on these procedures during the operational readiness reviews

Waste Avoidance Volume and Type LLW, estimates not quantified at this time
Cost Savings: Not quantified at this time

Field Unit 3

Project: **Acceptable knowledge and field screening to improve segregation**
Date of Implementation: FY 1995
Location: FU #3

Description: Materials during investigation are characterized and segregated using acceptable knowledge and radioactive analysis field screening techniques at the point of generation. This reduces the volumes of waste that requires analysis and management as LLW or HW.

Waste Avoidance Volume and Type:
Cost Savings: None

Project: **Maximize the reuse of Personal Protective Equipment (PPE), supplies and equipment**

Date of Implementation:

Location: FU #3

Description: PPE is reused as much as possible. Launderable coveralls were substituted for disposable, steel toes chemical resistant boots were used in place of disposable booties, and disposable site control materials (such as plastic sheeting) were replaced with longer-life, reusable materials, such as high density plastic mats

Waste Avoidance Volume and Type LLW PPE (zero PPE waste disposed in 1995)
Commercial waste, avoided 28 cu yds (total from all WMin/PP practices)

Cost Savings:

Project: **Contamination avoidance and control of materials in/out of contamination zones**

Date of Implementation: FY 1995

Location: FU #3

Description: Practices were routinely followed to avoid contact with contaminants and to minimize material in the contamination areas. Practices included: only one designated sampler handles or contacts the sample; minimum contact is maintained to limit glove requirements; leaning, kneeling, or sitting in the contamination zone is prohibited; easily decontaminated and designated tubs are used to handle equipment in the contamination zone to limit the possibility of contamination; only necessary materials are brought into or out of the contamination zone.

Waste Avoidance Volume and Type LLW - not quantified at this time
Commercial waste, avoided 28 cu yds (total from all WMin/PP practices)

Cost Savings:

Project: **Improved characterization and segregation**
Date of Implementation: FY 1995
Location: FU #3

Description: All waste are characterize and segregated using acceptable knowledge and radioactive analysis field screening techniques at the point of generation. This reduces the volumes of waste that requires analysis and management as LLW or HW.

Waste Avoidance Volume and Type LLW - not quantified at this time
Commercial waste, avoided 28 cu yds (total from all WMin/PP practices)
Cost Savings:

Project: **Discharge of Decontamination Fluids**
Date of Implementation: FY 1995
Location: FU #3, TA 16 and 33

Description: Decontamination fluids have historically been collected and managed as waste, pending characterization and release as non-contaminated. This created high volumes of fluids that were staged, sampled, and required disposal. In 1995, field units prepared a notice of intent (under the New Mexico Environment Department, Water Quality Requirements) to discharge decontamination fluids known to be non-contaminated directly to the site. This reduced the need to handle and treat the decontamination fluids.

Waste Avoidance Volume and Type An estimated 1180 gallons/year; liquid waste (non-contaminated)
Cost Savings:

Field Unit 4

Project: **Rotary Hand Augers**
Date of Implementation: FY1995
Location or Group: Canyons Investigation, Field Unit 4

Description: A rotary hand auger was used in place of a drill rig for boreholes with a depth of less than 15 feet. The rotary hand auger does not generate drill cutting and

significantly reduces equipment requiring decontamination. This method was used on approximately 25 boreholes out of 40 total. The method avoided an estimated 4 drums of cuttings per borehole and half a drum of decon water per borehole.

Volume and Type Avoided: 100 drums of cuttings, Low-level Radioactive
12.5 drums decon water, Low-level Radioactive

Cost Savings: Not estimated.

Project: **Discharge of Decontamination Fluids**
Date of Implementation: FY1995
Location or Group: Canyons Investigation, Field Unit 4

Description: Historically, decontamination water from sampling activities was drummed and managed as a waste based upon suspected site contamination. Recently some investigation sites have prepared a Notice of Intent (NOI) for discharge of decontamination fluids back onto the site within under the New Mexico Environment Department, Water Quality Requirements limitations.

Volume and Type Avoided: 120 gallons, liquid waste (non-contaminated).
Cost Savings: Not estimated.

Project: **Reuse of Personal Protective Equipment (PPE)**
Date of Implementation: FY1995
Location or Group: Field Unit 4

Description: Throughout the field unit, PPE is reused until unserviceable. PPE is removed and stored within the contamination reduction zone for reuse during the following days. This procedure eliminated approximately 50% of the PPE from the field unit during FY1995.

Volume and Type Avoided: Not estimated , Low-level Radioactive.
Cost Savings:

Project: **Segregation of Mercury contaminated soils**
Date of Implementation: FY1995

Location or Group: Field Unit 4

Description: During a Field Unit 4 Expedited Cleanup which removed mercury contaminated soils from a container storage area, soils with visible mercury contamination was separated from less contaminated material which could be treated and disposed at a lower cost. Proper segregation saved significant treatment costs prior to disposal.

Volume and Type Avoided: No volume reduction.
Cost Savings: Cost differential for treatment and disposal.

Project: **Utilizing drill rig cuttings as borehole backfill**
Date of Implementation: FY1995
Location or Group: Field Unit 4

Description: Cuttings generated from investigative drilling activities have been returned to the borehole. This is allowed if no groundwater is present and the backfill activity will not change the final remedy for the site, or increase potential for contaminant migration. This procedure avoids handling of the investigative derived soil waste, and allows the media to be handled during the final remedial action.

Volume and Type Avoided: 10 drums, Low-level Radioactive
Cost Savings:

Project: **Preliminary Dry Decontamination Step Added**
Date of Implementation: FY1995
Location or Group: Field Unit 4

Description: The drilling and sampling equipment decontamination process was modified to add a dry decontamination step. This step removes the majority of potentially contaminated soil from the equipment, which in turn reduces the amount of liquid decontamination fluids generated by approximately 50%.

Volume and Type Avoided: Not estimated.
Cost Savings:

Project: **Preliminary Site Survey**
Date of Implementation: FY1995
Location or Group: Field Unit 4

Description: Prior to initiating a surface sampling campaign, the area of concern is screened for contamination. If no contamination is identified the health and safety plan is revised to indicate a lesser level or no personal protective equipment. This source reduces all of the PPE from the activity.

Volume and Type Avoided: Not estimated.
Cost Savings:

Field Unit 5

Project: **Sampling grid, field screening to improve hazard assessment, segregation, and reduce use of Personal Protective Equipment (PPE)**
Date of Implementation: 1995
Location: FU #5, MDA "M"

Description: Field screening, preliminary site survey information, and a 25 ft by 25 ft grid system was used to better define the contamination reduction zones and exclusion zones. This helped reduce the need for PPE and decontamination by limiting the use of PPE, etc only to those areas that were known to be contaminated.

Waste Avoidance Volume and Type LLW and HW PPE
Cost Savings: Not quantified at this time

Project: **Sampling grid and field screening to improve segregation**
Date of Implementation: FY 1995
Location: FU #5, MDA "M"

Description: A sampling grid (25 ft by 25 ft) was established and field screening were used to better define the areas and contamination of concern. The original site was believed to contain LLMW, and covered an area of over 3 acres. The refined sampling techniques

allowed materials to be better characterized and segregated at the point of generation, allowing waste materials to be classified as Commercial waste instead of suspect LLMW, LLW, or HW. This reduced the LLMW and LLW generated and reduced the analytical requirements.

Waste Avoidance Volume and Type: LLMW

Potentially contaminated area was over 14,000 cu yds; only 2 cu yd generated after grid and segregation techniques

Cost Savings: Not calculated at this time

Project: **Discharge of Decontamination Fluids**

Date of Implementation: FY 1995

Location: FU #5

Description: Decontamination fluids have historically been collected and managed as waste, pending characterization and release as non-contaminated. This created high volumes of fluids that were staged, sampled, and required disposal. In 1995, field units prepared a notice of intent (under the New Mexico Environment Department, Water Quality Requirements) to discharge decontamination fluids known to be non-contaminated directly to the site. This reduced the need to handle and treat the decontamination fluids.

Waste Avoidance Volume and Type liquid waste (non-contaminated)

Cost Savings:

Project: **Minimize drill core "kerf" and use drilling cuttings as backfill for the borehole**

Date of Implementation: FY 1995

Location: FU #5, MDA "M"

Description: The diameter and kerf of the drilling/core barrel were minimized to reduce the drilling wastes while maintaining the drilling core. This reduced the volume of drilling waste generated. In addition, drilling cuttings were returned to the borehole.

Waste Avoidance Volume and Type LLW and commercial waste, estimated up to 22 cubic yards avoided

Cost Savings:

Project: **Use bulk packaging and direct shipment for waste disposal**

Date of Implementation: FY 1995

Location: FU #5, MDA "M"

Description: Volume reduction was also accomplished through manual compaction of IDW and other containerized waste. Bulk packaging (B-25 boxes) were used for on site disposal of LLW soil, which minimized the landfill space required for disposal. Contaminated soil for off site disposal is excavated directly to dump-trunks for direct transport to the disposal facility, reducing the need for containers, handling, and more efficient use of the landfill space.

Waste Avoidance Volume and Type LLW landfill space avoided; HW landfill space avoided

Cost Savings:

Project: **WMin/PP incentives and requirements were included in subcontractor documents**

Date of Implementation: FY 1995

Location: FU #5, MDA M

Description: Remediation subcontractor documents included incentives for recycling and waste reduction. The contract required the contractor to be responsible for waste disposal, allotting a unit price for waste disposal and providing initial waste projections. This resulted in the subcontractor using all efforts to reduce the waste generation and identify lower cost disposal options. Significant waste disposal cost savings were realized (for DOE) by the contractor's direct contract with an off-site disposal facility.

Waste Avoidance Volume and Type Hazardous and Commercial waste

Cost Savings: Waste management cost savings estimated at over $5 Million

Project: **Concrete recycling**
Date of Implementation: FY 1995
Location: FU #5, MDA M

Description: Concrete was screened, segregated and non-contaminated concrete rubblized for reuse. Remediation contractor initiated actions for reuse, because the subcontractor documents provided incentives for avoiding waste disposal. The contract required the contractor to be responsible for waste disposal, allotting a unit price for waste disposal and providing initial waste projections. This resulted in the subcontractor using all efforts to recycle, when possible and reduce the waste generation.

Waste Avoidance Volume and Type: Concrete (Commercial waste)
Cost Savings:

Project: **Metal recycling**
Date of Implementation: FY 1995
Location: FU #5, MDA M

Description: Metal scrap was screened, segregated and non-contaminated metal was sent off-site for recycle. The remediation contractor initiated actions for recycle, because the subcontractor documents provided incentives for avoiding waste disposal. The contract required the contractor to be responsible for waste disposal, allotting a unit price for waste disposal and providing initial waste projections. This resulted in the subcontractor using all efforts to recycle, when possible and reduce the waste generation.

Waste Avoidance Volume and Type: Metal (Commercial waste); over 40,000 pounds.
Cost Savings:

Field Unit 6 - Decommissioning

Project: **Recycling of Contaminated Structural Carbon Steel**
Date of Implementation: FY1995
Location or Group: TA-21, Decommissioning Group

Description: Structural steel generated during demolition of building 3 and 4 south is being segregated from the LLW debris and staged for shipment to a commercial recycler. During FY1995 a contractual vehicle was obtained, procedures for waste handling prepared, and containers were sent or staged for smelting.

Volume and Type Avoided: 180 M^3, Low-level Radioactive
Cost Savings:
Waste Minimization Expenditures: $4,500 - reusable transportainers for staging and shipment.

Project: **Decontamination of Contaminated Concrete**
Date of Implementation: FY1995
Location or Group: TA-21, Decommissioning Group

Description: The razing of buildings 3 and 4 south involved the removal of contaminated concrete. The portions of the concrete was scabbled which removed surface contamination, screened to ensure attainment of cleanup levels, and the clean waste stream staged for crushing and reuse as backfill..

Volume and Type Avoided: 530 M3, Low-level Radioactive.
Cost Savings:
Waste Minimization Expenditures: $30,000 - Blast-track scabbling unit.

Project: **Stripping of Contaminated Surface Coatings**
Date of Implementation: FY1995
Location or Group: TA-21, Decommissioning Group

Description: Many surfaces within buildings 3 and 5 south contained embedded contamination under surface coatings but no volume contamination. To effectively decontaminate the surfaces for demolition a coatings removal mechanical scraper was purchased. Portions of the building debris were scraped, and then were eligible for survey and release. This also resulted in a marked improvement in worker safety.

Volume and Type Avoided: Low-level Radioactive.
Cost Savings:
Waste Minimization Expenditures: $4,000 - Mechanical Scraper.

Project: **Compaction of PPE/Cellulose Waste**
Date of Implementation: FY1995
Location or Group: TA-21, Decommissioning

Description: Two waste compactors, one drum and one B-25 box, were purchased, approved for operation, and utilized. During the last several months of the project all of the compatible waste from TA-21 was compacted in either the 55 gallon drum or B-25 box compactor. In addition specially designed B-25 boxes were purchased for usage with the compactors.

Volume and Type Avoided: 118 M^3, Low-level Radioactive.
Cost Savings:
Waste Minimization Expenditures: $43,000 - Two waste compactors.
$9,000 - Special B-25 Boxes

Project: **Bulk Packaging and Void Space Reduction**
Date of Implementation: FY1995
Location or Group: TA-21, Decommissioning Group

Description: Additional packaging requirements and procurement efforts have been made to bulk package waste, and to ensure that minimal void space exists in packages sent for disposal. Used bulk transportainers were procured to ship and dispose building debris at TA-54. This method minimizes the amount of space used for packaging in the landfill and increases packaging efficiencies..

In addition the group rented demolition shearing equipment which removes sections of the building structure in a manner which lends to efficient bulk packaging. The shears were also used to section the structural metal into two waste streams, one destined for metal melt and a second which is staged for potential decontamination.

Volume and Type Avoided:
Cost Savings:
Waste Minimization Expenditures: $63,000 - Demolition equipment rental.
$47,000 - Bulk waste containers

Project: **Recycling of Enriched Uranium**
Date of Implementation: FY1995
Location or Group: TA-21, Decommissioning Group

Description: Decontamination of the furnaces in building 4 south resulted in the recovery of 1.5 kg of 93% enriched uranium which was sent to an on-site laboratory for re-use.

Volume and Type Avoided: 1.5 kg, Low-level Radioactive
Cost Savings:
Waste Minimization Expenditures:

Project: **Reuse of Soils as Fill Material**
Date of Implementation: FY1995
Location or Group: TA-16, Decommissioning Group

Description: Clean soils removed during demolition of structures at TA-16 were shipped for usage as fill material at other locations throughout the laboratory.

Volume and Type Avoided: 400 yd^3, Commercial waste
Cost Savings:
Waste Minimization Expenditures:

Project: **Recycling of Structural Debris**
Date of Implementation: FY1995
Location or Group: TA-16, Decommissioning Group

Description: Metal framing and piping was segregated and shipped for recycling at a regional scrap vendor.

Volume and Type Avoided: 1 yd^3, Commercial Waste.
Cost Savings:
Waste Minimization Expenditures:

Project: **Recycling of Contaminated Steel**
Date of Implementation: FY1995
Location or Group: TA-35 Phase Separator Pit, Decommissioning Group

Description: Metal generated during the demolition of structures at TA-35 were segregated and staged for shipment to a commercial radioactive smelting company.

Volume and Type Avoided: 283 yd^3, Low-level Radioactive
Cost Savings:
Waste Minimization Expenditures:

Project: **Decontamination, Survey, and Free Release of Metals**
Date of Implementation: FY1995
Location or Group: TA-35 Phase Separator Pit, Decommissioning Group

Description: Ductwork and other materials agreeable for radiological screening were decontaminated, surveyed using approved procedures and shipped to a regional salvage company.

Volume and Type Avoided: 107 yd^3, Low-level Radioactive
Cost Savings:
Waste Minimization Expenditures:

Project: **Value Engineering Study**
Date of Implementation: FY1995
Location or Group: TA-2 Omega West Reactor, Decommissioning Group

Description: The Omega West Reactor is scheduled for decommissioning during the next several years. To prepare for the project, a value engineering study was conducted to evaluate potential options for projected waste streams. The study quantified waste streams which are eligible for decontamination, recycling, and reuse.

Volume and Type Avoided: Between 53-80% Reduction of Planned Volumes, Low-level Radioactive
Cost Savings: Estimated waste management cost savings are projected between $1M-3M,

Los Alamos National Laboratory

ENVIRONMENTAL RESTORATION

Environmental Restoration

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Date: February 15, 1996
Refer to: EM/ER:96-058

Mr. David Neleigh
NM Federal Facilities Section
EPA, Region 6, 6PD-N
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

SUBJECT: ANNUAL SUBMITTAL OF THE WASTE MINIMIZATION AND POLLUTION PREVENTION AWARENESS PLAN

Dear Mr. Neleigh:

Enclosed is the annual submittal of the Waste Minimization and Pollution Prevention Awareness Plan for the Los Alamos National Laboratory. This deliverable is required under the specific condition B.1. within Module VIII of the Resource Conservation and Recovery Act Operating Permit. A request for an extension of the submittal date from December 1, 1995 to February 15, 1996, was granted by the EPA in a letter dated December 5, 1995.

If you have any questions, please feel free to contact David McInroy at (505) 667-0819 or Ted Taylor at (505) 665-7203.

Sincerely,

Jorg Jansen, Program Manager
Environmental Restoration

Sincerely,

Theodore J. Taylor, Program Manager
Los Alamos Area Office

JJ/TT/bp

Enclosure: Waste Minimization and Pollution Prevention Awareness Plan

EM/ER:96-

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CERTIFICATION

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

Document Title: Waste Minimization and Pollution Prevention Awareness Plan

Name: _____ Date: 2-15-96

Jorg Jansen, Program Manager
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or

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Los Alamos National Laboratory

ENVIRONMENTAL RESTORATION PROJECT WASTE MINIMIZATION AWARENESS PLAN

1996 Submittal

15 February 1996

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Los Alamos National Laboratory
Environmental Restoration Project

WASTE MINIMIZATION AWARENESS PLAN

15 February 1996

1.0 INTRODUCTION

Waste minimization is an inherent goal within all the operating procedures of the Los Alamos National Laboratory (the Laboratory). The U.S. Department of Energy (DOE) and the Laboratory are required by the U.S. Environmental Protection Agency (EPA) to submit annually a waste minimization plan, as part of the Laboratory's operating permit under the Hazardous and Solid Waste Amendments Act (HSWA). This document represents the waste minimization and pollution prevention (WMin/PP) awareness plan for the Laboratory's Environmental Restoration (ER) Project.

This plan demonstrates that the Laboratory's ER Project supports WMin/PP as a goal and that there is an active and ongoing program in place to incorporate waste reduction practices into ER activities and procedures. The plan was prepared by the Environmental Restoration Project, Program Office, in the Environmental Management Directorate, and it supports the requirements of module VIII, Section B.1 of the Laboratory's HSWA operating permit. This plan is specific to the ER Project and should be considered a companion document to the Laboratory's site-wide plan, *The Los Alamos National Laboratory Waste Minimization and Pollution Prevention Awareness Plan,* dated May 27, 1994.

1.1 Background

The mission of the Laboratory's ER Project is to protect human health and the environment from risks posed by inactive and surplus DOE facilities and contaminated areas, by remediating sites and facilities in the most cost efficient and responsible manner possible in order to provide for potential future beneficial use. In completing this mission, ER activities[1] have the potential to result in large volumes of waste that will require special handling,

[1] Throughout the text of this document, "ER" refers to both the clean-up of environmental media and the safe decontamination and decommissioning of inactive facilities.

treatment, storage, and disposal. Because the contamination is already present in the environmental media or facility (as a result of past DOE activities), the ER Project is not the original generator of the waste, in the traditional sense. However, the ER Project is faced with the responsibility and the challenge to minimize the amounts of waste that will require subsequent management or disposal. Minimization is necessary because of the high cost of waste management, the limited capacity for on-site or off-site waste treatment, storage, or disposal, and the need to protect the environment from future off-site releases caused by current waste management practices.

In 1990, Congress passed the Pollution Prevention Act (PPA) which changed the focus of environmental policy from "end-of-pipe" regulation to encouraging source reduction or eliminating waste prior to treatment, storage, or disposal. Under the PPA, all waste generators must certify that they have a waste minimization "program in place" as specified in 40 CFR 265.75(h). The elements of this program are further defined in the May 1993 EPA interim final guidance, "Elements of a Resource Conservation and Recovery Act (RCRA) Waste Minimization Program in Place." The program guidance lists what EPA considers the minimum level of infrastructure and effort which must be expended to have an acceptable program. This includes top management support, process evaluation, technology exchange, waste minimization employee training, and waste generation tracking and projections.

DOE also requires a pollution prevention program as outlined in the 1994 Waste Minimization/Pollution Prevention Crosscut Plan (DOE/FM-0145). The DOE program has specific program requirements for every waste generator which includes evaluating waste minimization options as early in the planning process as possible. The DOE Program also places responsibility for WMin/P2 implementation with the waste generating program.

1.2 Purpose and Scope

The purpose of this plan is to establish an approach for minimizing the wastes generated by the Laboratory's ER Project. This plan discusses the methods and activities that will be routinely employed to prevent or reduce waste generation in FY 1996; and it reports historical waste generation quantities and significant waste minimization accomplishments for FY 1995. It also discusses the ER Project Director's commitment to WMin/P2 and provides a discussion of specific program elements for the ER WMin/P2 program, and a presentation of the barriers to implementation of further significant reductions.

This plan is designed to fulfill the requirements of the Laboratory's Hazardous and Solid Waste Amendments Act Permit, Module VIII, Section B.1, and the generator requirements within the Resource Conservation and Recovery Act, 40 CFR 265.75(h).

The scope of this plan addresses all waste types generated by the ER Project during the course of planning and conducting the investigation and clean-up of environmental media and the decontamination and decommissioning of DOE facilities. Wastes generated by ER include "primary" and "secondary" waste streams: primary waste consists of contaminated material or media that was present in the environment or facility as a result of past DOE activities prior to any containment and restoration activities such as contaminated building debris, or contaminated groundwater or soil from a removal action; secondary waste streams consist of materials that were added to the investigative or remedial process or utilized in the process of remediation, such as investigative derived waste (e.g., personal protective equipment [PPE], sampling waste, drilling cuttings), wastes resulting from treatment, storage or handling operations, and additives used to stabilize waste, etc. Waste types generated vary on a case-by-case basis and may include: low-level radioactive (LLW), low-level mixed radioactive mixed (LLM), transuranic radioactive (TRU), chemical wastes (which includes RCRA hazardous, Toxic Substances Control Act (TSCA) hazardous, and New Mexico Special Waste), and commercial waste.

The scope of a WMin/P2 effort for an individual ER Project will be dependent on the primary and secondary wastes expected and the feasibility of waste reduction for those waste types.

1.3 Requirements of the Operating Permit

The Laboratory's Operating Permit, (Hazardous and Solid Waste Amendments Act Permit, Module VIII, Section B.1) requires a waste minimization program in place; and the submittal of an annual submittal of an awareness plan. The specific requirements of the permit are listed in Table 1.3.1 along with the corresponding section of the plan that addresses the requirement.

Table 1.3.1

Los Alamos National Laboratory HSWA Permit Module VIII, Section B.1

Permit Requirement	Topic	Refer to Report Section
Section B.1.a.1	Policy Statement	Section 2.0
Section B.1.a.2	Employee Training	Section 6.3
Section B.1.a.2	Incentives	Section 6.11
Section B.1.a.3	Past Source Reduction and Recycling	Section 5.4
Section B.1.a.4	Itemized Capital Expenditures	Section 5.4
Section B.1.a.5	Barriers to Implementation	Section 7.0
Section B.1.a.6	Sources of Information	Section 6.4
Section B.1.a.7	Investigation of Additional WMin Efforts	Section 6.2
Section B.1.a.8	Utilization of Hazardous Materials	Section 5.2
Section B.1.a.9	Justification of Waste Generation	Section 5.0
Section B.1.a.10.a	Site Lead Inventory Program	Section 6.12
Section B.1.a.10.b	Steel for Lead Substitution Program	Section 6.12
Section B.1.a.10.c	Lead Shielding Coating Program	Section 6.12
Section B.1.a.10.d	Lead Decontamination Program	Section 6.6
Section B.1.a.10.e	Scintillation Cocktail Substitution Program	Section 5.2
Section B.1.a.10.f	Radioactive Waste Segregation Program	Section 6.6

2.0 PROGRAM DIRECTOR POLICY STATEMENT AND MANAGEMENT COMMITMENT

The Laboratory's ER Project Director, Program Managers, Field Project Leaders, and other project personnel are committed to preventing or reducing the generation of waste from ER Project activities, as much as is technically and economically feasible and consistent with the ER project mission.

The Laboratory's support for pollution prevention and waste minimization programs is documented in the Laboratory's Administrative Requirements ("Waste Minimization," Administrative Requirement 10-8 in *Environment, Safety, and Health Manual,* Los Alamos National Laboratory Manual, Chapter 1) and in a Director's Policy Statement, DP 105, Waste Minimization. In addition, the Environmental Management Directorate (EM), of which ER is a part, is committed to WMin/P2.

The ER Project fully supports the Laboratory's and EM's written WMin/P2 policies and commitments. The ER Project will support the goal of waste reduction by giving preference to source reduction, improved segregation and characterization, and environmentally and regulatory sound recycling practices over waste treatment and disposal techniques. Evidence of the ER Project commitment is demonstrated by this plan, as well as the documentation of past waste reduction efforts within the ER Project (Section 5.4 and Attachment B) and the ER Waste Minimization Awareness Strategy/Action Plan (see attachment A). The ER Project will allocate sufficient resources necessary to pursue the goals and approaches established by this plan and will coordinate with the EM Directorate and the Pollution Prevention Program Office (P3O), as necessary.

3.0 ORGANIZATIONAL STRUCTURE AND STAFF RESPONSIBILITIES

The ER project is part of the Environmental Management Directorate at the Laboratory, and is subject to all Laboratory and EM policies and requirements. The organizational structure of the ER Project is shown in Figure 3.0.1.

Los Alamos National Laboratory
Environmental Restoration Project
Waste Minimization Organization Chart

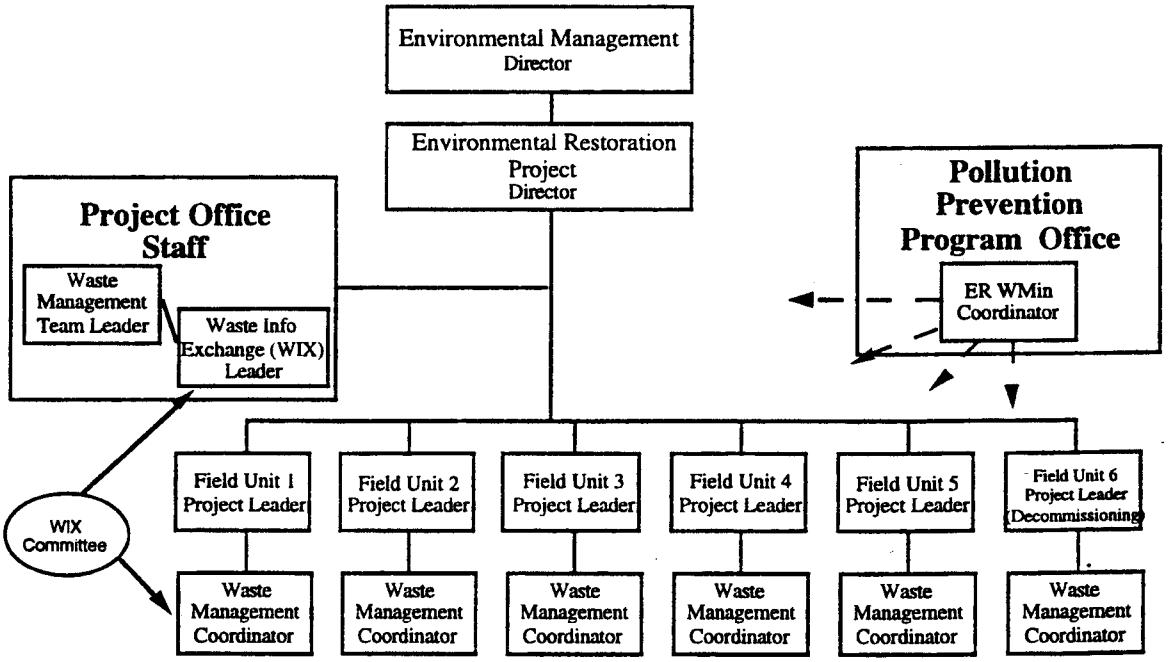

Figure 3.0.1

The organizational structure for developing and implementing WMin/PP programs in ER are outlined below:

- The Laboratory Director and the Associate Director for Operations have oversight responsibilities and provide annual review of the Laboratory wide WMin/PP program goals and performance.

- The Environmental Management Directorate (EM Project Office) has primary responsibility for the Laboratory-wide WMin/PP program and the ER Project.

- The EM/Pollution Prevention Program Office (P3O) has been delegated by the EM Directorate to develop and manage the Laboratory-wide WMin/PP program. The P3O provides oversight for WMin/PP implementation; a base of technical knowledge and resources for WMin/PP practices; assistance with identifying waste generation trends and WMin/PP opportunities; recommendations for WMin/PP solutions and applications; support in tracking and reporting waste generation trends and WMin/PP successes; assistance in preparing funding applications and proposals for WMin/PP projects; and facilitation of actions to overcome WMin/PP implementation barriers. For FY 1996, the P3O has taken the responsibility to designate P3O resources as WMin/P2 coordinators for the ER Project.

- The ER Project Director has primary responsibility for developing and implementing WMin/PP programs and strategies for all ER projects that result in waste generation, as described in this plan. The ER Project must allocate sufficient resources to facilitate the successful attainment of the goals and approaches identified in this plan. The ER project is responsible for establishing and submitting an annual WMin/PP plan to EPA, establishing WMin/PP goals and performance measures, and coordinating with the P3O, as necessary, to implement WMin/PP activities and to report success stories.

- The ER Project - Waste Management (WM) Team Leader, is the focal point for planning and implementing waste minimization activities and reporting of waste minimization successes for the ER Project. The ER WM Team Leader is the primary liaison between the P3O and the ER WMin/PP program. For FY 1996, the WM Team Leader will coordinate directly with the WMin/P2 coordinators.

- ER Project Field Project Leaders (FPLs) report to the ER Director. The FPLs have the responsibility to identify and incorporate WMin/PP practices into project plans, and field activities, as much as technically and economically feasible.

- The Waste Information Exchange Team (WIX) Leader, reports to the Waste Management Team Leader. The WIX assists with overseeing and implementing the WMin/PP responsibilities and facilitates WMin/PP information exchange and the tracking and reporting of WMin/PP successes. The WIX includes waste coordinators for each of the field units who are responsible for maintaining competence in the field on waste management and waste minimization.

4.0 GOALS AND PERFORMANCE MEASURES

The overall goal of the ER's WMin/PP strategy is to increase the routine implementation of WMin/PP practices in the planning and execution of ER activities so as to avoid or reduce waste requiring subsequent handling or disposal. Performance measures for the WMin/PP effort include:

- Increased cognizance of WMin/P2 within the ER Project,
- Volume of waste reduced or avoided,
- Volume of material recycled or reused,
- Documentation of WMin/P2 successes.

Specific metrics and reporting requirements will be determined during the second quarter of FY 1996, through interaction with the ER Project Office, the ER FPLs, the P3O, and the DOE Albuquerque Operations Office. Because of the non-routine nature of ER waste, it is not possible to provide measurable waste reduction goals for specific waste types.

The ER WMin/PP approach will focus on:

- First, avoiding or reducing LLW, LLM, TRU or TRU-Mixed that requires handling or disposal at the on-site waste management facility (TA 54);
- Second, avoiding or reducing hazardous waste that requires handling at TA-54 or off-site shipments for treatment or disposal;
- Finally,
  - avoiding or reducing material going into any other waste stream requiring on- or off-site waste management,
  - reducing the volume of waste from ER treatment operations,
  - increasing the recovery of material for reuse or recycle.

Figure 4.1 shows the environmental hierarchy for ER wastes. The ER WMin/PP approach promotes source reduction and environmentally sound recycling practices, in place of waste

treatment and disposal techniques, when economically and technically feasible. Although source reduction is preferred, the ER WMin/PP approach recognizes that there may be limited opportunity for source reduction of primary wastes because much of the waste already exists and environmental and health concerns may require removal. When appropriate, source reduction of primary wastes will be accomplished through the application of risk based clean-up criteria, land-use scenarios, and the consideration of in-situ or non-intrusive remediation technologies during project planning and negotiation stages, and improved characterization and segregation during the execution of field activities. Source reduction of secondary wastes will be accomplished through proper planning; improved housekeeping, segregation and characterization; and application of WMin/PP criteria during technology selection, design and construction activities. Recycling and reuse practices will be considered for all primary and secondary wastes. Volume reduction, including size reduction, compaction, and optimal packaging, will be considered for all primary and secondary wastes that can not be avoided or recycled.

ENVIRONMENTAL MANAGEMENT
HIERARCHY
WITHIN ENVIRONMENTAL RESTORATION

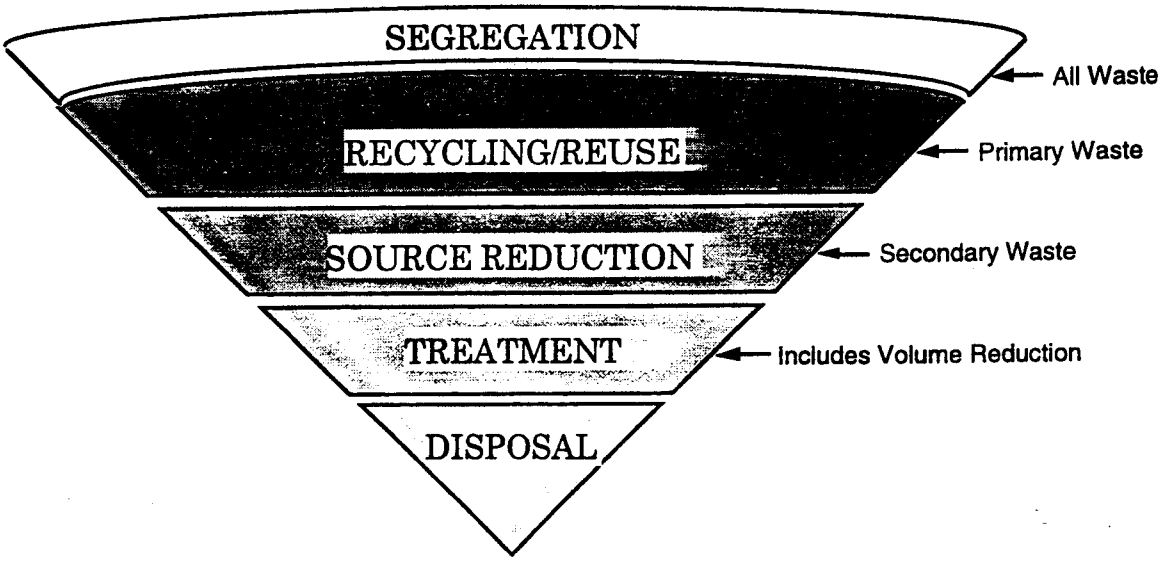

Figure 4.1

The WMin/PP approaches outlined above are consistent with the waste reduction priorities established by the Laboratory's site-wide waste minimization plan, which recognizes the severe limitations of on-site disposal capacity for LLW and on-site storage capacity for LLM. In addition, the approach was adopted to address the variable and non-recurring nature of wastes coming from ER activities.

5.0 SITUATION ANALYSIS

The Laboratory's ER Project originally consisted of approximately 2,100 potential release sites (PRSs). Currently, there are approximately 1,100 PRSs remaining which require investigation and/or remediation, and 140 structures identified for decommissioning in the project plan. The Laboratory's ER Project is scheduled for completion in the year 2011.

In FY 1995, the LANL ER Project activities which resulted in waste generation included remedial site assessment, site remediation, and the decommissioning of surplus facilities.

The assessment portion of the ER project included submission of 16 RCRA Facility Investigation (RFI) reports to EPA, conducted RCRA Facility Investigation field work on 470 sites, submittal of two work plans, and development of a canyon work plan in cooperation with the San Ildefonso Pueblo.

The remedial activities conducted in FY1995 included eight sites remediated under the Expedited Cleanup process and 37 sites remediated under the Voluntary Cleanup process. In addition, during the evaluation of other potential remedial sites 576 sites were determined by risk assessment to not require remedial action. These 576 sites were then proposed for removal from the site Hazardous and Solid Waste Amendment Act Permit Module VIII through a permit modification requests.

The decommissioning activities demolished 12 contaminated facilities, including radioactively contaminated facilities from Technical Area (TA)-21 and high explosive contaminated facilities from TA-16.

The FY1996 planned activities include the remediation of approximately 40 PRSs. In addition a large number of sites will be investigated and considered for no further action (NFA). The estimated waste generation for FY 1996 is listed in table 5.3.2.

5.1 Applicable Regulations

The LANL ER project is subject to many environmental regulations. The key drivers for the WMin/P2 program are listed below. A complete description of these regulations may be found in the LANL Waste Minimization Awareness Plan or the "Waste Minimization and Pollution Prevention Regulations and Orders, Requirements and Identification List." DOE/EM, May 1995.

Federal Regulations and Executive Orders

- Resource Conservation and Recovery Act (RCRA)
- Pollution Prevention Act (PPA)
- Executive Order 12873 - Federal Acquisition, Recycling, and Waste Prevention
- Executive Order 12856 - Federal Compliance With Right-to-Know Laws and Pollution Prevention

State of New Mexico Regulations

- New Mexico Solid Waste Regulations
- New Mexico State Hazardous Waste Management Regulations

DOE Policy

- DOE Order 5400.1, General Environmental Protection Program
- DOE Order 5400.3, Hazardous and Radioactive Mixed Waste Program
- DOE Order 5400.5, Radiation Protection of the Public and the Environment
- DOE Order 5820.2A, Radioactive Waste Management
- Secretary of Energy Notice 37-92, Waste Minimization Policy Statement
- DOE Waste Minimization/Pollution Prevention Cross-Cut Plan, 1994

Los Alamos National Laboratory Directives and Policies

- Director's Policy Statement, DP 105, *Waste Minimization*
- "Waste Minimization," Administrative Requirement 10-8 in *Environment, Safety, and Health Manual,* Los Alamos National Laboratory Manual, Chapter 1).

5.2 Justification for the Usage of Hazardous Materials

ER Project activities currently introduce only small amounts of hazardous materials into field and support operations. During the past years, most usage of hazardous material has

substituted less hazardous alternatives in an effort to reduce the generation of secondary hazardous or mixed waste. These efforts include the following:

- Decontamination Solvents - In isolated instances, site conditions may warrant the addition of methanol or ethanol into decontamination fluids to aid in the removal of heavy organic compounds from sampling equipment. However, in most cases the methanol and ethanol have been replaced by a non-toxic soap product. The use of the hazardous solvents is unlikely in future years.

- Scintillation Cocktails - The routine usage of scintillation cocktails media which results in a RCRA hazardous waste has been discontinued at the Laboratory. The scintillation media was substituted by a media which generates a non-regulated hazardous media. In rare instances where substitutes are not available, a small amount of scintillation cocktail media may be generated from ER characterization, where sample analysis procedures dictate the usage of a substance which results in a RCRA regulated waste.

- Analytical Processes - Some of the sample analysis required for site characterization may involve the usage of hazardous substances as prescribed by EPA analytical procedures, SW-846. These analysis processes have been evaluated by both EPA and private companies and universities for potential alternative processes and material substitution. The usage of hazardous substances in the analysis is currently viewed as necessary. However, ER field units are making efforts to minimize the number of samples requiring laboratory analysis, through the use of field screening. Thus reducing the use of laboratory solvents.

5.3 FY 1995 Waste Generation Summary and FY 1996 Projections

The ER Project Fiscal Year 1995 waste generation summary is listed in Table 5.3.1. Listed in Table 5.3.2 is the estimated generation volume for Fiscal Year 1996. A more accurate waste projection system is being developed for the outyears.

Table 5.3.1

Fiscal Year 1995 Waste Generation Summary

Waste Generation - Solid State	
Waste Type	Volume (Cubic Yards)
Chemical Waste*	738
Low-level Radioactive Waste	2445
Transuranic Radioactive Waste	0
Mixed Waste	13
Waste Generation - Liquid State	
Waste Type	Volume (Gallons)
Chemical Waste	2623
Low-level Radioactive	2925
Mixed Waste	0

* The chemical waste type includes RCRA, Toxic Substance Control Act (TSCA), and New Mexico Special regulated wastes.

Table 5.3.2

Fiscal Year 1996 Waste Volume Projections

Waste Projection - Solid State	
Waste Type	Volume (Cubic Yards)
Chemical Waste*	4378
Low-level Radioactive Waste	9264
Transuranic Radioactive Waste	20
Mixed Waste	27
Waste Projection - Liquid State	
Waste Type	Volume (Gallons)
Chemical Waste	20
Low-level Radioactive	311
Mixed Waste	29

* The chemical waste type includes RCRA, Toxic Substance Control Act (TSCA), and New Mexico Special regulated wastes.

5.4 Waste Minimization Accomplishments FY 1995

WMin/PP was an integral part of the FY 1995 ER field projects through recycling, reuse, contamination avoidance, risk-based clean-up strategies, and many other practices. However, there was limited tracking and reporting of WMin/PP successes on an ER Project-wide or field project basis. Waste reduction benefits are typically difficult to track and quantify because the data to measure the amount of waste reduced (as a direct result of a WMin/P2 activity) is often not available and is not easily extrapolated. Many waste reduction successes are attributed to best management practices or standard practices that are not identified or tracked as independent WMin/P2 practices. In January, 1996, the ER Project initiated efforts to collect and report WMin/PP efforts and successes during the previous year's projects. Similar tracking and reporting efforts will continue in the future.

The effectiveness of the 1995 ER WMin/P2 efforts (for reducing or avoiding) varied with the phase when WMin/P2 was applied and the waste types. For example, WMin/PP efforts that were integrated in the planning stages of a decommissioning project provided a high estimated volume reduction, where WMin/PP during assessment and characterization efforts produced relatively low volume reductions because the waste potential was lower. In addition, recycling potentials are greater for commercial waste streams, but LLW and LLMW streams provide lower opportunities for reuse and recycle.

High volume waste streams resulting from ER activities include contaminated soil and demolition debris such as metal and concrete. The WMin/PP techniques used in 1995 to reduce these high volume waste streams included the following:

- Contaminated soil
  - initiated negotiations to allow remedies that did not remove the soil (e.g., in-situ treatment or no-action);
  - used alternative drilling and sampling techniques to reduce investigative derived wastes;
  - used field screening techniques to allow better definition of contamination boundaries and improved characterization of materials;
  - improved segregation practices to avoid cross contamination;

- Demolition debris
  - included WMin/PP practices in decommissioning plans and specifications
  - used improved segregation techniques to allow staging of recyclables

- recycled metals and concrete
- surface scouring and surface decontamination of concrete and other materials

A summary of specific WMin/PP accomplishments for the ER field units during 1995 is presented below. Additional information is provided in Attachment B. (It should be noted that many of the practices identified below are used by all the field units; the list below highlights a cross section of practices and is not intended to be a comprehensive list of practices used by the Field Units.)

- **Field Unit #1** conducted investigation, characterization and remediation activities at several operable units. The projects avoided and reduced the generation of LLW, LLMW, HW, and commercial (non-hazardous, non-radioactive) wastes by using the following procedures.
  - Using a cone penetrometer test (CPT) in place of a drill rig to avoid the generation of drill cuttings and core.
  - Consolidating waste containers prior to shipment for disposal.
  - Conducting waste minimization planning prior to implementation of expedited cleanup removal actions.

- **Field Unit #2** conducted investigation and characterization activities at several operable units. The projects avoided and reduced the generation of LLW, LLMW, HW, and commercial (non-hazardous, non-radioactive) wastes by using the following procedures.
  - Using risk-based strategies and field screening to better define and limit the areas of contamination and removal actions.
  - Returning excess sample media to the site, in compliance with EPA and Laboratory procedures.
  - Maximizing the reuse of equipment and supplies, and limiting the use of disposable plastics except when necessary (e.g. for sampling of high explosives)
  - Controlling the personnel and equipment allowed into the contamination zones and screening, sorting, and segregating all material out of the contamination zones.
  - Limiting the number and size of samples sent for analysis and improved sample management (which has reduced the number of samples shipped for analysis by an estimated 50%).

- Returning drill cuttings to the borehole (avoiding an estimated 7 to 18 cubic yards of waste).
- Testing alternative drilling methods that reduce waste (e.g., vibratory drilling and hydropunch) although the techniques were determined to be not appropriate for the current applications.
- Use of launderable and reusable PPE in place of disposal coveralls and booties.

Purge water and decontamination fluids were returned to the site, in compliance with EPA and Laboratory procedures, avoiding over 400 gallons of liquid waste.

Volume reduction was also accomplished through manual compaction of materials in drums and size reduction, when possible.

The Field Unit has initiated negotiations to allow risk-based, in-situ remedies for the closure of waste lagoons (at TA-53) which could potentially avoid the handling and treatment of over 20 cubic yards of LLMW.

- **Field Unit #3** conducted investigation and characterization activities at TA-16 and 33. The projects avoided and reduced the generation of LLW, LLMW, HW, and commercial (non-hazardous, non-radioactive) wastes by an estimated 26 cubic yards using the following procedures.
  - Including WMin/PP in operating procedures and site specific waste management plans
  - Training personnel on site specific waste management and WMin procedures
  - Use of launderable and reusable PPE in place of disposal coveralls and booties, resulting in zero PPE waste during 1995;
  - Maximizing the reuse of other equipment and supplies, such as using high density plastic mats, in place of less-durable plastic sheeting;
  - Contamination avoidance such as reducing contact with samples, limiting personnel and equipment into potentially contaminated areas, protecting equipment that is carried into the contamination zones, and prohibiting leaning, kneeling, or sitting in the contaminated zones.

- Expanding the decontamination process to include the removal of obvious contamination while in the contamination zone before exiting or entering the decontamination area.
- Improved waste characterization and segregation, through the use of acceptable knowledge, radioactive analysis and segregation at the point of generation, and the implementation and use of the ER Waste Characterization Strategy Form.

Liquid wastes (an estimated 1180 gallons) were avoided by returning decontamination fluids to the sampling sites, in compliance with EPA and Laboratory procedures.

- **Field Unit #4** conducted investigation, characterization and remediation activities at locations within the canyons on Laboratory property. The projects avoided and reduced the generation of LLW, LLMW, HW, and commercial (non-hazardous, non-radioactive) wastes by using the following procedures.
  - Using a rotary hand auger in place of a drill rig to avoid the generation of drill cuttings and core.
  - Reusing personal protective equipment.
  - Utilizing borehole cuttings as backfill in boreholes.
  - Conducting dry decontamination of equipment prior to liquid decontamination.
  - Conducting a preliminary site survey to justify the need for personnel protective equipment.

Liquid wastes (an estimated 120 gallons) were avoided by returning decontamination fluids to the sampling sites, in compliance with EPA and Laboratory procedures.

- **Field Unit #5** conducted investigation and characterization activities and began remediation of a material disposal area (MDA). The field unit has successfully avoided and reduced the generation of LLW, LLMW, HW, and commercial (non-hazardous, non-radioactive) wastes by using the following procedures.

- Using preliminary site survey information and field screening to better define the contamination areas, limiting the areas requiring PPE use and refining the areas requiring further action.
- Including WMin/PP incentives and requirements in subcontractor documents.
- Improved segregation through field screening and proper characterization, which has reduced the volume of LLMW and HW originally projected.
- Segregating concrete, rubblizing and distributing concrete for reuse
- Segregating metal (non-contaminated) for recycle (estimated 150 cubic yards of metal waste avoided).
- Returning excess sample media and decontamination fluids to the site, in compliance with EPA and Laboratory procedures.
- Maximizing the reuse of equipment and supplies, and limiting the use of disposable plastics except when necessary (e.g., for sampling of high explosives).
- Controlling the personnel and equipment allowed into the contamination zones and screening, sorting, and segregating all material out of the contamination zones.

Volume reduction was also accomplished through manual compaction of materials for disposal and the use of direct shipment of waste materials for off-site disposal, which reduced the need for bulk containers and minimized the use of space in the disposal unit.

- **Field Unit #6 - Decommissioning** razed radioactively contaminated buildings at TA-21 and TA-35; and demolished high explosives contaminated facilities at TA-16. In addition planning activities were conducted for the TA-2 Omega West Reactor. The activities described below avoided the disposal of 1,200 Yd^3 of LLW, and 420 Yd^3 of commercial waste. The field unit dedicated over $200,000 of project funds to waste minimization activities in 1995.

- Recycling contaminated structural steel.
- Decontaminating structural steel and ductwork.
- Compacting PPE and plastics.
- Scabbling contaminated concrete surfaces.

- Removal of contaminated surface coatings.
- Bulk packaging of debris destined for disposal.

In addition the field unit evaluated several other waste minimization projects for future implementation.

6.0 WASTE MINIMIZATION PROGRAM ELEMENTS

Listed below are program elements of the Laboratory's ER waste minimization program for FY 1996. Several of the elements are currently in place; however, several are in the planning stages. The elements which are listed as planned will be implemented if economically and technical feasible.

6.1 WMin Coordinator

The WMin/PP coordinators will have a primary role in FY 1996 for developing and implementing programmatic elements of the ER WMin/PP program by conducting the following activities[2]:

- Improve WMin/P2 awareness and information exchange within the ER Project, as outlined in Attachment A.

- Provide technical reviews and WMin/P2 input to ER documents and procedures, such as Corrective Measure Studies, Sampling and Analysis Plans, or other project work plans and provide working examples of "model" documents that incorporate WMin/P2 elements.

- Assist with an ER Equipment Sharing Program to identify equipment needs that may be served by use of equipment that is currently available at other DOE facilities, thus reducing the purchase or lease of new equipment.

- Technical Assistance and Consistency Among Field Units to formalize standard approaches for WMin/PP in ER project plans and procedures and

[2] These activities are currently proposed and planned. Actual activities to be completed will be based on the FY 1996 project needs and funding levels

institutionalize the use of design reviews, WMin/PP checklists, or value engineering for WMin/P2 applications.

- Develop WMin/P2 language for ER subcontractor documents and project specifications so as to provide incentives and measurable goals for waste reduction.

- Pilot test or demonstrate a site specific waste reduction activity with a high potential for immediate return on investment.

The typical WMin/PP tools and practices that the WMin coordinator(s) will make available to the ER projects are summarized in Table 6.1. The specific application and waste reduction potential of a tool will be dependent of the specific ER project and left to the judgment of the Field Project Leader.

Table 6.1 - Common WMin Tools for use in the ER Project	
WMin/P2 tools for the *Negotiations and Planning Phases*	
-	Negotiate with regulators to recognize and implement WMin/P2 where appropriate
-	Write WMin/P2 into ER program documents
-	Include WMin/P2 in budgets and contracts
-	Integrate WMin/P2 into construction team activities
-	Train ER personnel on WMin/P2 and build WMin/P2 awareness
WMin/P2 tools for the *Assessment Phase* include	
-	Conduct efficient sample management and analysis
-	Consider alternative sampling techniques
-	Consider alternative drilling techniques
-	Segregate materials and waste through field screening
-	Utilize site control techniques
-	Use bulk waste packaging
-	Train ER personnel on WMin/P2 and build WMin/P2 awareness
WMin/P2 tools for the *Alternative Evaluation and Selection Phase* include	
-	Identify WMin/P2 as a criteria during treatment selection
-	Incorporate WMin/P2 in key decision making documents
-	Conduct treatability studies that support WMin/P2
-	Train ER personnel on WMin/P2 and build WMin/P2 awareness

Table 6.1 - Common WMin Tools for use in the ER Project (cont.)	
WMin/P2 tools for the *Implementation Phase* include	
-	Scour and decontaminate building materials
-	Recycle and reuse materials from decommissioning activities
-	Dedicate a person on ER projects to promote WMin/P2 (e.g. a WMin Coordinator)
-	Reuse equipment
-	Train ER personnel on WMin/P2 and build WMin/P2 awareness

6.2 WMin Planning and Cost Analysis

WMin is best integrated during the project planning, design, and engineering phases. To ensure that WMin is evaluated, and appropriately integrated in these phases, a WMin checklist will be designed for use by project managers and FPLs. The checklist tool will be used during project planning for all activities and in the operational readiness review for field activities. The checklist tool prompt planners and FPLs to ensure that the fundamentals of WMin are considered. Part of this process will include introducing unit costs for waste management, that can be used for evaluating the cost effectiveness of WMin ideas.

WMin/P2 strategies incorporated during the planning (and negotiations) phases are one of the few opportunities for "source reduction" because they have the potential to avoid or reduce the generation of contaminated soil, groundwater, and building debris, which represents a significant waste volume within the ER Project. Well defined agreements (with regulators and stakeholders) regarding land-use scenarios, cleanup performance standards, and risk and pathway scenarios have shown to be highly effective in avoiding or reducing these primary wastes (e.g. soil, building debris) and secondary wastes.

Other techniques that may be used (during the planning phases) to reduce waste may include: incorporating WMin/P2 practices into budgets; inserting WMin/P2 language into project plans, specifications, and contractor documents; coordinating with design engineers and construction teams during conceptual and preliminary design stages; negotiating with regulators to allow treatment options that generate little secondary waste; and developing sampling strategies that limit the number of samples.

6.3 Employee Training and Awareness Plan

Waste minimization implementation is most effective when all employees consider WMin/P2 part of their job responsibilities. To accomplish this, a planned approach to building waste minimization awareness has been developed (see attachment 2, Awareness Strategy for the Pollution Prevention/Waste Minimization in Environmental Restoration Project [FY 1996]). The goals of the awareness plan are to:

- Develop a value-added perception of P3O resources relative to ER activities
- Improve recognition among employees that WMin/P2 practices apply to ER activities
- Educate employees about successful implementation at the Laboratory and within DOE
- Improve documentation of WMin/P2 accomplishments

In addition to awareness activities, the following training is mandatory for ER waste handling personnel and addresses various topics including waste minimization:

- "Waste Management Coordinator Requirements"
- "Waste Generator Overview"
- "Waste Documentation Forms"
- "Waste Packaging, Shipping, and Materials Handling"

In addition to the above classes, Field Unit's Waste Management Coordinators (WMC) are required to attend quarterly WMC meetings as ongoing training in issues important to performing the duties of a WMC.

6.4 Information and Technology Introduction

The introduction of new technologies for WMin/P2 and waste management approaches are important to minimizing wastes. To support technology exchange the waste minimization coordinators will be available to research technologies or WMin/P2 tools for ER FPLs, necessary to attain information on technical or economic feasibility. They will also be available to train project personnel on the access and usage of several large information sources such as:

- DOE, Remedial Action Project Information Center, Oak Ridge, TN
- DOE, EPIC - the DOE Pollution Prevention Information Clearinghouse, Pacific Northwest Labs, Richland, WA
- EPA, Superfund Innovative Technology Evaluation (SITE) Database

Planed information and technology exchange activities are shown in attachment 2.

6.5 Tracking and Reporting

A uniform and routine collection of waste minimization accomplishments will be established in FY 1996, beginning with documentation of representative WMin/P2 successes from FY 1994 and FY 1995. Upon completion of the historical data collection, FPLs will be encouraged to participate in collection of accomplishments as they occur, with an semi-annual data consolidation effort project wide.

6.6 Sort, Decontaminate, and Segregate

This task is currently implemented and is designed to sort and decontaminate LLW materials from Decommissioning operations for the purpose of eliminating their disposal at TA-54 as low level radioactive waste. Typical sorting practices include collection of all metal debris in separate boxes destined for shipment to an off-site smelter for metals recovery. Decontamination work will involve the removal of surface radioactive contamination on equipment to allow for its reuse either at Los Alamos or other DOE facilities.

6.7 Compaction

This task has been employed by the Decommissioning operations at the Laboratory for the past year with great success. In the upcoming fiscal year, this technique will be employed by the ER Project to reduce low level radioactive waste volumes. By compacting low density solid wastes (e.g. PPE and plastic), the ER Project will realize a 30 to 1 waste volume reduction. The Project plans to implement this process either by purchasing and utilizing a mobile compaction unit from or by taking advantage of the current fixed unit at TA-21 and transporting suitable waste to it prior to final disposal.

6.8 Survey and Release

Where past practices have conservatively classified non-indigenous investigative-derived waste (PPE, sampling materials, decon water) as contaminated based on association with contaminated areas, the ER Project has developed procedures to survey and release these materials as non-radioactive. This will have a dramatic impact on volume of low level waste buried at Area G from ER activities.

6.9 Incineration

During this fiscal year, the ER Project will conduct a pilot program requiring workers at a predetermined site to wear specially designed incinerable PPE. This material will be collected in suitable waste bins and shipped directly to a commercial low level radioactive incinerator. By landfilling only the ash from the incinerator instead of the entire PPE drum, volume reductions on the order of 95-99% can be achieved.

6.10 Risk Assessment

Risk assessments are routinely conducted for ER projects. Risk assessments allow the ER Project to plan remediation activities on the basis of the future risk to health and the environment. Often the risk assessment may determine that it is appropriate or beneficial to leave the material in the ground, thus avoiding the generation of waste.

Properly designed land-use agreements and risk-based cleanup strategies can provide flexibility to select remedial actions (or other technical activities) that may avoid or reduce the need to excavate or conduct other actions that typically generate high volumes of contaminated soil, groundwater, or demolition debris. This is one of the few opportunities for source reduction. For example, if the community and regulators agree that the future land use of a site will be grazing and agriculture, then it would not be practicable to clean the site to levels established for future human residents. Similarly, contaminated sites that will remain under DOE administrative control or be slated for commercial use may be able to consider in-situ treatments that could reduce the need for excavation and disposal of contaminated soil and debris.

6.11 Incentives Programs

The ER Project participates in the Laboratory-wide "Waste Minimization Chargeback Tax" system. This system charges the ER Project based on the volumes and toxicity of wastes generated from the program. This financial burden is an incentive for ER project managers to reduce waste generation to lower total project costs. The ER Project will be actively soliciting proposals for WMin/P2 projects that are eligible for funding through this tax.

6.12 Lead Handling Procedures

The ER project does not routinely procure or use lead, or handle the generation of excess lead. The inventory and decontamination of existing lead at the Laboratory has been conducted as part of a milestone of the Laboratory's FFCA agreement, and is out of the scope of the ER project.

ER activities will manage and minimize the amount of lead contaminated waste using the following approaches:

- Projects will specify a preference to avoid the procurement or use of lead, when possible, giving preference to the use of steel in place of lead.

- Projects will specify the use of strippable or washable coatings for any lead materials that must be used and have the potential to become contaminated

- Projects will plan for the decontamination of lead materials, when economically feasible, using blast grit, carbon dioxide blast (or other non-destructive blast), or chemical decontamination techniques. Preference will be given to decontamination techniques that minimize the generation of secondary waste (from the treatment process.)

- Projects that handle non-contaminated lead waste as a primary waste from the removal action or decommissioning activity will make efforts to recover and redistribute the lead for use at the Laboratory or at another DOE facility, per Administrative Requirements, "Hazardous and Mixed Waste." Administrative Requirement No. 10-3, and "Excess government Personal Property", Administrative Requirement No. 10-6 .

- Projects will coordinate with the Laboratory's waste management group for the appropriate handling and disposition of radioactively contaminated lead that can not be decontaminated or redistributed.

6.13 Equipment Reuse

The reuse of equipment and materials such as plastic gloves, sampling scoops, plastic sheeting and PPE will produce significant waste reduction and cost savings in FY 1996. In addition, a cost benefit analysis is currently being conducted by P3O to look at using launderable PPE in the field to replace current disposable types. PPE from contaminated sites would be segregated and shipped to a laundry facility in Santa Fe where they would be cleaned and returned for reuse.

In addition LANL has initiated a equipment exchange program which attempts to identify surplus or inactive equipment for use at LANL. This saves capital equipment dollars by not purchasing the equipment, but it also avoids the eventual disposal of the equipment when no longer needed.

7.0 BARRIERS TO WASTE MINIMIZATION IMPLEMENTATION

Uniform Clean-up Levels - Failure to take into account site specific factors or risk assessments before establishing cleanup levels based on regulatory guidelines has proved to be a barrier in minimizing waste within the ER Project. At one particular site in FY 95, an initial expedited cleanup of 30 cubic yards of soil in a restricted access area escalated to 850 cubic yards based on cleanup levels mandated by EPA Region VI. The cleanup level (which was set at 1 ppm) was much lower than what was recommended based on both Human Health and Ecological Risk assessments.

Project Performance Measures - Performance requirements for the ER project, established under negotiated agreements with regulators or others, are not consistent with a WMin/P2 philosophy and may run counter to waste reduction efforts. For example, existing performance measures are based on the number of contaminated sites cleaned-up in a given time frame, regardless of risk or contamination levels, and no credit is given for a no-further-action decision. This creates an incentive to excavate and dispose, so as to show a high level of activity, without regard for waste generation.

As a alternative, performance requirements specific to WMin/PP can provide incentives, such as establishing numerical goals for recycling and recovery of material, setting limits on the volume of waste that can be generated, and including no-further-action determinations as a measure of progress. These type of performance measures are not yet standard in the ER project.

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ATTACHMENTS

Attachment A - Awareness strategy

Attachment B - 1995 Waste Minimization Accomplishments

Tool	Audiences[1]				Activities and Milestones		
	ER F&P WIET	ER PM, FPL DPL	DOE	P3O		Status/Frequency	Start
Designate P3O Contact for ER Program Objectives: Provide technical assistance Integrate with other P3O programs Assist with funding requests Networking and information exchange	XX	XX		X	- Identify P3O contact(s) for ER - Meet with ER Program Manager (PM) - Meet with WIET, Field Project Leaders (FPLs) - Meet with ER Project Consistency Team (PCT) and participate in routine meetings - Locate in ER program offices - Solicit CHIPs and ROI proposals and assist with proposals - Develop ER WMin plan - Review ER project plans, as requested	Completed In progress/as needed In progress/monthly Planned Planned Planned/as needed In progress Planned/as needed	 1/96 12/95 2/96 3/96 TBD 1/96 6/96
ER Program Colloquiums and Workshops Objectives: Educate on definition, scope and performance measures, economic benefits and regulations Inform on P2/WMin tools, strategies Inform of P3O role, services Demonstrate past successes	XX	XX			- Present WMin Module to ER Waste Mgmt Workshop - Present WMin Module at ER Program Colloq. (as part of Project Consist Team) - Participate in Monthly ER Program Colloq (as appropriate)	Planned Planned Planned/monthly	1/96 1/96 1/96
Fact Sheets on P2/WMin in ER Objectives: Educate on definition, scope and performance measures,economic benefits and regulations Identify waste stream specific P2/WMin opportunities. General information on P2/WMin tools, strategies Inform of P3O role, services, resources Publish successes	XX	X			- Publish FactSheet (FS) on a) P3O role and contacts for 96 b) CHIPs and ROI infor/assistance c) 1995 ER Task and Successes d) Waste Stream Specific Tools and opportunities (PPE, Decon water, drilling, etc) e) monthly fact sheets on appropriate topics - Put FS on HomePage	Planned In progress/monthly	1/96 2/96
P2/WMin module on ER Home Page Objectives: Same as above Notify of training, colloquiums Notify of P3O Contacts	XX	X			- Develop Homepage - Maintain Homepage	In progress Planned/monthly	1/96 2/96

Tool	Audiences[1]				Activities and Milestones		
	ER F&P WIET	ER PM, FPL DPL	DOE	P3O		Status/Frequency	Start
ER Quarterly Reports Objectives: Publish successes Inform on P2/WMin tools, strategies, P3O role, services	X	XX	X		Submit information to LANL ER Report	Planned/quarterly	1/96
P3O Education Colloquiums Objectives: Interface with other P3O programs Info exchange, tech demonstrations	XX				Announce P3O workshops in WIET meetings, HomePage, and direct contact	In progress/monthly as needed	12/95
Routine Tracking/Reporting Mechanism on ER P2/WMin Successes Objectives: Collect and publish successes	X	XX	XX	XX	- Meet with ER, DOE AL to establish performance measures - Meet with WIET and FPL on perf measures and reporting mechanisms - Develop tracking/reporting tool, test tool with FPLs - WIET Meetings to identify successes - Institutionalize tracking/reporting	Planned Planned In progress In progress/monthly Planned	1/96 1/96 1/96 12/95 4/96
Participate in regularly scheduled program meetings Objectives: Networking Technical assistance or referrals Information exchange Collect success stories	XX				- Participate in ER WIET meetings - Participate in ER monthly meetings - Set up one-to-one meetings with FPLs - Plan, participate in WMin/P2 project reviews (for specific projects)	In progress/monthly In progress/monthly Planned/quarterly TBD	12/95 12/95 2/96
ER Training Courses Objectives: Training	XX				- Evaluate existing ER courses for P2/WMin content; review with ER PM - Draft input for ER courses	TBD TBD	
ROD Database; EM-40 Success Database Objectives: Information Exchange	XX		XX		- Coordinate with L. Allmon - Publish success stories on Home page and Fact Sheets - Develop database of potentially applicable RODs,distribute on Home Page	In progress Planned Planned	1/96 2/96 2/96

Tool	Audiences[1]				Activities and Milestones		
	ER F&P WIET	ER PM, FPL DPL	DOE	P3O		Status/Frequency	Start
External Publications and Presentations Objectives: Publish successes Information exchange Networking			XX		- Present at ER 96 Workshop - Submit success story to DOE ER TIE Quarterly (Newsletter)	Planned Planned	8/96 9/96
PTS Reports Objectives: Publish successes Reporting			XX	XX	Complete PTS Reports	In progress/monthly	1/96
P3O quarterly Reports Objectives: Publish successes Reporting				XX	Complete P3O Reports	In progress/quarterly	1/96

1. Audiences include the following:
ER F&P, WIX = ER field and project personnel, Waste Information Exchange Team members
ER PM,FPL, DPL = ER program managers, field project leaders, and decommissioning field project leaders
DOE = Department of Energy ER programs
P3O = Laboratory Pollution Prevention Program Office

XX is a primary audience; X identifies a secondary audience.

Attachment B

Los Alamos National Laboratory
Environmental Restoration Project

1995 Waste Minimization Accomplishments

WMin/PP was an integral part of the FY 1995 ER projects through recycling, reuse, contamination avoidance, risk-based clean up strategies, and many other practices. However, there was limited tracking and reporting of WMin/PP successes on an ER Project-wide or field project basis. Waste reduction benefits are typically difficult to track and quantify because the data to measure the amount of waste reduced (as a direct result of a WMin/P2 activity) is often not available and is not easily extrapolated. Many waste reduction successes are attributed to best management practices or standard practices that are not identified or tracked as independent WMin/P2 practices. In January, 1996, the ER project initiated efforts to collect and report WMin/PP efforts and successes during the previous year's projects. Similar tracking and reporting efforts will continue in the future.

The effectiveness of the 1995 ER WMin/P2 efforts (for reducing or avoiding) varied with the phase when WMin/P2 was applied and the waste types. For example, WMin/PP efforts that were integrated in the planning stages of a decommissioning project provided an high estimated volume reduction, where WMin/PP during assessment and characterization efforts produced relatively low volume reductions because the waste potential was lower. In addition, recycling potentials are greater for commercial waste streams, but LLW and LLMW streams provided lower opportunities for reuse and recycle.

High volume waste streams produced from ER activities include contaminated soil and demolition debris such as metal and concrete. The WMin/PP techniques used (in 1995) to reduce these high volume waste streams included the following:

- Contaminated soil
  - initiated negotiations to allow remedies that did not remove the soil (e.g. in-situ treatment or no-action);
  - used alternative drilling and sampling techniques to reduce investigative derived wastes;
  - used field screening techniques to allow better definition of contamination boundaries and improved characterization of materials;
  - improved segregation practices to avoid cross contamination;

- Demolition debris
  - included WMin/PP practices in decommissioning plans and specifications
  - used improved segregation techniques to allow staging of recyclables
  - recycled metals and concrete
  - surface scouring and surface decontamination of concrete and other materials

A summary of specific WMin/PP accomplishments for the ER field units during 1995 is presented below.

Project Wide

Project: **Solvent Substitution**
Date of Implementation: FY1995
Location or Group: Project Wide

Description: During the past fiscal year, each ER Field Unit successfully substituted a decontamination rinse solution comprised of alconox and water for a methanol-based solution. By replacing the potentially hazardous methanol solution, The ER Project has reduced its overall liquid hazardous waste volumes by 98 percent.

Volume and Type Avoided:
Cost Savings:

Project: **Use of Characterization Strategy Form to improve waste characterization**
Date of Implementation: FY 1995
Location: Project Wide

Description: In cooperation with the Laboratory's waste management group, ER field units implemented the use of a Characterization Strategy Form to improve the characterization of waste materials from investigation activities. Use of the form allows analytical parameters to address site characterization as well as future waste characterization needs. This reduces the need to re-test waste materials for compliance with waste acceptance criteria and improves the ability to segregate materials and reduces the need for LLW and LLMW disposal.

Waste Avoidance Volume and Type
Cost Savings:

Field Unit 1

Project: **Cone Penetrometer Sampling**
Date of Implementation:
Location or Group:

Description: A cone penetrometer test (CPT) was used in place of a drill rig for boreholes with a depth up to 87 feet in depth. The CPT does not generate drill cutting and significantly reduces equipment requiring decontamination. This method was used on approximately 52 boreholes. The method avoided an estimated 4 drums of cuttings per borehole and half a drum of decon water per borehole.

Volume and Type Avoided: 200 drums cuttings, 25 drums decon fluid, Waste Analysis Pending.

Cost Savings:

Project: **Consolidation of Waste Containers**
Date of Implementation: FY1995
Location or Group: Field Unit 1

Description: Drums and other waste containers which were originally segregated by sampling location, were consolidated after waste characterization to optimize waste packaging efficiencies.

Volume and Type Avoided:
Cost Savings:

Project: **Waste Minimization Planning**
Date of Implementation: FY1995
Location or Group: Hillside 140, Field Unit 1

Description: A waste minimization plan was prepared to evaluate technologies and processes for removal of radioactively contaminated soils from a hillside expedited action cleanup project. The plan specifically addressed field screening and segregation techniques.

Volume and Type Avoided:
Cost Savings:

Field Unit 2

Project: **Risk based strategy for in-situ remedial actions.**
Date of Implementation: Planning initiated in FY 1995; Implementation 96-97
Location: FU #2, TA 53

Description: Field unit managers have initiated negotiations to allow an risk-based, in-situ remedy for the closure of waste lagoons. Allowing in place remedies will avoid excavation of primary waste that would be management as LLMW

Waste Avoidance Volume and Type LLMW; potential avoidance of 20 cubic yards
Cost Savings: Estimated avoided waste management costs are over $30 million

Project: **WMin/PP and waste projections included in procedures an operational readiness reviews**
Date of Implementation: FY 1995
Location: FU #2

Description: Waste implementation plans are written for all field activities. Plans include waste stream projections and disposition options and procedures are set for WMin/PP and waste management. Waste management, material control, segregation procedures, and the waste characterization strategy Form are reviewed during operational readiness reviews, which helps improve segregation and attention to WMin/PP practices.

Cost Savings:

Project: **Discharge of Decontamination Fluids**
Date of Implementation: FY 1995
Location: Operable units # 1085, 1086, 1093; FU #2

Description: Decontamination fluids have historically been collected and managed as waste, pending characterization and release as non-contaminated. This created high volumes of fluids that were staged, sampled, and required disposal. In 1995, field units prepared a notice of intent (under the New Mexico Environment Department, Water Quality Requirements) to discharge decontamination fluids known to be non-contaminated directly to the site. This reduced the need to handle and treat the decontamination fluids.

Waste Avoidance Volume and Type Over 100 gallons/year; liquid waste (non-contaminated)
Cost Savings: Not quantified at this time

Project: **Discharge of Groundwater purge fluids to the site**
Date of Implementation: FY 1995
Location: Operable units # 1093; FU #2

Description: Purge water from the sampling of monitoring wells have historically been collected and managed as waste, pending characterization and release as non-contaminated. This created high volumes of fluids that were staged, sampled, and required disposal. In 1995, field unit #2 received approval to discharge those purge fluids known to be non-contaminated to the site. This reduced the volumes of fluids that required handling and treatment.

Waste Avoidance Volume and Type: An estimated 480 gallons/year avoided of liquid waste (non-contaminated) (Based on avoided waste of 15 gallon/well/quarter and 8 wells sampled per quarter)
Cost Savings:

Project: **Return drilling cuttings as backfill for the borehole**
Date of Implementation: FY 1995
Location: All units, FU #2

Description: Cuttings generated from investigative drilling activities have been returned to the borehole. This is allowed if no groundwater is present, the backfill activity will not change the final remedy for the site, or increase potential for contaminant migration. This procedure avoids handling of the investigative derived soil waste, and allows the media to be handled during the final remedial action.

Waste Avoidance Volume and Type LLW avoided, estimated 7 to 18 cubic yards avoided
Cost Savings:

Project: **Return excess sample materials to site**
Date of Implementation: FY 1995
Location: All units, FU #2

Description: Excess sample materials that are not transported for off site analysis are returned to the site, for remediation during the final action. This is done if no additional contamination is added as a result of the sample material and if the action will not change the final remedy for the site, or increase potential for contaminant migration. This procedure avoids handling of the investigative derived wastes from the samples, and allows the media to be handled during the final remedial action.

Waste Avoidance Volume and Type
Cost Savings:

Project: **Improved sample management, reduced sample number and volume**
Date of Implementation: FY 1995
Location: All units, FU #2

Description: FU #2 implemented an pilot field sample shipment procedure and improved sample management strategy that reduced the volume and number of samples collected and shipped for analysis by 50 % from previous years. By reducing the number and volume of samples shipped for analysis, the pilot project has reduced the waste generated from analytical procedures. (Excess analytical samples are often required to be returned

to the generator for disposal). Under the pilot strategy, the FU uses private (off site) laboratory for sample analysis, and the FU negotiated reductions in the number and volume of sample for analysis while still meeting analytical requirements. In addition, the FU performs field screening of samples to limit the number of samples requiring analysis, targeting the samples that are shown by the field screening to be of concern. The FU directly handles the collection, screening, packaging, and shipment of the samples which reduced the handling time and costs.

Waste Avoidance Volume and Type Not estimated, but expected to be 50% of previous years waste from analytical processes

Cost Savings:

Project: **Vibratory Drilling, cone penetrometer sampling**

Date of Implementation: FY 1995

Location: FU #2

Description: Alternative drilling techniques of vibratory drilling and hydropuch (cone penetrometer) sampling were tested at FU #2 in an effort to reduce the generation of drilling wastes. The techniques were determined to be non-effective for the FU #2 applications, so the waste avoided benefits were considered moot.

Waste Avoidance Volume and Type

Cost Savings:

Project: **Acceptable knowledge and field screening to improve characterization**

Date of Implementation: FY 1995

Location: FU #2

Description: This technique is practiced concurrently to the improved sample management practice. Materials during investigation are screened, characterized and segregated using acceptable knowledge and radioactive analysis (scintillation gamma, alpha and gamma smears) and hazardous waste (photo and flame ionization detectors) field screening techniques at the point of generation. The field screening helps to better define the areas of concern and reduce the samples that require laboratory analysis. Field screening improves segregation, reducing the volumes of waste that requires analysis and management as LLW or HW.

Waste Avoidance Volume and Type
Cost Savings:

Project : **Maximize the reuse of PPE, supplies and equipment, and control and segregation of materials in/out of contamination zones**
Date of Implementation:
Location: FU #2

Description: Reusable equipment such as PPE and stainless steel sampling tools, are used in place of disposable equipment as much as possible. The use of plastic (disposable) sampling tools are limited to only high explosive sampling activities. Practices are written in the operating procedures to limit the materials and equipment allowed in the contamination areas and to screen, sort, and segregate materials exiting the contamination areas. Designated areas are established to segregate materials and avoid cross contamination. Personnel are trained on these procedures during the operational readiness reviews

Waste Avoidance Volume and Type LLW, estimates not quantified at this time
Cost Savings: Not quantified at this time

Field Unit 3

Project: **Acceptable knowledge and field screening to improve segregation**
Date of Implementation: FY 1995
Location: FU #3

Description: Materials during investigation are characterized and segregated using acceptable knowledge and radioactive analysis field screening techniques at the point of generation. This reduces the volumes of waste that requires analysis and management as LLW or HW.

Waste Avoidance Volume and Type:
Cost Savings: None

Project: **Maximize the reuse of Personal Protective Equipment (PPE), supplies and equipment**

Date of Implementation:

Location: FU #3

Description: PPE is reused as much as possible. Launderable coveralls were substituted for disposable, steel toes chemical resistant boots were used in place of disposable booties, and disposable site control materials (such as plastic sheeting) were replaced with longer-life, reusable materials, such as high density plastic mats

Waste Avoidance Volume and Type LLW PPE (zero PPE waste disposed in 1995)
Commercial waste, avoided 28 cu yds (total from all WMin/PP practices)

Cost Savings:

Project: **Contamination avoidance and control of materials in/out of contamination zones**

Date of Implementation: FY 1995

Location: FU #3

Description: Practices were routinely followed to avoid contact with contaminants and to minimize material in the contamination areas. Practices included: only one designated sampler handles or contacts the sample; minimum contact is maintained to limit glove requirements; leaning, kneeling, or sitting in the contamination zone is prohibited; easily decontaminated and designated tubs are used to handle equipment in the contamination zone to limit the possibility of contamination; only necessary materials are brought into or out of the contamination zone.

Waste Avoidance Volume and Type LLW - not quantified at this time
Commercial waste, avoided 28 cu yds (total from all WMin/PP practices)

Cost Savings:

Project: **Improved characterization and segregation**
Date of Implementation: FY 1995
Location: FU #3

Description: All waste are characterize and segregated using acceptable knowledge and radioactive analysis field screening techniques at the point of generation. This reduces the volumes of waste that requires analysis and management as LLW or HW.

Waste Avoidance Volume and Type LLW - not quantified at this time
Commercial waste, avoided 28 cu yds (total from all WMin/PP practices)
Cost Savings:

Project: **Discharge of Decontamination Fluids**
Date of Implementation: FY 1995
Location: FU #3, TA 16 and 33

Description: Decontamination fluids have historically been collected and managed as waste, pending characterization and release as non-contaminated. This created high volumes of fluids that were staged, sampled, and required disposal. In 1995, field units prepared a notice of intent (under the New Mexico Environment Department, Water Quality Requirements) to discharge decontamination fluids known to be non-contaminated directly to the site. This reduced the need to handle and treat the decontamination fluids.

Waste Avoidance Volume and Type An estimated 1180 gallons/year; liquid waste (non-contaminated)
Cost Savings:

Field Unit 4

Project: **Rotary Hand Augers**
Date of Implementation: FY1995
Location or Group: Canyons Investigation, Field Unit 4

Description: A rotary hand auger was used in place of a drill rig for boreholes with a depth of less than 15 feet. The rotary hand auger does not generate drill cutting and

significantly reduces equipment requiring decontamination. This method was used on approximately 25 boreholes out of 40 total. The method avoided an estimated 4 drums of cuttings per borehole and half a drum of decon water per borehole.

Volume and Type Avoided: 100 drums of cuttings, Low-level Radioactive
12.5 drums decon water, Low-level Radioactive

Cost Savings: Not estimated.

Project: **Discharge of Decontamination Fluids**
Date of Implementation: FY1995
Location or Group: Canyons Investigation, Field Unit 4

Description: Historically, decontamination water from sampling activities was drummed and managed as a waste based upon suspected site contamination. Recently some investigation sites have prepared a Notice of Intent (NOI) for discharge of decontamination fluids back onto the site within under the New Mexico Environment Department, Water Quality Requirements limitations.

Volume and Type Avoided: 120 gallons, liquid waste (non-contaminated).
Cost Savings: Not estimated.

Project: **Reuse of Personal Protective Equipment (PPE)**
Date of Implementation: FY1995
Location or Group: Field Unit 4

Description: Throughout the field unit, PPE is reused until unserviceable. PPE is removed and stored within the contamination reduction zone for reuse during the following days. This procedure eliminated approximately 50% of the PPE from the field unit during FY1995.

Volume and Type Avoided: Not estimated , Low-level Radioactive.
Cost Savings:

Project: **Segregation of Mercury contaminated soils**
Date of Implementation: FY1995

Location or Group: Field Unit 4

Description: During a Field Unit 4 Expedited Cleanup which removed mercury contaminated soils from a container storage area, soils with visible mercury contamination was separated from less contaminated material which could be treated and disposed at a lower cost. Proper segregation saved significant treatment costs prior to disposal.

Volume and Type Avoided: No volume reduction.
Cost Savings: Cost differential for treatment and disposal.

Project: **Utilizing drill rig cuttings as borehole backfill**
Date of Implementation: FY1995
Location or Group: Field Unit 4

Description: Cuttings generated from investigative drilling activities have been returned to the borehole. This is allowed if no groundwater is present and the backfill activity will not change the final remedy for the site, or increase potential for contaminant migration. This procedure avoids handling of the investigative derived soil waste, and allows the media to be handled during the final remedial action.

Volume and Type Avoided: 10 drums, Low-level Radioactive
Cost Savings:

Project: **Preliminary Dry Decontamination Step Added**
Date of Implementation: FY1995
Location or Group: Field Unit 4

Description: The drilling and sampling equipment decontamination process was modified to add a dry decontamination step. This step removes the majority of potentially contaminated soil from the equipment, which in turn reduces the amount of liquid decontamination fluids generated by approximately 50%.

Volume and Type Avoided: Not estimated.
Cost Savings:

Project: **Preliminary Site Survey**
Date of Implementation: FY1995
Location or Group: Field Unit 4

Description: Prior to initiating a surface sampling campaign, the area of concern is screened for contamination. If no contamination is identified the health and safety plan is revised to indicate a lesser level or no personal protective equipment. This source reduces all of the PPE from the activity.

Volume and Type Avoided: Not estimated.
Cost Savings:

Field Unit 5

Project: **Sampling grid, field screening to improve hazard assessment, segregation, and reduce use of Personal Protective Equipment (PPE)**
Date of Implementation: 1995
Location: FU #5, MDA "M"

Description: Field screening, preliminary site survey information, and a 25 ft by 25 ft grid system was used to better define the contamination reduction zones and exclusion zones. This helped reduce the need for PPE and decontamination by limiting the use of PPE, etc only to those areas that were known to be contaminated.

Waste Avoidance Volume and Type LLW and HW PPE
Cost Savings: Not quantified at this time

Project: **Sampling grid and field screening to improve segregation**
Date of Implementation: FY 1995
Location: FU #5, MDA "M"

Description: A sampling grid (25 ft by 25 ft) was established and field screening were used to better define the areas and contamination of concern. The original site was believed to contain LLMW, and covered an area of over 3 acres. The refined sampling techniques

allowed materials to be better characterized and segregated at the point of generation, allowing waste materials to be classified as Commercial waste instead of suspect LLMW, LLW, or HW. This reduced the LLMW and LLW generated and reduced the analytical requirements.

Waste Avoidance Volume and Type: LLMW

Potentially contaminated area was over 14,000 cu yds; only 2 cu yd generated after grid and segregation techniques

Cost Savings: Not calculated at this time

Project: **Discharge of Decontamination Fluids**

Date of Implementation: FY 1995

Location: FU #5

Description: Decontamination fluids have historically been collected and managed as waste, pending characterization and release as non-contaminated. This created high volumes of fluids that were staged, sampled, and required disposal. In 1995, field units prepared a notice of intent (under the New Mexico Environment Department, Water Quality Requirements) to discharge decontamination fluids known to be non-contaminated directly to the site. This reduced the need to handle and treat the decontamination fluids.

Waste Avoidance Volume and Type liquid waste (non-contaminated)

Cost Savings:

Project: **Minimize drill core "kerf" and use drilling cuttings as backfill for the borehole**

Date of Implementation: FY 1995

Location: FU #5, MDA "M"

Description: The diameter and kerf of the drilling/core barrel were minimized to reduce the drilling wastes while maintaining the drilling core. This reduced the volume of drilling waste generated. In addition, drilling cuttings were returned to the borehole.

Waste Avoidance Volume and Type LLW and commercial waste, estimated up to 22 cubic yards avoided

Cost Savings:

Project: **Use bulk packaging and direct shipment for waste disposal**
Date of Implementation: FY 1995
Location: FU #5, MDA "M"

Description: Volume reduction was also accomplished through manual compaction of IDW and other containerized waste. Bulk packaging (B-25 boxes) were used for on site disposal of LLW soil, which minimized the landfill space required for disposal. Contaminated soil for off site disposal is excavated directly to dump-trunks for direct transport to the disposal facility, reducing the need for containers, handling, and more efficient use of the landfill space.

Waste Avoidance Volume and Type LLW landfill space avoided;
HW landfill space avoided
Cost Savings:

Project: **WMin/PP incentives and requirements were included in subcontractor documents**
Date of Implementation: FY 1995
Location: FU #5, MDA M

Description: Remediation subcontractor documents included incentives for recycling and waste reduction. The contract required the contractor to be responsible for waste disposal, allotting a unit price for waste disposal and providing initial waste projections. This resulted in the subcontractor using all efforts to reduce the waste generation and identify lower cost disposal options. Significant waste disposal cost savings were realized (for DOE) by the contractor's direct contract with an off-site disposal facility.

Waste Avoidance Volume and Type Hazardous and Commercial waste
Cost Savings: Waste management cost savings estimated at over $5 Million

Project: **Concrete recycling**
Date of Implementation: FY 1995
Location: FU #5, MDA M

Description: Concrete was screened, segregated and non-contaminated concrete rubblized for reuse. Remediation contractor initiated actions for reuse, because the subcontractor documents provided incentives for avoiding waste disposal. The contract required the contractor to be responsible for waste disposal, allotting a unit price for waste disposal and providing initial waste projections. This resulted in the subcontractor using all efforts to recycle, when possible and reduce the waste generation.

Waste Avoidance Volume and Type: Concrete (Commercial waste)
Cost Savings:

Project: **Metal recycling**
Date of Implementation: FY 1995
Location: FU #5, MDA M

Description: Metal scrap was screened, segregated and non-contaminated metal was sent off-site for recycle. The remediation contractor initiated actions for recycle, because the subcontractor documents provided incentives for avoiding waste disposal. The contract required the contractor to be responsible for waste disposal, allotting a unit price for waste disposal and providing initial waste projections. This resulted in the subcontractor using all efforts to recycle, when possible and reduce the waste generation.

Waste Avoidance Volume and Type: Metal (Commercial waste); over 40,000 pounds.
Cost Savings:

Field Unit 6 - Decommissioning

Project: **Recycling of Contaminated Structural Carbon Steel**
Date of Implementation: FY1995
Location or Group: TA-21, Decommissioning Group

Description: Structural steel generated during demolition of building 3 and 4 south is being segregated from the LLW debris and staged for shipment to a commercial recycler. During FY1995 a contractual vehicle was obtained, procedures for waste handling prepared, and containers were sent or staged for smelting.

Volume and Type Avoided: 180 M^3, Low-level Radioactive
Cost Savings:
Waste Minimization Expenditures: $4,500 - reusable transportainers for staging and shipment.

Project: **Decontamination of Contaminated Concrete**
Date of Implementation: FY1995
Location or Group: TA-21, Decommissioning Group

Description: The razing of buildings 3 and 4 south involved the removal of contaminated concrete. The portions of the concrete was scabbled which removed surface contamination, screened to ensure attainment of cleanup levels, and the clean waste stream staged for crushing and reuse as backfill..

Volume and Type Avoided: 530 M3, Low-level Radioactive.
Cost Savings:
Waste Minimization Expenditures: $30,000 - Blast-track scabbling unit.

Project: **Stripping of Contaminated Surface Coatings**
Date of Implementation: FY1995
Location or Group: TA-21, Decommissioning Group

Description: Many surfaces within buildings 3 and 5 south contained embedded contamination under surface coatings but no volume contamination. To effectively decontaminate the surfaces for demolition a coatings removal mechanical scraper was purchased. Portions of the building debris were scraped, and then were eligible for survey and release. This also resulted in a marked improvement in worker safety.

Volume and Type Avoided: Low-level Radioactive.
Cost Savings:
Waste Minimization Expenditures: $4,000 - Mechanical Scraper.

Project: **Compaction of PPE/Cellulose Waste**
Date of Implementation: FY1995
Location or Group: TA-21, Decommissioning

Description: Two waste compactors, one drum and one B-25 box, were purchased, approved for operation, and utilized. During the last several months of the project all of the compatible waste from TA-21 was compacted in either the 55 gallon drum or B-25 box compactor. In addition specially designed B-25 boxes were purchased for usage with the compactors.

Volume and Type Avoided: 118 M^3, Low-level Radioactive.
Cost Savings:
Waste Minimization Expenditures: $43,000 - Two waste compactors.
$9,000 - Special B-25 Boxes

Project: **Bulk Packaging and Void Space Reduction**
Date of Implementation: FY1995
Location or Group: TA-21, Decommissioning Group

Description: Additional packaging requirements and procurement efforts have been made to bulk package waste, and to ensure that minimal void space exists in packages sent for disposal. Used bulk transportainers were procured to ship and dispose building debris at TA-54. This method minimizes the amount of space used for packaging in the landfill and increases packaging efficiencies..

In addition the group rented demolition shearing equipment which removes sections of the building structure in a manner which lends to efficient bulk packaging. The shears were also used to section the structural metal into two waste streams, one destined for metal melt and a second which is staged for potential decontamination.

Volume and Type Avoided:
Cost Savings:
Waste Minimization Expenditures: $63,000 - Demolition equipment rental.
$47,000 - Bulk waste containers

Project: **Recycling of Enriched Uranium**
Date of Implementation: FY1995
Location or Group: TA-21, Decommissioning Group

Description: Decontamination of the furnaces in building 4 south resulted in the recovery of 1.5 kg of 93% enriched uranium which was sent to an on-site laboratory for re-use.

Volume and Type Avoided: 1.5 kg, Low-level Radioactive
Cost Savings:
Waste Minimization Expenditures:

Project: **Reuse of Soils as Fill Material**
Date of Implementation: FY1995
Location or Group: TA-16, Decommissioning Group

Description: Clean soils removed during demolition of structures at TA-16 were shipped for usage as fill material at other locations throughout the laboratory.

Volume and Type Avoided: 400 yd^3, Commercial waste
Cost Savings:
Waste Minimization Expenditures:

Project: **Recycling of Structural Debris**
Date of Implementation: FY1995
Location or Group: TA-16, Decommissioning Group

Description: Metal framing and piping was segregated and shipped for recycling at a regional scrap vendor.

Volume and Type Avoided: 1 yd^3, Commercial Waste.
Cost Savings:
Waste Minimization Expenditures:

Project: **Recycling of Contaminated Steel**
Date of Implementation: FY1995
Location or Group: TA-35 Phase Separator Pit, Decommissioning Group

Description: Metal generated during the demolition of structures at TA-35 were segregated and staged for shipment to a commercial radioactive smelting company.

Volume and Type Avoided: 283 yd^3, Low-level Radioactive
Cost Savings:
Waste Minimization Expenditures:

Project: **Decontamination, Survey, and Free Release of Metals**
Date of Implementation: FY1995
Location or Group: TA-35 Phase Separator Pit, Decommissioning Group

Description: Ductwork and other materials agreeable for radiological screening were decontaminated, surveyed using approved procedures and shipped to a regional salvage company.

Volume and Type Avoided: 107 yd^3, Low-level Radioactive
Cost Savings:
Waste Minimization Expenditures:

Project: **Value Engineering Study**
Date of Implementation: FY1995
Location or Group: TA-2 Omega West Reactor, Decommissioning Group

Description: The Omega West Reactor is scheduled for decommissioning during the next several years. To prepare for the project, a value engineering study was conducted to evaluate potential options for projected waste streams. The study quantified waste streams which are eligible for decontamination, recycling, and reuse.

Volume and Type Avoided: Between 53-80% Reduction of Planned Volumes, Low-level Radioactive
Cost Savings: Estimated waste management cost savings are projected between $1M-3M,

WASTE MINIMIZATION AND POLLUTION PREVENTION AWARENESS PLAN

LOS ALAMOS NATIONAL LABORATORY

27 MAY 1994

EXECUTIVE SUMMARY

This Waste Minimization and Pollution Prevention Awareness Plan addresses the basic elements and funding requirements for the Pollution Prevention Program at Los Alamos National Laboratory.

Discussion of elements include the Process Waste Assessment methodology, recycling methodology, awareness and training methodology, waste minimization goals and the methodology to meet those goals. Discussion of funding includes Site Coordinator funding, productivity increase funding, Return on Investment funding and an implementation recharge funding mechanisms.

Important companion documentation to this plan include plans for:

- Oil recycling
- Coolant recycling
- Integrated material substitution
- Chemical exchange facility
- Revamped Pollution Prevention Awareness
- Case studies
- External recycling
- Customer service and technical assistance

These additional plans will be finished by 30 September 94.

1.0 INTRODUCTION

1.1 PURPOSE OF PLAN

The purpose of this plan is to establish the Los Alamos National Laboratory (LANL) Waste Minimization and Pollution Prevention Awareness Program. The plan discusses those activities and methods that will be employed to prevent the quantity and toxicity of waste generated at the site. This plan will be in accordance with all federal, state, and Department of Energy (DOE) requirements. The Pollution Prevention Awareness Program is included with the Waste Minimization Program as permitted by DOE Order 5400.1.

This plan will be used to define the mandates and requirements for waste minimization, to define the resources and specific methodologies to implement waste minimization, and to provide a plan to accommodate the specific issues for site wide and generator specific implementation at Los Alamos National Laboratory.

1.2 SCOPE OF PROGRAM

This plan addresses these waste streams:

RCRA hazardous chemicals
Non-RCRA, State regulated waste
Low Level radioactive waste
TRU waste
Low Level and TRU mixed waste
Air emissions and water releases
Sanitary waste

Particular problem areas include mixed waste based on Federal Facilities Compliance Agreement requirements for minimization of mixed waste and water releases based on NPDES requirements. These problem areas are addressed in this plan.

2.0 POLICY

2.1 POLICY STATEMENT

The Laboratory Leadership Counsel and the Pollution Prevention Program Office (P^3O) are committed to minimizing the generation of waste, by giving preference to source reduction, material substitution, and environmentally sound recycling over treatment, control and disposal of such wastes. Laboratory Leadership Counsel will take appropriate action to provide adequate personnel, funding, training, and material on a continuing basis to ensure that the objectives of the Waste Minimization and Pollution Prevention Awareness Program are met. Evidence of this commitment is a written Director's Policy

(DP105) that establishes the Waste Minimization Program at LANL. DP105 as presently approved is shown in Appendix A.

2.2 STATEMENT OF MANAGEMENT COMMITMENT

Laboratory Leadership Counsel will soon implement a much more aggressive, comprehensive, and detailed Waste Minimization Policy that will provide for a specific set of actions that will require all Laboratory functions to implement Waste Minimization in a prescribed manner. This policy will include a mandated preference for source reduction over recycling and a mandated preference of pollution prevention over treatment, storage, and disposal. Adequate resources for pollution prevention will be developed through DOE line item funding and through Laboratory recharge system funding and indirect funding. The Laboratory recharge program will directly pull in implementation funds from the generators.

In addition, the Environmental Management Program Directorate (EM) and the Pollution Prevention Program Office (P^3O) are committed to waste minimization . The EM mission statement is shown in Appendix B, and the (P^3O) mission statement is shown in Appendix C.

3.0 ORGANIZATION AND STAFF RESPONSIBILITIES

The Pollution Prevention Program organization is shown in Appendix D and includes:

The Laboratory Director who has general oversight and implementation responsibilities and provide annual review of the program goals and performance;

The Environmental Management Office (EM) which is the Office of Primary Responsibility for Pollution Prevention (P^3O) program;

The Pollution Prevention Program Office (P^3O) works to provide every generating group with a base of technical knowledge in waste minimization, appropriate procedures to identify applicable problems, and appropriate procedures to identify applicable problems, and appropriate solutions in waste reduction.

The (P^3O) also interfaces with generators to anticipate changes that arise from program changes, emerging technologies, changing disposal requirements, and regulatory changes. From this proactive position, the (P^3O) will continue to identify waste minimization opportunities. The (P^3O) charter includes oversight of administrative and technical methods for waste minimization, segregation, and education. Team members take the necessary steps to change procedures and policy, when required.

The (P^3O) develops educational and training materials and teaches some of the waste management and minimization courses. This educational process includes formal classroom settings, informal briefings to generating groups and Waste Management

Coordinators, and individual sessions for solving specific problems. Team members also develop and distribute technical bulletins on waste minimization and other pertinent information. The (P^3O) maintains the electronic data base required to supply the technical information needed for process changes and substitutions.

The responsibilities of the (P^3O) include:

Provide oversight and guidance for waste minimization implementation of generating functions;
Help generators to identify potential technical and administrative solutions for waste generating problems and assist in preparation of site specific plans;
Set waste minimization goals and track and report waste minimization data;
Serve as the Site Waste Minimization coordinator for EM and DP;
Obtain waste generator support and input for the program;
Establish waste minimization goals and objectives;
Sponsor ongoing employee awareness and training;
Coordinate program participation by represented areas;
Prioritize waste streams or facility areas for assessment; and
Assist teams to conduct process waste assessments;
Recommend and rank options for management implementation;
Monitor performance of waste minimization options that have been implemented and evaluating performance accordance to success criteria;
Monitor and report progress of the waste minimization program, utilizing audits and monthly reviews;
Recommend personnel for achievement and incentive awards, and
Facilitate technology transfer and pollution prevention awareness.

Laboratory Managers and Waste Management Coordinators. A Waste Management Coordinator will be appointed by Laboratory managers for each generating group. The Coordinator is the focal point of waste minimization and waste management within the group. Generators will be accountable for waste minimization implementation through the recharge funding mechanism.

Waste management coordinators need to know the processes and systems that generate waste within their groups. The Laboratory provides training to coordinators to enhance their ability to minimize and manage waste. Coordinators are encouraged to review their operations in detail and find specific ways to reduce waste on an ongoing basis.

4.0 GOALS

4.1 SPECIFIC GOALS

This plan sets forth the following goals. All baseline years are for FY91.

WASTE CLASS	FY91 LEVEL	FY99 REDUCTION GOAL
Hazardous RCRA	215,353 KG[a]	50%
Non-RCRA, State regulated waste	886,253 KG	50%
Low Level radioactive waste	5769 M^3	50%
TRU Waste	114 M^3	50%
Low Level and TRU mixed waste	301 M^3	50%
Air emissions	1200 POINTS	50%
Water releases	123 SOURCES	50%
Sanitary waste	4,800 TONS	50%
Ozone depletors	1076 KG	50%

[a]It is important to note that EPCRA chemicals are tracked with hazardous chemicals and are therefore included in the Hazardous RCRA category.

33/50 CHEMICALS

Reduction of these 33/50 chemicals will be addressed from 1991 baseline:

TARGET CHEMICAL	FY99 REDUCTION GOAL
Toluene	50%
Lead and Compounds	50%
Chlorofluorocarbons	50%
Sulfuric Acid	50%

4.2 ACTIVITY FLOW CHARTS

Flow charts for these activities are shown in Appendix G.

4.2a HAZARDOUS RCRA

1. Perform Process Waste Assessments on all major waste streams (20 per year for three years)
Perform system walkthroughs on all minor waste streams (20 per year for three years)
2. Use process data and Best Available Technology to define a Site Specific Plan for the implementation of process and administrative changes for waste minimization.
3. Use special project funding to address particularly difficult and large waste streams.
4. Further develop external recycling as a cost effective and environmentally sound alternative to disposal.
5. Milestones include addressing the major processes that generate chemical waste including analytical chemistry, photographic processing, machining, explosives processing, and laser processes.

These activities are flagged in Sections 6 and 7 as requirements to meeting these goals.

4.2b EPCRA CHEMICALS

Reduction of EPCRA chemicals are addressed as part of the hazardous RCRA class of chemicals and are included in the PWA and recycling processes defined in section 4.2a.

4.2c NON-RCRA STATE REGULATED

Non-RCRA regulated wastes include oil and other non-RCRA chemicals. These chemicals will be reduced through recycling efforts and substitution where possible. Current efforts include recycling of all oils, oil contaminated water and other hydrocarbons through an external recycler.

4.2d LOW LEVEL RADIOACTIVE

1. Perform Process Waste Assessments on all major waste streams (15 per year for three years)
Perform system walkthroughs on all minor waste streams (15 per year for three years)
2. Use process data and Best Available Technology to define a Site Specific Plan for the implementation of process and administrative changes for waste minimization including segregation and substitution.
3. Use special project funding to address particularly difficult and large waste streams.
4. Use the Waste Acceptance for Non-nuclear Disposal (WAND) project to eliminate suspect waste, which is estimated at approximately 50% of the LLW stream.
5. Milestones include addressing the major processes that generate LLW waste including actinide processing, analytical chemistry, and machining.

These activities are flagged in Sections 6 and 7 as requirements to meeting these goals.

4.2e TRU

1. Perform Process Waste Assessments on the major waste streams.

2. Use process data and Best Available Technology to define a Site Specific Plan for the implementation of process and administrative changes for waste minimization including segregation and substitution.
5. Milestones include addressing the major process that generates TRU waste at TA-55.

These activities are flagged in Sections 6 and 7 as requirements to meeting these goals.

4.2f MIXED WASTES
Mixed wastes are addressed in the same way that RCRA hazardous and Low Level Wastes are in Sections 4.2a & d. In addition, because of the FFCA, mixed wastes will be addressed first. PWAs for the 40 mixed waste generators have already been initiated and will be finalized in the first part of FY95.

4.2g AIR EMISSIONS
These releases are addressed as part of the PWA process on any system with these releases as part of their mass balance.

4.2h WATER RELEASES
These releases are addressed as part of the PWA process on any system with these releases as part of their mass balance.

4.2i SANITARY WASTE
Sanitary waste is addressed by source reduction and by recycling. Source reduction will be included in the forthcoming Green Facilities Program which will include procurement of recycled materials and energy and water conservation. Recycling programs for sanitary waste at the Laboratory currently include the recycling of paper, industrial and precious metals, electrical and mechanical equipment, and office equipment. Future recycling plans include cardboard recycling through the Site Coordinator Program.

4.2j OZONE DEPLETORS
Ozone depletors at the Laboratory fall into two categories, refrigerants and cleaning solvents. Both of these waste streams will be eliminated by substitution.

4.2k 33/50 CHEMICALS
Toluene, lead, Chlorofluorocarbons, and sulfuric acid waste streams will be eliminated through recycling efforts.

4.3 TOTAL PWAs REQUIRED
We estimate that a total of 210 PWAs and walkthroughs will be required to address all of the Laboratory's waste generating processes. These 210 PWAs and walkthroughs required are estimated based on the list of waste generating groups.

4.4 PROCUREMENT OF RECYCLED MATERIALS

The Laboratory, through the purchasing department, is currently in the process of upgrading its procurement of recycled materials. The Laboratory does purchase a large amount of recycled paper goods.

4.5 NON-ROUTINE QUALITATIVE GOALS

Waste minimization considerations will be incorporated into Environmental Restoration Program site characterization and site remediation activities to minimize waste generation from these ER activities. Waste minimization methodology will be built into Decontamination and Decommissioning (D&D) procedures to ensure that environmental restoration is accomplished in a manner that provides for least amount of waste generated possible form these activities. Waste minimization will also be built into spill cleanup procedures to also ensure that the least amount of waste is generated from that activity.

4.6 ES&H ADS

ES&H ADS, as submitted to DOE, to support these planning efforts, are shown in Appendix E.

4.7 TECHNOLOGY DEVELOPMENT

The Laboratory uses Laboratory Directed Research and Development funding and DOE Return on Investment funding to develop bench, pilot and full scale technologies for waste minimization. These technologies address specific Laboratory problems and are ultimately transferable. Specific projects are discussed in Appendix F.

5.0 SITUATION ANALYSIS

5.1 CURRENT SITUATION

The Waste Minimization program at LANL is in a transition phase. Previous effort was directed towards setting up systems to support the implementation of waste minimization. This effort is complete and implementation efforts have begun. Baseline site coordinator efforts will be ongoing. The implementation phases will be funded through recharge on waste generation rates. Recharge implementation funding will be used to fund projects within the CSO that provided the recharge funds. Special project will continue under EM funding.

5.2 PROGRAM DIRECTIVES

This program is driven by the following directives:

- Resource Conservation and Recovery Act
- New Mexico State Hazardous Waste Management Regulations
- Federal Facilities Compliance Act
- Emergency Planning and Right to Know Act
- Pollution Prevention Act
- DOE Order 5400.1
- DOE Order 5820.2A
- Executive Order 12856

5.3 RELEVANT SITE DIRECTIVES AND GUIDANCE

Waste minimization is required by the following Laboratory directives and procedures:

- DP-105, Director's policy
- Federal Facilities Compliance Agreement
- 10-1 Radioactive Liquid Waste
- 10-2 Low-Level Radioactive Solid Waste
- 10-3 Chemical, Hazardous, and Mixed Waste
- 10-4 Polychlorinated Biphenyls
- 10-5 Transuranic (TRU) Solid Waste
- 10-6 Excess Government Personal Property
- 10-8 Waste Minimization

5.4 BARRIERS ANALYSIS

Potential problems exist from the lack of a multi-year, long term overall DOE implementation strategy. This problem will be partially addressed at the Laboratory by the use of recharge funding and EM special projects funding.

5.5 PLANNING ASSUMPTIONS

P^3O assumes the acceptance of the recharge funding system by both the generators and their funding organizations, as well as assuming the continued support of DOE and the Laboratory.

6.0 SITE WIDE PROGRAM ELEMENTS

NARRATIVE DESCRIPTION

6.1 ORGANIZATION AND INFRASTRUCTURE

This element covers both EM and DP efforts and provides for the site coordinator activities for the EM coordinator, and includes management and oversight of implementation efforts.

Milestones: Annual report

6.2 PROGRAM DEVELOPMENT

Program development includes program leadership, strategic planning and direction, guidance and procedures, procurement of funding, including developing and operating a recharge system for implementation, and visitor support. Program management includes personnel management, Activity Datasheet System management, Work Authorization Directive management, FFCA deliverables, Tiger Team Action Plans deliverables. The scope of this work package also includes coordination of the interactions between LANL and DOE and other outside stakeholders. It includes providing performance evaluation procedures and QA, and includes providing technical support and data to other Laboratory functions. Clerical and secretarial support for the entire program are included in this work element.

Milestones: Internal Laboratory Strategic Plan
Recharge system finalized

6.3 EMPLOYEE INVOLVEMENT

This work element includes the Pollution Prevention Awareness Campaign, an employee awareness effort; writing training materials and Newsbulletin articles. This effort also includes SOP review to implement waste minimization. It also includes support of non-Laboratory education programs. This work element also includes the employee suggestion program, an annual contest that collects and judges suggestions and provides cash incentives for suggestions. Implementation of suggestions is not included in this element.

Milestones: Monthly waste coordinator meetings
Annual Incentive Award Competition

6.4 TRACKING

This work element provides for the oversight of waste generating data and trends and may include the development of a fence to fence tracking system. This element also provides for the development of a normalized waste generating baseline that takes into account off-normal generation from D&D and spills.

Milestones: Normalized data base system established

6.5 REPORTING

This work element provides for all reporting to Headquarters and Operational offices including Program Tracking System reporting requirements, and the Annual report deliverable. This element also provides support to other Laboratory reporting requirements that have a waste minimization component.

Milestones: Annual report to DOE
Annual report to EPA and New Mexico Environment Department

6.6a REDUCTION PROGRAMS

This work element provides for the continuing development and implementation support of the Process Waste Assessment system. This includes testing and maintenance of the software model, performing walkthroughs with the generator, developing and providing Best Available Technology databases to provide the best technical solutions, developing and providing a Cost/Benefit model to provide the best economic solutions, supporting applicable funding development efforts, collating data, and writing reports.

This work element also includes using PWA data and contractor support to support the development of Site Specific Waste Minimization Plans for generators implementation efforts. This effort also includes development support of SSPs that do not require an initial PWA effort.

This work element also includes development of funding and oversight management of implementation efforts by the generators. This element also includes the initial design elements of Green Facilities programs and Environmentally Conscious Manufacturing programs and development of the funding for these programs.

This work element also includes special projects that address particular problems. These projects are described in Appendix F "Specific Research and Development Projects of Note".

Milestones: Support 70 PWAs, walkthroughs and SSP efforts per year for three years
Support Return on Investment and Productivity Increase funded projects on major waste streams.

6.6b RECYCLING PROGRAMS

This work element includes both internal and external recycling efforts. Internal recycling includes distribution of a list of reusable chemicals to interested Laboratory personnel. External recycling includes development of technical and contractual relationships to recycle chemicals through commercial users. Actual recycling implementation costs are not included in this element.

Milestones: Expand external recycling efforts to address all major chemical waste streams

Expand internal recycling efforts to address all specific chemical waste streams

6.6c SANITARY WASTE

Sanitary waste is addressed by source reduction and by recycling. Source reduction will be included in the forthcoming Green Facilities Program which will include procurement of recycled materials and energy and water conservation. Recycling programs for sanitary waste at the Laboratory currently include the recycling of paper, industrial and precious metals, electrical and mechanical equipment, and office equipment. Future recycling plans include cardboard recycling through the Site Coordinator Program.

Milestones: Develop Recycling Program Implementation Plan
Expand external recycling efforts on all commercially viable waste streams

6.7 TECHNICAL ASSISTANCE

This work element includes the review of all new projects by the ES&H Questionnaire Committee to ensure that waste minimization is included in the design phase of the program.

Milestones: Review every new Laboratory project that has a waste minimization potential

6.8 INFORMATION AND TECHNOLOGY EXCHANGE

This work element includes transfer and coordination of R&D needs to appropriate technical groups for further development. It also includes the transfer and coordination of technology that is developed in the PWA process and is of commercial benefit through Laboratory tech transfer organizations.

Milestones: Ongoing transfer of all technologies that are commercially viable.

6.9 PROGRAM EVALUATION

This work element includes evaluation of employee participation and overall program performance. It also provides for oversight of the generators waste minimization implementation efforts.

TABLE 6.1 Required resources for the site wide WMin/PP program for FY94-FY96

	FY94 BUDGETED $K	FY95 ESTIMATED $K	FY96 ESTIMATED $K
6.1 ORGANIZATION AND INFRASTRUCTURE	100[a]	105[a]	110[a]
6.2 PROGRAM DEVELOPMENT	250[a]	262[a]	275[a]
6.3 EMPLOYEE INVOLVEMENT	50[a]	52[a]	55[a]
6.4 TRACKING	90	95	99
6.5 REPORTING	50	52	55
6.6a REDUCTION PROGRAMS	500[a]	525[a]	551[a]
6.6b RECYCLING PROGRAMS	100[a]	350[a]	350[a]
6.6c SANITARY WASTE	0	0	0
6.7 TECHNICAL ASSISTANCE	50	52	55
6.8 INFORMATION AND TECHNOLOGY EXCHANGE	50	52	55
6.9 PROGRAM EVALUATION	50	52	55
TOTAL	1,290	1597	1660

[a]THESE ACTIVITIES ARE DIRECTLY REQUIRED TO MEET THE GOALS LISTED IN SECTION 4.

TABLE 6.2 Estimated resources for the site wide WMin/PP program for FY97-FY99

	FY97 ESTIMATED $K	FY98 ESTIMATED $K	FY99 ESTIMATED $K
6.1 ORGANIZATION AND INFRASTRUCTURE	116[a]	121[a]	128[a]
6.2 PROGRAM DEVELOPMENT	289[a]	304[a]	319[a]
6.3 EMPLOYEE INVOLVEMENT	58[a]	61[a]	64[a]
6.4 TRACKING	104	109	115
6.5 REPORTING	58	61	64
6.6a REDUCTION PROGRAMS	579[a]	608[a]	638[a]
6.6b RECYCLING PROGRAMS	350[a]	350[a]	350[a]
6.6c SANITARY WASTE	100	100	100
6.7 TECHNICAL ASSISTANCE	58	61	64
6.8 INFORMATION AND TECHNOLOGY EXCHANGE	58	61	64
6.9 PROGRAM EVALUATION	58	61	64
TOTAL	1828	1902	1980

[a]THESE ACTIVITIES ARE DIRECTLY REQUIRED TO MEET THE GOALS LISTED IN SECTION 4.

7.0 GENERATOR PROGRAM ELEMENTS

NARRATIVE DESCRIPTION

7.1 ORGANIZATION AND INFRASTRUCTURE
This work element provides for the support of the DP site coordinator.

7.2 PROGRAM DEVELOPMENT
At LANL, this work element is a site wide activity and therefore not included in generator activities.

7.3 PROGRAM PARTICIPATION
This work element provides for generator participation in information exchange activities, provides for generator effort in fence to fence tracking systems, and provides for generator input into data collection activities.

Milestones: Finalize the development of the fence to fence tracking system

7.4 FACILITY TRAINING
This work element provides for generator participation in training activities.

Milestones: Ongoing generator participation in training activities.

7.5 OPPORTUNITY ASSESSMENTS
This work element provides for the continuing implementation by the generators of the Process Waste Assessment system. This includes performing walkthroughs with the Pollution Prevention Program Office support and operating the PWA software. This element includes performing 45 PWAs per year.

Milestones: Perform 45 PWAs, walkthroughs and SSP per year for three years
Use Return on Investment and Productivity Increase funded projects on major waste streams.

7.6a REDUCTION PROGRAMS
This work element includes using PWA data and contractor support to support the development of Site Specific Waste Minimization Plans (SSP) for DP generators implementation efforts. This effort also includes development of SSPs that do not require an initial PWA effort. This element includes implementing 70 SSPs per year.

Milestones: Implement 70 SSPs per year for three years

7.6b RECYCLING PROGRAMS
This work element includes both internal and external recycling efforts. Internal recycling includes distribution of a list of reusable chemicals to interested Laboratory personnel.

External recycling includes development of technical and contractual relationships to recycle chemicals through commercial users.

Milestones: Ongoing reuse of internally recycled chemicals
Ongoing segregation of chemicals into recyclable streams.

7.6c SANITARY WASTE

Sanitary waste is addressed by source reduction and by recycling. Source reduction will be included in the forthcoming Green Facilities Program which will include procurement of recycled materials and energy and water conservation. Recycling programs for sanitary waste at the Laboratory currently include the recycling of paper, industrial and precious metals, electrical and mechanical equipment, and office equipment. Future recycling plans include cardboard recycling.

Milestones: Expand external recycling efforts on all commercially viable waste streams

7.7 DESIGN CONSIDERATIONS

At LANL, this work element is a site wide activity and therefore not included in generator activities.

7.8 PROGRAM EVALUATION

At LANL, this work element is a site wide activity and therefore not included in generator activities.

TABLE 7.1 Required resources for the generator WMin/PP program for FY94-FY96

	FY94 BUDGETED $K	FY95 ESTIMATED $K	FY96 ESTIMATED $K
7.1 ORGANIZATION AND INFRASTRUCTURE	36	36	36
7.3 PROGRAM PARTICIPATION	60[a]	60[a]	60[a]
7.4 FACILITY TRAINING	50	50	50
7.5 OPPORTUNITY ASSESSMENTS	407[a]	407[a]	407[a]
7.6a REDUCTION PROGRAMS	407[a]	407[a]	407[a]
7.6b RECYCLING PROGRAMS	0	160[a]	160[a]
7.6c SANITARY WASTE	0	0	0
TOTAL	960[b]	1920[b]	1920[b]

[a]THESE ACTIVITIES ARE DIRECTLY REQUIRED TO MEET THE GOALS LISTED IN SECTION 4.
[b]THESE BUDGETS ARE BASED ON ESTIMATES OF REVENUE RECEIVED FROM THE NEW RECHARGE SYSTEM FOR THE IMPLEMENTATION OF WASTE MINIMIZATION.

Note that these budgets do not escalate because these funds are derived from a recharge system based on generation rates and generation is expected to go down, not escalate.

TABLE 7.2 Estimated resources for the generator WMin/PP program for FY97-FY99

	FY97 ESTIMATED $K	FY98 ESTIMATED $K	FY99 ESTIMATED $K
7.1 ORGANIZATION AND INFRASTRUCTURE	36	36	36
7.3 PROGRAM PARTICIPATION	60[a]	60[a]	60[a]
7.4 FACILITY TRAINING	50	50	50
7.5 OPPORTUNITY ASSESSMENTS	757[a]	757[a]	757[a]
7.6a REDUCTION PROGRAMS	757[a]	757[a]	757[a]
7.6b RECYCLING PROGRAMS	160[a]	160[a]	160[a]
7.6c SANITARY WASTE	100[a]	100[a]	100[a]
TOTAL	1920[b]	1920[b]	1920[b]

[a]THESE ACTIVITIES ARE DIRECTLY REQUIRED TO MEET THE GOALS LISTED IN SECTION 4.
[b]THESE BUDGETS ARE BASED ON ESTIMATES OF REVENUE RECEIVED FROM THE NEW RECHARGE SYSTEM FOR THE IMPLEMENTATION OF WASTE MINIMIZATION.

Note that these budgets do not escalate because these funds are [illegible] recharge system based on generation rates and generation is expected to go down, not escalate.