General

LANL / WSA / WL Min.

Standard Data Report

1994 Annual Report on Waste Generation and Waste Minimization Progress as Required by DOE Order 5400.1

Los Alamos National Laboratory
State: NM
Operations Office: AL

Prepared for:
U.S. Department of Energy
Waste Minimization Division, EM-334

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Report Date: 02/14/96

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I. Executive Summary

The Los Alamos National Laboratory (LANL) Pollution Prevention Program Office (P30) supports LANL efforts to meet waste reduction goals established by DOE, LANL management, and the University of California. LANL is committed to a proactive and innovative waste minimization and pollution prevention program, as well as to ensuring that all activities are designed to protect employees, the public, and the environment.

Significant accomplishments of the EM-30-funded Site-Wide Pollution Prevention Program during the reporting period include: (1) the expansion of the recycling program to include the diversion of potential RCRA and State-regulated hazardous wastes to off-site recycling vendors; (2) initiation of the WMin/PP Chargeback Program; (3) the utilization of Chargeback revenues to conduct Pollution Prevention Opportunity Assessments (PPOAs) on all LANL mixed waste generating processes, as required by the Federal Facilities Compliance Agreement; (4) initiation of an analysis of historic LANL waste generation to establish priority waste types and priority waste generating facilities for focused P30 attention; (5) initiation of a productivity improvement assessment of Waste Management Program operations; (6) initiation of a disposal options study for verified clean wastes; (7) development of a method to uniquely identify individual waste generating processes at LANL; (8) continued support of the LANL Materials Substitution Committee; (9) continuation of the Waste Minimization Incentive Awards programs which provides cash prizes for employee waste reduction suggestions; (10) continuation of waste minimization employee training programs; (11) enhancement of Pollution Prevention Awareness Campaign activities; (12) tracking of LANL progress against three waste minimization performance measures in the UC Contract; (13) preparation of reports to meet DOE Order 5400.1, FPCA, Affirmative Procurement, and DOE Operations Office requirements; (14) continued involvement of P30 staff in the ES&H Questionnaire Review Committee and in the review of Standard Operating Procedures; and (15) continuation of P30 technical support to waste generators in the form of PPOA coordination, acquisition of funding to support waste minimization implementation and research, and waste generation tracking and trend analysis.

Additional funding, supplied by DOE EM-334, was received in the December FIN Plan and will be utilized during CY 1995 to support the initiation of several generator-specific waste minimization projects, including the application of dedicated P30 technical support to the Chemistry and Metallurgy Research (CMR) Building upgrade project, an analysis of potential waste minimization applications to Environmental Restoration activities, evaluation and testing of alternative radioactive liquid waste treatment processes, as well as the improvement and formalization of the internal chemical exchange program, initiation of recycling procedures for radioactively-contaminated metals, and development of a pollution prevention procurement program.

Further discussion of the impacts of the WMin/PP Chargeback Program, initiated at the start of FY95, can be found in Section V: Site Wide WMIN Accomplishments, as well as more information regarding the accomplishments of the EM-funded Site-Wide Pollution Prevention Program. Finally, this section also provides a thorough discussion of the diverse recycling activities accomplished at Los Alamos.

II. General Site Information

General Site Mission

Los Alamos National Laboratory's original mission to design, develop, and test nuclear weapons has broadened and evolved as technologies, national priorities, and the world community have changed. Los Alamos is a multi-program laboratory with the central mission of reducing the nuclear danger. The Laboratory is dedicated to developing world-class science and technology and applying them to the nation's defense, particularly in nuclear weapons technology, and will increasingly use its multidisciplinary capabilities to solve important civilian problems.

Today, Los Alamos uses the core technical competencies developed for defense programs to carry out both our national security responsibilities and our broadly-based programs to improve environmental quality, energy recovery and usage, national infrastructure, economic and industrial competitiveness, research leadership, and the quality of science and technology through improved education and research opportunities. Los Alamos is committed to ensuring that all activities are designed to protect employees, the public, and the environment.

Mailing Address

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Los Alamos, NM 87545

Lead CSO	Additional CSOs											
DP	AD	CR	DP	EE	EM	ER	ET	FE	HR	NE	NN	PM	RW
				X	X	X		X		X			X

Site Size (acres)	Number of Employees DOE	Number of Employees Contractor
27520	80	10160

Data contained in this report represents waste generation in the following states(s):

NM

III. Introduction

GENERAL INTRODUCTION
It must be kept in mind that the waste data presented in this report is obtained from the LANL Waste Management Program databases. As such, this data represents the quantity of wastes managed by the EM-30-funded Waste Management Program during the year rather than the amount of waste generated at the Laboratory. Since there is some lag time between the time a waste is generated and the time it is transferred to Waste Management, a waste can be generated late one year and managed to disposal early the following year. However, since long-term waste storage at a generator site is not routinely performed, there is rarely a significant difference between the quantities of wastes generated and those handled by Waste Management.

The numbers of contractor personnel presented on page 2 break down as follows, as of December 1994:

Los Alamos National Laboratory	7163
Protection Technology	418
Johnson Controls	1575
Other Technical	1012

The DOE-Los Alamos Area Office employee count increased from 59 in CY 1993 to 80 as of December 1994.

The P3O is currently completely revising the LANL Site Pollution Prevention Awareness Plan. As a result, the information provided in the last section of this report will be revised in the next Annual Report to coincide with the waste generation baseline, waste reduction goals, and metrics developed for the new Site Plan.

Table 1.0, Total Waste Generated in 1994, in Section IV, demonstrates that the quantities of all waste types handled at LANL, except TRU-Mixed, were higher than in 1993. Table 2.0, Routine Versus Non-Routine Waste, however, clearly shows that LANL has achieved significant reductions in TRU-Mixed, LLW, and State-regulated routine wastes. Generation of non-routine wastes of all types has increased significantly due to increased environmental restoration and D&D activities. This illustrates an area of significant concern: while some waste avoidance is being accomplished within the LANL Environmental Restoration/D&D Program, most of these successes are due to the personal initiative of a few project leaders. Overall, the LANL Environmental Restoration Program has no established waste avoidance and/or recycling goals, project leaders are not provided with formal direction or incentive to accomplish waste avoidance, and LANL Environmental Restoration/D&D personnel do not believe their DOE customer supports the pursuit of such activities.

INTRODUCTION TO SITE GENERATION DATA
The LANL P3O continues to improve the process of attributing waste generation data to CSOs for this report. This year, some additional, although very small, waste generating CSOs were identified at LANL. These small generators include: Environment, Safety, and Health (EH), Nonproliferation and National Security (NN), Energy Efficiency (EE), and Civilian Radioactive Waste Management (RW). Since the Annual Report software does not recognize EH or NN, the wastes attributed to these CSOs will be included in the Environmental Restoration and Waste Management (EM) data and will be broken out in the EM-specific narrative. Although this is the first year that LANL is reporting wastes for these four CSOs, we do not feel that this represents new or increased waste generating activities; rather, this is a function of our improved data collection and reporting efforts.

Again, as last year, wastes which were identified as having been produced by LANL

Work for Others (WFO), Laboratory institutional overhead or G&A programs, or that small quantity of waste which could not be accurately attributed to its program of origin, will be included in the Defense Programs (DP) data, since DP is the LANL site landlord. The quantities of wastes from each of these sources will be broken out in the DP-specific narrative. Finally, DP will be attributed with all of the process wastewater influent treated at the radioactive liquid waste treatment plant during CY 1994, while EM is attributed with all the solid wastes which are a result of the operations of this plant.

Improved data collection regarding sanitary wastes sent to the Los Alamos County Landfill makes the quantity reported here for CY 1994 much more reliable than in past reports.

LANL does not generate High-Level Waste (HLW).

All of the low-level mixed waste stored at Los Alamos meets the RCRA solid waste definition. As such, it is all reported as solid waste.

Los Alamos waste acceptance criteria for LLW, TRU, and TRU-Mixed wastes forbid the presence of free liquids; all such wastes disposed or stored at LANL are in solid form. The quantities reported as solid wastes represent the true totals for these waste types. The total quantity of liquid waste influent entering the radioactive liquid waste treatment plant is reported in the Process Wastewater Generation table.

In the CY 1993 Annual Report, the LANL data for Mixed-TRU showed a large "spike" causing the appearance of a tremendous increase in the generation of this waste type. As explained in the CY 1993 report, the majority of this spike was due to a specific Mixed-TRU waste stream being delivered to the Waste Management storage site which had been "backlogged" at generator facilities due to a waste form/waste acceptance criteria problem. Approximately 214 cubic meters of the CY 1993 Mixed-TRU data was due to the arrival of this "backlogged" waste. Thus, the "true" CY 1993 generation figure for Mixed-TRU waste was 41.3 cubic meters. Since this report shows the CY 1994 generation as 17.2 cubic meters, LANL has achieved a reduction in this waste category of 24.1 cubic meters.

In the past, the only wastes managed at LANL which were reported as TSCA or TSCA-Mixed were PCBs. In CY 1994, the Waste Management Program began to track and report asbestos wastes in the TSCA categories. As a result, apparent increases in LANL TSCA and TSCA-Mixed wastes demonstrated in this Annual Report, as compared to the 1991-1993 data, should be attributed to the fact that asbestos wastes were included in the TCSA categories for the first time this year. In previous years, asbestos was reported as a State-regulated waste.

LANL does not use PCB oils or asbestos as inputs to any processes or research. The only source of such wastes is abatement/replacement efforts focused on removing such materials. As a result, all TSCA and TSCA-Mixed wastes are reported as "Non-Routine" wastes in this report.

As is the case with all materials which are recycled rather than disposed, the quantities of routine and non-routine RCRA and State-regulated materials which were recycled during CY 1994, as discussed in the Recycling Activities section, are not included in the CY 1994 waste generation figures for RCRA and State-regulated wastes.

Of the non-routine wastes reported here, 3.3 cubic meters of Mixed-LLW is the result of moving 16 drums of wastes into storage which had been collected over a period of 2.5 years from Environmental Restoration sampling activities.

IV. Site Generation Data

Table 1.0 Total Waste Generated in 1994
as Packaged for T/S/D
(does not include process wastewater)

Waste Type	Liquid	Solid	Total	Inventory* Waste (as of 12/93)
High Level Waste	0 m3	0 m3	0 m3	0 m3
Transuranic Waste (TRU)	0 m3	66.8 m3	66.8 m3	10300 m3
Mixed-TRU	0 m3	17.2 m3	17.2 m3	619 m3
Low-Level Waste (LLW)	0 m3	2830 m3	2830 m3	227000 m3
Mixed-LLW	0 m3	75.7 m3	75.7 m3	665 m3
RCRA Regulated		136 mt	136 mt	1.70 mt
State Regulated		803 mt	803 mt	2.10 mt
TSCA Regulated		170 mt	170 mt	1.20 mt
Mixed-TSCA		48.1 mt	48.1 mt	2430 mt
Sanitary		8740 mt	8740 mt	

* Total waste generated at the site during calendar year 1994, which is a sum of all wastes generated, regardless
of source or activity; also provided for reference is the total amount of waste in inventory at the site, as of 12/93.

IV. Site Generation Data (cont.)

Table 1.1 Amount of Waste Generated in Other States by this Site's Operations or Activities

You have indicated that you are reporting waste for only 1 state. Therefore, this page is intentionally blank.

IV. Site Generation Data (cont.)

Table 2.0 Routine * vs. Non-Routine ** Waste

Waste Type		Routine	Non-Routine	Total
High Level Waste	(L)	0 m3	0 m3	0 m3
	(S)	0 m3	0 m3	0 m3
Transuranic Waste (TRU)	(L)	0 m3	0 m3	0 m3
	(S)	66.8 m3	0 m3	66.8 m3
Mixed-TRU	(L)	0 m3	0 m3	0 m3
	(S)	17.20 m3	0 m3	17.20 m3
Low-Level Waste (LLW)	(L)	0 m3	0 m3	0 m3
	(S)	1754.14 m3	1071.44 m3	2827.2 m3
Mixed-LLW	(L)	0 m3	0 m3	0 m3
	(S)	24.330 m3	51.43 m3	75.730 m3
RCRA Regulated		32.623 mt	102.834 mt	136.143 mt
State Regulated		234.609 mt	568.187 mt	802.700 mt
TSCA Regulated		0 mt	169.547 mt	169.547 mt
Mixed-TSCA		0 mt	48.1 mt	48.1 mt

Total waste generated at the site during calendar year 1994, which is a sum of all wastes generated regardless of source or activity

* Routine waste is defined as waste produced from any type of production operation, analytical and/or R&D laboratory operations; T/S/D operations, "work for others", or any other periodic and recurring work that is considered on-going in nature.

** Non-Routine waste is defined as one-time operations waste; Wastes produced from environmental restoration program activities, including primary and secondary wastes associated with retrieval and remediation operations; "legacy wastes"; and D&D/Transition operations.

IV. Site Generation Data (cont.)

Table 2.1 Process Wastewater* Generation

Waste Type	Volume (1000 Liters)= 1 m3
High Level Waste	0 m3
Transuranic Waste (TRU)	0 m3
Mixed-TRU	0 m3
Low-Level Waste (LLW)	19700 m3
Mixed-LLW	0 m3
RCRA Regulated	0 m3
State Regulated	0 m3
TSCA Regulated	0 m3
Mixed-TSCA	0 m3
Sanitary	0 m3

Total waste generated at the site during calendar year 1994, which is a sum of all wastes generated regardless of source or activity.

* Process Wastewater is defined as any water produced during manufacturing or processing operations which comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by-product, or waste product. This determination is independent of the level and/or nature of the contaminants.

V. Site-Wide WMIN Accomplishments

This section provides a description of the accomplishments of the EM-30-funded Site-Wide Pollution Prevention Program at the Los Alamos National Laboratory (LANL) during CY 1994, as well as other significant site-wide accomplishments or developments.

WMIN/PP CHARGEBACK

During CY 1993, the LANL Pollution Prevention Program Office (P3O) designed a recharge mechanism named the WMin/PP Chargeback Program; the EM-30 funding received for the conduct of the "base" site-wide pollution prevention program supported the development of the WMin/PP Chargeback Program. This program was designed to provide LANL waste generators with a financial incentive to implement waste reduction actions by assessing a "tax" against their budgets, based upon the types and quantities of wastes they deliver to the EM-30 Waste Management Program. This system was approved for implementation after undergoing a review and authorization process through which all recharge programs at LANL must be approved.

The WMin/PP Chargeback was initiated at the start of FY95 (October 1, 1994). The maximum target for revenues was established as $1.5M. Expenditure of the funds collected through this program is administered by the P3O and activities to be supported by these revenues include the conduct of Pollution Prevention Opportunity Assessments (PPOAs), development of facility-specific waste minimization plans, and implementation of specific WMin/PP projects selected based upon their potential return on investment.

Each month, when vouchers are prepared to collect the "taxes" from waste generators, a memorandum and tables showing the amounts of wastes generated and the funds to be collected, are distributed to the line managers, financial analysts, and waste management coordinators within the affected organizations. All waste generators are assessed the tax at the same rate per waste type; this includes EM waste generating organizations such as Environmental Restoration.

Since this program was only initiated in late CY 1994, and the majority of the operation experience occurred during CY 1995, a summary of the accomplishments during the initial year of this program will be provided in the next Annual Report. Briefly, the revenues collected through this program assisted in the accomplishment of PPOAs on about 70 processes, including the 39 identified sources of Mixed-LLW as required by the FFCA. Additionally, this program provided funding to support a number of WMin/PP projects, significantly increased waste generator awareness of the impacts of waste generation, and achieved marked improvement to the quality of the data maintained in the Waste Management databases.

POLLUTION PREVENTION AWARENESS PLAN

Although LANL did deliver a site plan as required in May 1994, significant changes in the personnel, management, and focus of the LANL P3O occurred after submittal of the Plan. The P3O undertook an historical review of LANL waste generation which assisted in the development of a waste generation baseline, establishment of a method of measuring waste reduction progress, identification of priority waste types for focused WMin/PP actions, and identification of the priority waste generating facilities which require dedicated WMin/PP technical support. The results of this strategic planning effort are currently being documented in a new Site Pollution Prevention Awareness Plan. The information provided in the last section of this report, particularly the budgetary information, represents the content of the most current version of the plan.

AWARENESS EFFORTS

During CY 1994, the P3O planned for the conduct of a LANL Pollution Prevention

Showcase to be held in Santa Fe, NM in January 1995. P30 personnel worked with other LANL organizations, the County of Los Alamos Landfill personnel, representatives of the major LANL support subcontractor, Johnson Controls (JCI), and members of the Nambe Indian Pueblo in an effort to establish a material composing/baling and recycling facility on Nambe Pueblo land. The P30 provided assistance and funding to support the E-2000 environmental science competition within the public schools. The P30 initiated publication of a quarterly newsletter entitled the P2 REPORTER, one of the inaugural issues was dedicated to providing LANL personnel with information regarding the purpose and function of the newly-implementation WMin/PP Chargeback program. P30 personnel attended the DOE EM Pollution Prevention Conference X to exhibit the PPOA software developed at LANL, an exhibit was presented at the Waste Management '94 conference, exhibits were held in conjunction with Los Alamos County activities for Earth Day, and a mobile WMin/PP exhibit was placed on display within the public spaces of several large LANL facilities. Also during CY 1994, the P30 initiated efforts to evaluate LANL ES&H Training classes to identify opportunities to add or improve course content regarding WMin/PP. At the request of LANL personnel responsible for administering the University of California's contract with DOE for operation of the Laboratory, the P30 assumed management of 3 contract performance measures which establish annual waste reduction goals. The P30 developed presentations and regularly distributed charts to LANL line managers which illustrated LANL progress against these measures.

INCENTIVES PROGRAMS

In addition to the implementation of the new WMin/PP Chargeback program described above, the P30 continued the Annual WMin/PP Employee Incentive Awards program. This is an contest conducted by the P30 in which LANL employees may enter suggestions for WMin/PP projects in three categories: Large-Scale Projects, Administrative Changes, or Small-Scale Projects. The entries are judged by a committee of LANL personnel selected from across the site and cash awards are made to up to three winners in each category. This very popular program is the source of some very innovative ideas each year. The funding for the awards themselves is provided by DOE morale funding administered by the LANL Human Resources organization. The funding to conduct the call for entries, the judging, the printing of certificates for all participants, and the awards ceremony itself is provided by the EM-30 Site-Wide Program. Johnson Controls (JCI), the major LANL support services subcontractor, developed and initiated their own employee WMin/PP awards program in 1994 which was designed after the P30 program.

REPORTING

This is an area of significant effort funded by the Site-Wide Program funds. During the year, P30 produced the CY 1993 Annual Report, 2 required program and work plans describing WMin/PP efforts for compliance with the FFCA, the 1994 Site Awareness Plan, delivered the Annual Affirmative Procurement Report, and provided input to other LANL organizations for accomplishment of RCRA and SARA reporting requirements. The P30 undertook and effort to improve the content of the monthly Progress Tracking System input provided to the DOE Albuquerque Operations Office. In addition, efforts were designed and initiated during the year to uniquely identify waste generating processes at LANL and implement other data collection and data validation improvements within the Waste Management databases to facilitate implementation of the WMin/PP Chargeback program and improve the quality of data submitted in the Annual Reports. Efforts were also initiated to develop performance measures to track the effectiveness of the Site-Wide Program and of the personnel working within P30, these programmatic performance measures will be implemented in 1995. In addition, data tracking a reporting efforts were initiated to manage LANL progress toward 3 WMin/PP performance measures in the UC/DOE operating contract, as mentioned above in the awareness section. Tracking of these performance measures also required that the P30 prepare and conduct a survey of WMin/PP-related activities being conducted at the Laboratory. The results of this survey were delivered to the DOE Los Alamos Area Office in

January 1995. P3O personnel provided continued support to DOE staff and contractors involved in the upgrade of the Annual Report software, contributed to a pollution prevention performance measures working group, and continued to support the Avoidable Waste Management Costs study which published a final report in January 1995.

ASSESSMENT OF WASTE MANAGEMENT OPERATIONS
During 1994, the P3O initiated planning to conduct an assessment of the waste management process at LANL, evaluate operations for productivity improvement opportunities, and assist that program in the development of an action plan to align activities to a sharply declining budget. As part of this effort, plans were begun to conduct a disposal options study to identify off-site disposal alternatives for verified clean materials. The P3O has been working to establish procedures and policies to facilitate the segregation of clean materials from the volume of waste now being managed as LLW. It is estimated that 60-80% of the volume of LLW is actually clean materials which are handled as radioactive due to inappropriate administrative controls or other institutional or technology barriers which prevent the material from being managed as nonradioactive waste. The P3O will continue efforts to eliminate such materials from the radioactive waste disposal pathway and identify alternative disposal or release routes.

OTHER SITE-WIDE PROGRAM ACTIVITIES
Miscellaneous activities also pursued by the P3O included:

- support of the LANL Materials Substitution Committee
- review of LANL Standard Operating Procedures
- review of LANL ES&H Questionnaires on new/modified processes
- support of the Waste Management customer service hotline
- interface with LANL Waste Management Coordinators
- membership on the LANL RMMA Program Advisory Board
- P3O support of the DOE WMin Contractor Coordination Group
- conduct of an internal chemical exchange program
- input to the development of employee procurement training
- representation on the JCI WMin/PP Task Force
- interaction with Los Alamos County Landfill personnel

NEW HAZARDOUS AND MIXED WASTE TREATMENT FACILITY DESIGN
The Los Alamos Waste Management Program is presently in the engineering and design phases for new hazardous and mixed waste receiving, storage, and treatment facilities. The P3O conducted a pollution prevention assessment of the engineering design and operations plans for the new facility to identify and recommend WMin/PP technologies and methods which should be incorporated into the design. In addition, the P3O provided input to the storm water management and site plan design. Materials and equipment were selected to minimize wastes generated during operation of, as well as decommissioning and closure of, the new facility.

ONLINE SWAP SHOP
The Swap Shop is an online listing of items no longer needed by LANL users. The listing includes the item's description, property number, manufacturer, model, cost, location, and the name of the property administrator to contact; items can be anything from laboratory glassware to electronic equipment and copiers to construction equipment - anything that can be moved to another site. LANL workers can look for items using a keyword search similar to that used on wordprocessors. If the item is not requested by someone in the Laboratory within 21 days, it will be picked up by personnel from the Redistribution and Marketing center and made available to schools, if appropriate, and then to other federal and state agencies. Useable items which are not placed in this manner are sold at public auction; unserviceable items are scrapped for recycling.

ONLINE FORMS ACCESS
The Laboratory's Computing, Information and Communications division has obtained

site-wide licenses for a special software tool which enables LANL employees to access the multitude of official forms online, fill out and submit the form, or download and print the form. Cafeteria catering order forms, computing center password request forms, and official visitor escort forms are just a few examples of the type of forms used at LANL on a daily basis. By providing such forms online, the Laboratory no longer has to worry about making sure enough forms are stocked at the warehouse, the space in the warehouse is freed for other materials, and countless reams of paper are saved. And, since forms are constantly updated, the Laboratory will no longer be throwing away tons of wasted, unused forms, saving even more time, paper, and money.

STEAM PLANT REPLACEMENT
The Laboratory conducted a process design review when faced with the need to upgrade or replace the steam plant at technical area 16. As a result of this analysis, the decision was made to replace the steam plant with package boilers. Comparisons of the steam plant and package boiler technologies included annual fuel consumption, heat conversion efficiencies, and emissions of nitrogen oxides, carbon monoxide, sulfur oxides, particulate matter, and non-methane volatile organic compounds. The decision was made to replace the steam plant with package boilers, reducing NOx from 171 to 23 tons/year, SOx from 1 to 0.4 tons/year, particulate matter from 17 to 7 tons/year, CO from 43 to 23 tons/year, and VOCs from 3 to 2 tons/year.

LIQUID OUTFALL REDUCTION EFFORTS
The LANL Waste Stream Characterization Program is a project that has been established in accordance with the EPA Administrative Order that sets water quality compliance requirements. As part of this effort, the Laboratory eliminated 73 unpermitted discharges during the first quarter of FY95. This includes the elimination of 9 such outfalls at technical area 16 alone, through installation of new water collection systems and water recycling, resulting in the reduction of 3,483,000 gallons of water released to a dry canyon per year. Also as part of this effort, the LANL Water Quality and Hydrology organization has requested that another 50 permitted outfalls which did not discharge between August and October 1994 be eliminated. Finally, NPDES outfalls that are candidates for elimination have been identified and prioritized and a business plan for outfall reduction has been prepared; it is anticipated that 12 permitted NPDES outfalls will be eliminated under this plan during FY95.

HE WASTEWATER TREATMENT
Another project established in accordance with the EPA Administrative Order regarding water quality is the High-Explosive Wastewater Treatment Project. This original scope of this line item project consisted of constructing two new HE wastewater treatment facilities at LANL to treat the current annual HE wastewater discharge of 12,000,000 gallons. As an alternative to the current scope, a wastewater minimization option has been developed. This alternative consists of replacing HE processing systems within facilities that generate wastewater with systems that either recirculate water or do not use water at all. This will reduce the amount of HE wastewater generated from 12,000,000 to 130,000 gallons per year. In addition to providing water conservation, these waste minimization changes will eliminate the introduction of organic solvents that would require solvent recovery treatment, eliminate the installation of underground pipe systems, and reduce the planned 21 permitted outfalls to only 2. Additionally, the technology changes will reduce the overall project cost by about $1M.

STACK REDUCTION EFFORT
The Laboratory's Stack Reduction Program emphasizes the elimination or consolidation of stacks throughout the site in an effort to reduce the number of release points requiring sampling and monitoring. While reducing the number of stacks releasing to the atmosphere may not always reduce the quantity of emissions, reducing the number of release points does improve the Laboratory's ability to reliably monitor and regulate its air emissions. As a result of the

decontamination activities at technical area 21 facilities, existing radioactive operations at this facility will be incorporated elsewhere. This will eliminate the use of 12 stacks at this site. Decommissioning work conducted so far at this site has eliminated 90% of the radioactive emissions. Stack consolidation at technical area 50 will reduce the number of stacks at this site by 7. Elimination of cross connections and improved administrative controls at the Chemistry and Metallurgy Research (CMR) Building will eliminate the need to monitor releases from 10 stacks venting the office spaces in this facility. The shutdown of the Omega West Reactor has eliminated its stack emissions. The tritium operations at technical area 25, building 215, have been removed and consolidated at another facility, eliminating stack releases from this building. Finally, the DOE-wide tritium consolidation effort will result in reducing the number of stacks currently releasing tritium at technical areas 41 and 33.

NEW TECHNOLOGIES DEVELOPED AT LOS ALAMOS

Alternative Combustion Laboratory: LANL researchers have developed a novel method that disposes of gaseous, liquid, and slurried waste. This process treats a range of waste streams of interest to industry, including machining oils, halogenated solvents, and off-gases that contain organic and inorganic pollutants. The alternative combustion laboratory consists of two mechanisms, each about the size of a small refrigerator. The first unit vaporizes the influent, thereby oxidizing the hazardous constituents; because no flame is produced, the unit is not classified as an incinerator. The second mechanism, a silent discharge plasma unit, handles the uncombusted contaminants from the first unit, breaking chemical bonds and leaving nonhazardous, easily managed substances. This two-stage system can operate in a closed loop, recycling all exhaust gasses. Its demonstrated removal rate is greater than 99.9999 percent. Technical review and comment have been completed for a RCRA permit to treat several organic waste streams with this technology.

Laser-Induced Breakdown Spectroscopy (LIBS): LANL researchers have developed a method that provides a sensitive elemental analysis of a variety of materials. LIBS can detect elements such as barium, lead, and beryllium in a variety of media, such as metal, water, soil, and air; it also can determine the amount of contamination by measuring concentrations. An analysis is conducted by forming a laser-spark plasma by focusing a laser beam on the material; atomic emission spectroscopy analyzes the plasma light, providing results on a computer screen in less than one minute. The simplicity of the LIBS technique enables the development of portable instruments which are capable of providing real-time analyses.

Large-Volume Flow-Through Detector System (LVFTDS): A gas stack monitoring instrument developed at Los Alamos has the potential to eliminate concerns about effective radioactive emissions monitoring which have kept some incinerators from being built and others from operating. The LVFTDS instrument uses a completely new approach and has the potential to provide sensitivity an order of magnitude higher than conventional systems. Conventional devices take several minutes to analyze a sample, thereby delaying a shut-down warning if a mechanical failure allows radioactive particles to escape--the LVFTDS solves this problem by providing immediate real-time feedback on emissions.

Long-Range Alpha Detectors (LRADs): Los Alamos and Eberline, a private company in Santa Fe, NM, are working on developing and commercializing LRADs. The first such product to hit the market is an LRAD designed to screen small objects such as tools and clothing leaving a radiation-controlled area. Such capability is valuable for verifying materials segregated for clean release from such areas are indeed clean and safe for reuse, recycling or disposal as nonradioactive wastes. LANL is also working with Thermo Instrument Systems, Inc., to develop a commercial environmental monitor for soil.

Radio Frequency-Driven Oxygen Plasma: LANL scientists in the Physics, Chemical

Science and Technology, and Nuclear Materials Technologies organizations are using this method to clean manufactured parts, eliminating the traditional toxic solvents used to remove hydrocarbon-based contaminants such as grease, oil, or cutting fluids. When an object is immersed in the oxygen plasma, hydrocarbons on its surface are broken down and pumped away as water vapor and carbon dioxide.

Superconducting Quantum Interference Devices (SQUIDs): Researchers in the Los Alamos Physics organization are using SQUIDs technology to detect the magnetic effects associated with corrosion without disturbing the contents of waste drums, breaching the drum's integrity, or subjecting the drums to x-rays or other outside energy sources. The same technology can be used to monitor corrosion in pipelines, aircraft, or ocean-going vessels.

V. Site-Wide WMIN Accomplishments (cont.)

Table 3.0 Site-Wide Recycling Activities

Paper Products		
Office paper	290	mt
Corrugated cardboard	0	mt
Phone books	2.68	mt
Newspaper	0	mt
Aluminum cans	0	mt
Glass	0	mt
Plastic	0	mt
Styrofoam	0	mt
Scrap metals		
Stainless steel	16.0	mt
Copper	0.498	mt
Iron	179	mt
Aluminum	10.1	mt
Lead	28.7	mt
Zinc	0	mt
Other: (see discussion below)	316	mt
Precious metals		
Silver	0	mt
Gold	0	mt
Platinum	0	mt
Other: (see discussion below)	0	mt
Toner cartridges	0	mt
Batteries	12.9	mt
Engine oils	0	mt
Tires	11.2	mt
Food waste	0	mt
Concrete	0	mt
Wood (chips, compost)	0	mt
Other: (see discussion below)	151	mt

Other scrap metals included:

Electrical Cable	153.0 metric tons
Tin	162.5 metric tons
Brass	0.5 metric tons

Environmental Restoration/D&D Recycling:

Concrete-crushed and reused	950 cubic yards (about 1603 tons)
Process equipment	150 cubic yards
Building debris-decon./release	100 cubic yards

Soil: At an inactive firing range, soil washing was used to remediate 2000 cubic yards of excavated soil containing lead, copper, and zinc. The soil was then reused as road base at a local construction project.

Off Site Recycling:
LANL employees take newspaper, aluminum cans, and some glass and plastic home to recycle through the Los Alamos County residential curbside recycling program. These quantities are unknown.

Toner Cartridges:
Used toner cartridges are returned directly to the vendor when new cartridges are purchased. The quantity recycled through this pathway is also unknown.

Hazardous Materials:
As part of an EM-334-funded effort, the P3O identified potentially recyclable hazardous material being managed as waste, located viable commercial recyclers, and established an audit protocol for qualifying potential recyclers. The Laboratory's Environmental Protection organization reviewed and accepted the audit protocol. The LANL Waste Management Program initiated procedures to divert some potential hazardous materials to qualified off-site vendors which perform recycling, rather than disposal, services. During 1994, this effort achieved the recycling of the following materials (shown as "Other" in the table above):

RCRA Materials	Routine Generation	49,648 kg
	Non-Routine	9,433 kg
State-Regulated	Routine Generation	78,493 kg
	Non-Routine	13,362 kg

CFC Recovery:
On-site use of recovered CFCs in equipment continued during 1994. To date, 11,508 pounds of CFCs have been recovered for reuse. In 1994, 1,757 pounds were recovered. In the installation of a new Cray supercomputer, the freon was removed from the computer being replaced and recycled into the new machine. This resulted in waste avoidance and cost savings related to the purchase of 30-40 pounds of freon.

Construction Materials:
In 1994, a Construction Materials Redistribution Yard was established at Technical Area 63. This site will serve as a centralized warehouse facility to transfer reusable construction stock such as rebar, wood, paint, and pipe. A "real-time" inventory and query system is being established, as well as a transportation system to get materials to requestors.

Remilled Road Surface:
The LANL Utilities and Infrastructure organization coordinated the milling and overlay of Pajarito Road, an on-site, public-access, DOE-owned road. The estimated 500-700 tons of milled road surface material generated from this project was reused for road shoulder maintenance work, relieving the Los Alamos County landfill of what would have otherwise been waste material.

Water Recycling:
Treated sanitary waste water effluent is being used in the cooling towers and as boiler makeup water at the on-site power plant in place of potable water. This project has eliminated the contamination and discharge of approximately 150,000 gallons of potable water per day.

Antifreeze:
An ethylene glycol recycling program has been initiated in the fleet maintenance facility. Approximately 50 gallons per month is reused on-site in government vehicles.

Coolant Reuse:
The LANL machine shops located at technical area 3, buildings 39 and 102, have begun recycling the coolant used for machining equipment after the installation of a coolant recovery/recycling system. It is estimated this will result in an 80% reduction in the number of drums of this hazardous waste generated annually (down to 12 drums from an average of 75 per year). In addition, these shops have begun returning their empty machine oil drums to the vendor rather than crushing and disposing them. As a result, 20 55-gallon drums are no longer sent to the on-site disposal facility each year.

Automotive Parts:
The fleet maintenance facility personnel has started rebuilding automotive parts such as radiators, alternators, starters, and hydraulic cylinders, instead of routinely replacing them. During the first quarter of FY95, a waste reduction

of 1420 pounds has been realized.

Excess Property:
During 1994 the Redistribution and Marketing program processed about 24,000 pieces of property with an original acquisition cost of $41M. This property includes office supplies, furniture, computers, and machinery. Approximately $4.5M of that property was reutilized by LANL or transferred to public schools or other federal agencies. The balance was sold through on-site and off-site public sales. Some of these items would have been offerred for internal exchange through the On-Line Swap Shop (described in Section V); all items not successfully exchanged ultimately are handled by the Redistribution and Marketing program.

LANL Efforts at Nevada Test Site:
Equipment: The Laboratory's Dynamic Testing organization routinely transfers all usable equipment no longer needed at the Nevada Test Site for use at LANL. This effort has resulted in approximately $500K in equipment costs so far.
Boron: The NTS facility has reused scrap boron on-site for various applications and remelted and poured it into forms in production of shielding. A 4'x4' piece of boron costs approximately $5K. This reuse has resulted in significant savings.
Oil: The NTS facility has reduced unneeded oil changes in its equipment by testing the oil first. This has resulted in a savings of $1256 and a 3200 pound reduction of oil use in 1994.

Affirmative Procurement activities:
27% of the concrete purchased by LANL contained fly ash.
19% of the office paper purchased by LANL had recycled content.
3% of the tires purchased were retreads.
LANL does not purchase re-refined oils as we have moved to using synthetic (non-petroleum) oils.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount)	Amount/Year:
Low-Level Waste (LLW)-Solid	0.700 m3/1994

Implementing CSO: DP

Activity Identification Method: T05 source reduction activity: W13
OR recycling activity:

Serial Number:

Status:

The Weapons Engineering Tritium Facility at LANL has implemented a few simple changes in the ways materials are handled within its Radioactive Material Management Area (RMMA). First, liquid Fantastic, which is used in decontamination, was being purchased in 1-quart spray bottles which were thrown away in the LLW trash when they were emptied. Now, they purchase 1-gallon Fantastic refills which are carried into the RMMA to refill the spray bottles and the 1-gallon refill bottle is carried back out of the RMMA without ever being set down within the RMMA, avoiding its classification as LLW. The 1-quart spray bottles are thus reused, eliminating about 6 2-cubic foot boxes of waste per year.

Second, the yellow Pylox gloves used within the RMMA are unpackaged prior to being introduced into the RMMA, reducing the LLW generation by 6 more 2-cubic foot boxes per year.

These changes cost nothing, but save an estimated $2200 annually in LLW generation and management costs.

Comments:
included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount)	Amount/Year:
Low-Level Waste (LLW)-Solid	4890 m3/1994

Implementing CSO: DP

Activity Identification Method: T04

source reduction activity: W19
OR recycling activity:

Serial Number:

Status:

The LANL Chemistry and Metallurgy Research (CMR) Building was constructed in 1952 and underwent the first phase of facility upgrades in 1994. During project conceptual design for the upgrades, a modified value engineering approach was employed to identify a number of potential waste minimization actions. As a result, 6400 cubic yards of soils excavated from the site were reused for a retaining wall rather than sending them to LLW disposal. This no-cost option avoided an estimated $15M in waste generation and disposal costs.

Comments:
Included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount)	Amount/Year:
Low-Level Waste [LLW]-Solid	61.5 m3/1994

Implementing CSO: EM

Activity Identification Method: T04 source reduction activity: W19
OR recycling activity:

Serial Number:

Status:

At an Environmental Restoration project at technical area 49, field personnel implemented improved materials characterization and segregation procedures to reduce the quantity of wastes to be handled as LLW by 61.5 cubic meters. Personal protective equipment was used, reused, and carefully segregated from hazardous materials, reducing the amount of PPE disposed as LLW by an estimated 492 cubic feet. Soil drill cuttings which were determined to be nonradioactive and nonhazardous were returned to the site and leveled following the contour of the land, and the drums which had contained this soil were sent to another restoration site to be reused.

Comments:
Included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount)	Amount/Year:
Mixed-LLW-Solid	2.10 m3/1994

Implementing CSO: DP

Activity Identification Method: T04

source reduction activity: W42
OR recycling activity:

Serial Number:

Status:

The LANL Nuclear Materials Technology organization switched to a non-hazardous paint stripper during CY 1994, eliminating an average annual generation of 10 55-gallon drums of Mixed-LLW. This material substitution was achieved at no additional cost.

Comments:
Included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount)	Amount/Year:
Mixed-LLW-Solid	6380 m3/1994

Implementing CSO: DP

Activity Identification Method: T04 source reduction activity: W52
OR recycling activity:

Serial Number:

Status:

The modified value engineering approach employed during the design of the CMR building upgrade project determined that certain Mixed-LLW contaminated ductwork and ventilation system components could be reused rather than sent to waste management. This no cost option avoided an estimated 8350 cubic yards of Mixed-LLW with an associated savings for DOE of $40M in avoided waste generation and management costs.

Comments:
included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount)	Amount/Year:
Mixed-LLW-Solid	1110 m3/1994

Implementing CSO: DP

Activity Identification Method: T04 source reduction activity: W19
OR recycling activity:

Serial Number:

Status:

The modified value engineering approach which was employed during the conceptual design of the CMR Building upgrades project avoided the generation of an estimated 6400 cubic yards of LLW and 8350 cubic yards of Mixed-LLW. Through avoiding the generation of these wastes, the project personnel also avoided an estimated 1450 cubic yards of secondary wastes necessary for packaging, transportation and disposal.

Comments:
included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount) Amount/Year:

Mixed-LLW-Solid 39.2 m3/1994

Implementing CSO: EM

Activity Identification Method: T04 source reduction activity: W19
OR recycling activity:

Serial Number:

Status:

It is estimated that a total of 196 55-gallon drums of potential Mixed-LLW have been avoided during Environmental Restoration field work at Technical Areas 16, 22, and 46, through the efforts of the primary subcontractor, ICF Kaiser. Total waste volume was reduced by an estimated 90% through waste characterization and segregation, control of and changes to decontamination procedures, replacement of disposal contamination control and personal protective equipment with reusable items, and control of materials introduced into exclusion zones.

Comments:
Included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: [Type and amount]	Amount/Year:
RCRA-regulated-Process Wastewater	757 m3/1994

Implementing CSO: DP

Activity Identification Method: T05 source reduction activity: W42
OR recycling activity:

Serial Number:

Status:

When a water line, storage tank, well, or other potable water structure is built or returned to service after maintenance, it must be disinfected. This typically involves contact for several hours with a high-strength chlorine solution, after which the solution must be discharged to the environment - but, new regulations effectively prohibit this practice. The chlorine solution must be neutralized by treatment with dechlorinating agents, but this results in the practical problem of how to accomplish this with large (thousands of gallons) quantities of chlorine solution.

The JCI Mechanical Utilities section designed a portable dechlorination unit mounted on a trailer. The concept was adapted from similar equipment in use in a municipality in Kentucky, with modifications for use in Los Alamos. A solution tank containing dechlorinating agent is mounted on trailer along with a dosing pump, hoses, and other tools to create a complete, self-contained unit. The Kentucky prototype cost about $9K; JCI personnel were able to fabricate the unit in-house, using available materials, for a total cost of only $3K. This equipment greatly increases the efficiency in dechlorinating operations, helps protect the environment, prevents human exposure to chlorine solution, and saves money.

Although this is a wastewater treatment operation, the changes made to the conduct of this operation are pollution prevention changes, particularly since the improvement significantly reduces the releases of chlorine into the environment.

Comments:
Included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount)	Amount/Year:
RCRA-regulated-Solid	9.00 mt/1994

Implementing CSO: DP

Activity Identification Method: T04 source reduction activity: W49
OR recycling activity:

Serial Number:

Status:

The Computing, Information and Communication organization at LANL has succeeded in reducing or eliminating most of the photo fixer and silver residues from their photo chemical process. The total waste minimization is about 450 gallons a year which used to require processing by the LANL Waste Management organization. Cost savings as a result of the $1K invested in this effort include about $2200/year in processing costs and $620/year in waste containment and transportation for the waste generating group as well as an estimated $1K per year in liquid waste treatment and solid waste disposal costs for the Waste Management Program.

Comments:
included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount)	Amount/Year:
RCRA-regulated-Solid	2.65 mt/1994

Implementing CSO: DP

Activity Identification Method: T04 source reduction activity: W42
OR recycling activity:

Serial Number:

Status:

Through materials substitution, LANL has reduced its annual tetrachloroethylene use from 6,000 pounds to only 158 pounds. This was accomplished at no additional cost and saves an estimated $312K annually in waste generation and management costs.

Comments:
Included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount)	Amount/Year:
RCRA-regulated-Solid	0.318 mt/1994

Implementing CSO: DP

Activity Identification Method: T04

Source reduction activity: W42
OR recycling activity:

Serial Number:

Status:

LANL heavy metals recovery operations formerly used hydrochloric acid which has now been replaced by a common solvent which is also continuously reused, rather than disposed. This has reduced the annual HCl use by 700 pounds and saved an estimated annual cost of $40K in waste generation and management costs.

Comments:
included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount)	Amount/Year:
RCRA-regulated-Solid	0.885 mt/1994

Implementing CSO: DP

Activity Identification Method: T05 source reduction activity: W42
OR recycling activity:

Serial Number:

Status:

Materials substitution has enabled LANL to reduce its annual trichloroethylene use from 2,200 pounds to 250 pounds, avoiding an estimated $104K in waste generation and waste management costs annually.

Comments:
Included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount]	Amount/Year:
RCRA-regulated-Solid	1.30 mt/1994

Implementing CSO: DP

Activity Identification Method: T05 source reduction activity: W51
OR recycling activity:

Serial Number:

Status:

A LANL organization designs, fabricates and assembles printed wiring boards which must meet NASA specifications for use in outer space. To achieve the required cleanliness level, 1,1,1 Trichloroethane was traditionally used at a rate of approximately 40 liters per month. Raw material purchase and disposal costs for this chemical were rising dramatically, prompting the organization to identify and procure a cleaning unit which uses alcohol as the cleansing agent in a closed cleaning cycle which does not require human intervention and uses a filter to extend the life of the alcohol indefinitely. The filter must be replaced annually. The unit was capable of cleaning 100% more boards per year than the old method. The unit has an indefinite life span with only minimal maintenance. Its cost was $20K. Waste generation has been reduced from about 250 liters per year to only 1 3-pound non-hazardous filter; in addition, air emissions from the evaporation of 1,1,1 Trichloroethane have been eliminated.

Comments:
Included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount)	Amount/Year:
RCRA-regulated-Solid	20.0 mt/1994.

Implementing CSO: DP

Activity Identification Method: T04 source reduction activity: W51
OR recycling activity:

Serial Number: -

Status:

JCI installed a centrifugal unit in a paint spray booth. This allowed the water to be reused within the process rather than generating a large volume of hazardous wastewater. Prior to the project's implementation, 21 55-gallon drums of this waste was generated annually. After implementation, annual waste generation is only 2 55-gallon drums. The total project investment was $700.

Comments:
Included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount)	Amount/Year:
RCRA-regulated-Solid	150 mt/1994

Implementing CSO: EM

Activity Identification Method: T05

Source reduction activity: W19
OR recycling activity:

Serial Number:

Status:

The Pollution Prevention Program Office intervened in the disposal of 150,000 kg of clean soils from Environmental Restoration project drill cuttings, avoiding disposal of these soils as RCRA waste by recommending their return to the site from which they were removed after being analyzed and found non-hazardous.

Comments:
included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount)	Amount/Year:
Sanitary-Solid	272 mt/1994

Implementing CSO: EM

Activity Identification Method: T04 source reduction activity: W58
OR recycling activity:

Serial Number:

Status:

Approximately 600,000 pounds of stainless and carbon steel were removed from the D&D of the technical area 35 phase separator pit project. Rather than sending the metal to disposal at the Los Alamos County Landfill, the project leader opted to crush and recycle the metal.

Comments:
Included above.

VI. Return on Investments Accomplishments

Waste/Pollutant Quantity Reduction:

Prevented Waste: (Type and amount)	Amount/Year:
TSCA-regulated-Solid	13.2 mt/1994

Implementing CSO: EM

Activity Identification Method: T05 source reduction activity: W13
OR recycling activity:

Serial Number:

Status:

The Pollution Prevention Program Office intervened in the disposal of machine tools as PCB-contaminated wastes, eliminating 13,150 kg through oil sampling and analysis. The oil sampling performed by the LANL P3O was able to confirm that the machine tools could be released for reuse or metal recycle rather than sent for PCB disposal. Without this intervention, the generator would have simply declared the tools "PCB-contaminated" and sent them for disposal.

Comments:
Included above.

VII. CSO Specific Information

CSO: DP
Summary Statement of Operational Status and its affect on Waste Generation.

Defense Programs (DP) is the landlord CSO for Los Alamos National Laboratory. According to the LANL Institutional Plan, DP funding accounts for 40% of the entire LANL budget and supports 20% of the LANL workforce. DP owns and operates a number of large facilities at LANL, including the Chemistry and Metallurgy Research (CMR) Building, the Sigma Complex, and the TA-55 Plutonium Facility, all three of which have been identified as major waste generating facilities needing focused Pollution Prevention Program support.

Also included in the wastes attributed to this CSO are wastes generated by all Work for Others (WFO) conducted at the Laboratory, all indirect overhead and G&A activities, and a small quantity of wastes for which a program of origin could not be identified. According to the LANL Institutional Plan, WFO funding provides 17% of the Laboratory budget and supports 8% of the LANL workforce. Indirect, overhead, G&A, LDRD, and support programs account for 51.3% of the workforce.

The breakdown, by waste type, of the origin of the wastes attributed to this CSO is as follows:

TRU and TRU-Mixed:	DP 100%	
LLW:	DP Routine	736.4 m3
	DP Non-Routine	1.2 m3
	Indirect/G&A Routine	674.9 m3
	Indirect/G&A Non-Routine	18.3 m3
	WFO Routine	7.0 m3
	WFO Non-Routine	1.7 m3
	Unknown Routine	27.7 m3
	Unknown Non-Routine	12.2 m3
LLW-Mixed:	DP Routine	17.4 m3
	DP Non-Routine	1.6 m3
	Indirect/G&A Routine	1.8 m3
	Indirect/G&A Non-Routine	4.9 m3
	WFO Routine	0.1 m3
	Unknown Routine	0.6 m3
	Unknown Non-Routine	0.3 m3
RCRA:	DP Routine	3897.9 kg
	DP Non-Routine	461.7 kg
	Indirect/G&A Routine	11341.2 kg
	Indirect/G&A Non-Routine	4046.6 kg
	WFO Routine	3555.8 kg
	WFO Non-Routine	1676.8 kg
	Unknown Routine	1118.7 kg
	Unknown Non-Routine	22.0 kg
State:	DP Routine	3512.2 kg
	DP Non-Routine	379.7 kg
	Indirect/G&A Routine	76208.0 kg
	Indirect/G&A Non-Routine	7617.6 kg
	WFO Routine	2139.9 kg
	WFO Non-Routine	33172.9 kg
	Unknown Routine	87344.5 kg
	Unknown Non-Routine	42772.4 kg

TSCA (Non-Routine):	DP	4510.5 kg
	Indirect/G&A	40173.9 kg
	WFO	104111.3 kg
	Unknown	3349.4 kg
TSCA-Mixed: (Non-Routine)	DP	3061.8 kg
	Indirect/G&A	544.3 kg
	WFO	8543.6 kg
	Unknown	18.1 kg

As landlord CSO, DP has also been attributed with both the wastes generated by and the WMin/PP accomplishments of, the major LANL support services subcontractor, Johnson Controls World Services, Inc. (JCI). This company has undertaken an aggressive waste minimization program and their major accomplishments are discussed below.

During the reporting period, significant programmatic changes have affected DP waste generation. At the CMR Building, a major, multi-year and multi-phased facility upgrade project began producing significant quantities of many types of wastes, particularly LLW. At the TA-55 Plutonium Facility, three events caused increases in waste generation: first, much of the computer equipment within the contaminated zones of building PF-4 was replaced causing the generation of increased LLW; second, TA-55 underwent a Defense Board audit and 11-week shutdown during which aggressive clean-up activities incurred increases in LLW, low-level mixed, and RCRA wastes; and third, TA-55 was part of a nation-wide Plutonium Vulnerability Assessment which addressed the needs to stabilize plutonium materials inventories for long-term materials (not waste) storage. This effort is still underway. Priorities required that gaseous plutonium be stabilized first, followed by aqueous, and finally solid plutonium residues. These efforts required significantly modified chemistry processes which generated increased LLW and RCRA wastes.

DP ACCOMPLISHMENTS NARRATIVE:
Information is provided in this section for DP activities about which insufficient information could be obtained to complete one of the CSO-Specific Return On Investment project status reports.

The Media Group is having a microfiche film processor retrofitted, to reduce the volume and toxicity of their photo wastes. It is anticipated that a 75% reduction in the total volume of regulated waste and the elimination of 242 gallons of chromium waste will be achieved annually.

The Photo-Video Group installed new equipment that will reduce their hazardous waste levels enough to allow their photo waste outfall to be removed from the NPDES Permit because their liquid wastes can now be released to the sanitary sewer.

The Electronic and Electrochemical Materials and Devices Group moved their chemical processing operations out of fume hoods and into glove boxes, eliminating stack releases of evaporated chemicals and solvents.

A modification to the incinerator at technical area 16, building 1480, included the installation of an HE-contaminated waste oil burner. This will eliminate the open burning of such oils under the existing Open Burn/Open Detonation permit.

An analysis of firing point debris from technical area 39 has eliminated the disposal of this waste at the on-site LLW disposal site. Waste metals and cables from this firing site will now be sold to scrap metal dealers rather than disposed as LLW.

A portable cover will be installed on the flash pad at technical area 16 which

is used to decontaminate HE-contaminated materials. The cover will eliminate storm-water run-off pollution from the pad.

A Versatec printer/plotter has been removed from the Central Computing Facility, eliminating the purchase and disposal of it combustible, kerosene-based toner.

The Nevada Test Site tower team eliminated the use of hazardous chemicals and the need for a satellite storage area by employing a magnetic particle tester for testing wedged sockets.

The number of radioactive sources used at technical area 18 were reduced in 1994; only those that supported programmatic need were retained. In addition, TA-18 shipped its inventory of uncoated uranium foils to the Y-12 plant for recovery, thereby eliminating a potential source of radioactive contamination.

TA-55 Pluconium Facility Efforts:
The LANL organizations which operate the technical area (TA-) 55 Plutonium Facility have committed to an aggressive waste minimization campaign. A strategic plan for this effort was published in February 1994 (LA-12751-MS), and in April 1994, a second document was published which provides overviews of waste minimization technologies and facility operations (LALP-93-92). Despite the importance of this facility to future DP programs, however, the FY95 DP funding to support the TA-55 waste minimization Strategic Plan was eliminated from the budget by DOE-DP Stockpile Support.

A drum compactor was procured and operating instructions for its use developed. The compactor was installed in the basement of TA-55 PF-4 to size reduce low-level waste items up to the size of an 83-gallon drum. Suitable items will be crushed to achieve a size reduction of one-fifth the original volume.

Non-compactible trash receptacles have been eliminated from TA 55 PF-4 laboratories. Such items have previously been packaged in 2 cubic foot cardboard boxes for landfill disposal; now, such items will be used to fill void space in larger LLW boxes. The increased packaging efficiency and elimination of the 2 cubic foot cardboard boxes is anticipated to reduce LLW disposal by 700 cubic feet per year.

Rather than continuing to change all fluorescent bulbs used in the facility annually, the bulbs in TA-55, PF-4 will now be changed on an as-needed basis. It is estimated that this will save about 144 cubic feet per year of wastes managed as Mixed-LLW.

Acid scrubbing has been the method traditionally used for cleaning plutonium contamination from oralloy parts. This generated acidic mixed wastes. A new electrolytic decontamination method is now used which has resulted in zero liquid waste generation and the volume of solid waste is only a few milliliters per part.

Johnson Controls World Services, Inc. (JCI) Efforts:
In 1992, JCI, the Laboratory's primary support services subcontractor, adopted a corporate goal of 50% waste reduction by the end of 1996. Their waste minimization database, also established in 1992, tracks waste generation and reduction and reports progress against their waste reduction goal on a quarterly basis. At the end of CY94, JCI has achieved a 44% reduction which equates to a total reduction of 2,995,000 pounds.

Using the LANL WMin/PP Employee Awards Program conducted by P30 as a model, JCI initiated a similar employee incentive program to motivate their employees to develop and implement WMin/PP ideas.

JCI phased-out the use of oil-based paints and all paints containing toluene.

JCI moved to using high-pressure, low-volume paint guns to improve paint transfer efficiencies, lower VOCs, and reduce paint usage and waste.

To reduce the cost of paper towel and cloth rag purchases and reduce the volume of waste sent to the landfill, JCI is implementing a contract for laundering of hazardous and non-hazardous cloth rags.

The JCI Utilities Department has eliminated the use of gaseous chlorine by substituting a Bromine-Chlorine granulated solid at the power plant. This is a more costly alternative, but has eliminated the potential for catastrophic release of chlorine gas and reduces employee health/safety risks.

Other examples of JCI-initiated material substitution at the power plant include replacing sulfuric acid with carbon dioxide to neutralize boiler blowdown water prior to release to the environment. Water demineralizers at the power plant which use sulfuric acid and sodium hydroxide were replaced by water softeners which use salt for water reconditioning. This eliminated the use of over 5,000 gallons of H_2SO_4 and 50,000 pounds of NAOH.

NEW WMIN/PP TECHNOLOGIES FROM DP:
This section provides a brief overview of WMin/PP technologies under development by DP researchers at LANL.

High-Gradient Magnetic Separation can be applied to soil decontamination, liquid waste treatment, underground storage tank waste treatment, and chemical processing residues concentration. Testing has shown this technology capable of removing 90% of plutonium oxides from simulated DOE site soils, and 99% of the plutonium influent sent to the LANL radioactive liquid waste treatment facility.

Hydride-Dehydride Recycle Process is a one-step, zero-waste method of recovering metallic plutonium from the thousands of nuclear weapons built during the Cold War. Such plutonium recovery is traditionally a multi-step process in which the plutonium was leached out with acids, isolated, converted to an oxide, and reduced to a metal; this process was not applicable to all weapons types and generates a large amount of mixed wastes. The entire hydride-rehydride process is contained within a 36-square foot glove box, not hazardous materials are released and worker exposure to radiation is significantly reduced.

Acoustic Resonance Spectroscopy is based upon the acoustic vibrations of an object which enables this LANL instrument to quickly and safely identify the fill content of chemical weapons or other containers holding toxic substances. Traditional methods of verifying the contents of chemical munitions require drilling a hole into the container and extracting a sample for analysis. Acoustic resonance spectroscopy is a noninvasive system that uses a sensor head with two transducers that attach magnetically to the container being tested, returning a result in less than one minute, eliminating the time-consuming drilling, potential contamination of the environment, and exposure of workers.

Table 4.0 CSO: DP Waste Generation.

Waste Type		Routine	Non Routine	Total	Process Wastewaters
High Level Waste	(L)	* m3	* m3	0 m3	
	(S)	* m3	* m3	0 m3	* m3
Transuranic Waste (TRU)	(L)	* m3	* m3	0 m3	
	(S)	50.8 m3	0 m3	50.8 m3	* m3
Mixed-TRU	(L)	0 m3	* m3	0 m3	
	(S)	14.2 m3	0 m3	14.2 m3	* m3
Low-Level Waste (LLW)	(L)	0 m3	0 m3	0 m3	
	(S)	1446 m3	33.4 m3	1480 m3	19700 m3
Mixed-LLW	(L)	* m3	* m3	0 m3	
	(S)	19.9 m3	6.83 m3	26.7 m3	* m3
RCRA Regulated		19.9 mt	6.21 mt	26.1 mt	* m3
State Regulated		169 mt	83.9 mt	253 mt	* m3
TSCA Regulated		* mt	152 mt	152 mt	* m3
Mixed-TSCA		* mt	12.2 mt	12.2 mt	* m3

VII. CSO Specific Information

CSO: EE
Summary Statement of Operational Status and its effect on Waste Generation.

Energy Efficiency (EE) funding represents 1% of the LANL budget and supports almost 1% of the workforce. This CSO supports programs in energy storage and distribution, electrical energy, transportation systems, geothermal and solar energy, and advanced industrial concepts.

Although this is the first Annual Report which attributes waste generation to this CSO, it is felt that this does not represent an increase in waste generating programmatic activity. Instead, improved data collection and reporting is probably responsible for identifying the wastes generated as a result of ongoing EE activities at LANL.

Table 4.1 CSO: EE Waste Generation.

Waste Type		Routine	Non Routine	Total	Process Wastewaters
High Level Waste	(L)	* m3	* m3	0 m3	
	(S)	* m3	* m3	0 m3	* m3
Transuranic Waste (TRU)	(L)	* m3	* m3	0 m3	
	(S)	0 m3	0 m3	0 m3	* m3
Mixed-TRU	(L)	0 m3	* m3	0 m3	
	(S)	0 m3	0 m3	0 m3	* m3
Low-Level Waste (LLW)	(L)	* m3	* m3	0 m3	
	(S)	0 m3	0 m3	0 m3	* m3
Mixed-LLW	(L)	* m3	* m3	0 m3	
	(S)	0 m3	0 m3	0 m3	* m3
RCRA Regulated		0.317 mt	0.062 mt	0.379 mt	* m3
State Regulated		0.184 mt	0.092 mt	0.276 mt	* m3
TSCA Regulated		* mt	0.447 mt	0.447 mt	* m3
Mixed-TSCA		* mt	0 mt	0 mt	* m3

VII. CSO Specific Information

CSO: EM
Summary Statement of Operational Status and its affect on Waste Generation.

Environmental Restoration and Waste Management (EM) funding represents about 20% of the total LANL budget and supports 7.3% of the LANL workforce. EM directly funds both the LANL Waste Management and the Site-Wide Pollution Prevention Programs as well as the significantly-increased activities due to Environmental Restoration and Decommissioning and Decontamination (D&D) projects.

Also attributed to this CSO is the small quantity of wastes generated by 2 CSOs which the Annual Report software program did not recognize: Environment, Safety and Health (EH) and Nonproliferation and National Security (NN). EH funding represents 0.2% of the LANL budget and supports 0.2% of the workforce. NN provides almost 8% of the LANL budget and supports 4.3% of the workforce. Although this is the first Annual Report which attributes wastes to these CSOs, it is believed that this does not represent an increase in programmatic activities. Instead, identification of this waste generation is probably due to improved data collection and reporting. In past Annual Reports, EH wastes were probably attributed to EM while NN wastes were most likely included in DP waste generation figures.

The breakdown of wastes, by CSO, from the totals attributed to EM, is as follows:

TRU-Mixed:	EM 100%	
LLW:	EM 100%	
LLW-Mixed:	EM 100%	
RCRA:	EM Routine	10808.7 kg
	EM Non-Routine Primary	96464.9 kg
	EM Non-Routine Secondary	41.7 kg
	EH Routine	4.5 kg
	NN Routine	197.8 kg
State:	EM Routine	64040.3 kg
	EM Non-Routine	484203.0 kg
	EH Routine	132.1 kg
	NN Routine	59.6 kg
TSCA:	EM 100%	
TSCA-Mixed:	EM 100%	

Major facilities or operations conducted by EM during the reporting period include radioactive liquid waste treatment operations (the source of the solid TRU-Mixed wastes attributed to EM), operations of the LANL hazardous and mixed waste storage and shipping facility, operations of the on-site TRU storage and LLW disposal facility, as well as the conduct of a steadily increasing number of Environmental Restoration and D&D projects.

EM funded Environmental Restoration and D&D projects are the cause of the overall increase in LANL waste generation this year as compared to CY 1993. Although routine wastes generated at LANL are down in almost every waste category, non-routine wastes have increased significantly. While there have been some waste avoidance successes within the Environmental Restoration/D&D Program, discussed in the EM Accomplishments section below, these are due to the personal initiative of a few project leaders rather than to the adoption and promotion of specific waste reduction goals or the routine incorporation of WMin/PP methods

into the remediation process. The major barrier to institutionalization of WMin/PP actions within Environmental Restoration/D&D is the perception that the DOE customer does not support the time, manpower, and expense that is often associated with recycling/reusing/releasing materials as compared to waste disposal.

EM ACCOMPLISHMENTS NARRATIVE:
Information is provided in this section for EM activities about which insufficient information could be obtained to complete one of the CSO-Specific Return On Investment project status reports.

A description of the activities and accomplishments of the EM-funded Site-Wide Pollution Prevention Program is provided in Section V, Site-Wide WMin Accomplishments.

LANL has been collaborating with the Hanford site to remediate their high-level waste tanks. As part of this effort, LANL has developed a hydrothermal processing pilot plant that effectively removed organics and nitrates from Hanford tank waste.

Cancellation of certain construction projects planned for FY96-97 at Waste Management facilities which have been deemed not absolutely necessary will reduce construction waste and debris.

The LANL Waste Management Program obtained NEPA approval to install and operate a super-compactor at the LLW disposal facility. This device is expected to achieve volume reductions of 25-25% in the overall volume of LLW diposed in the on-site landfill.

The Waste Management Program is reducing the total size of the Radiation Control Area at the LLW disposal facility by 85%, decreasing the amount of potential LLW generated by operations at the facility.

TCLP tests conducted on leaded glovebox gloves used in plutonium-238 operations enabled the gloves to be properly classified as a TRU waste, rather than a mixed waste.

Utilizing special funding provided by EM-334, LANL researchers will modify a commercially-available high pressure water decontamination system for application to contaminated glove boxes. It is expected that this technique will reduce the contamination level of decommissioned gloveboxes to allow for their disposal as LLW.

EM-334 funding also supported research performed at the LANL radioactive liquid waste treatment facility by P30 personnel. This effort included the identification and bench-scale testing of alternative liquid waste processing technologies intended to reduce the quantity of solid secondary wastes generated by this plant.

EM-334 funding supported the development and pilot-testing of procedural changes designed to reduce waste generation from Radioactive Material Management Areas. Results of these trials will be presented to the LANL RMMA Advisory Board for possible incorporation into an overall LANL RMMA Program Plan.

Environmental Restoration/D&D Activities:
Energy dispersive x-ray fluorescence (EDXRF) and TCLP analysis methods were used to segregate lead-contaminated soils generated in the remediation of technical area 40 prior to disposal. So far, these methods have reduced the quantity of soil managed as hazardous waste by 80 percent.

A remediation project at technical area 39 incorporated segregation of personal

protective equipment to allow for its reuse in similarly-contaminated areas and proper classification of the items when they are disposed. Another practice utilized at this site was returning drill cuttings to their respective drill holes, reducing the quantity of soil handled as waste.

WMin/PP techniques employed at the technical area 21 D&D project avoided 450 cubic yards of LLW during CY94, including concrete, building debris, and equipment.

One of the major field support contractors to the LANL Environmental Restoration project is ICF Kaiser Engineers. This company's field teams were particularly aggressive in employing WMin/PP techniques in their 1994 field operations, including limiting materials brought into exclusion zones, limitation of personnel in sampling operations, use of reusable protective equipment and gear, incorporating improvements in decontamination techniques, and implementing materials segregation procedures.

Ground penetrating radar was used to determine that numerous underground utility lines obstructed removal of an underground storage tank. Since significant excavation would be required, generating a large amount of waste, and investigation of site history indicated a low probability the tank was ever used, the decision was made not to disturb the site.

Of more than 2000 LANL sites being investigated for potential contamination, 932 have been taken off the books, including nearly 300 designated as requiring no further action in 1994 alone. This was achieved through investigation of site history, sampling and analysis, and/or site remediation.

During 1994, several Environmental Restoration project leaders utilized project funding to support LANL research and development of soil washing technologies applicable to LANL restoration needs. This support has identified and tested a number of soil washing techniques, although none have been applied to a LANL project yet as the cost of on-site disposal of low-level contaminated soils is much less expensive than any treatment process yet identified for these soils.

NEW WMIN/PP TECHNOLOGIES FROM EM:
Polymer Filtration to recover metals such as zinc, nickel and silver from electroplating or photo-processing wastewaters has been developed by LANL researchers and personnel from Boeing Defense and Space Group. The system has two elements: special, water-soluble polymers that bind selectively with metal ions, and a compact pumping and ultrafiltration apparatus that puts the polymers in contact with the waste-stream and performs the separation. A test-scale version of the Polymer Filtration System was utilized in process optimization studies performed by P30 personnel at the LANL radioactive liquid waste treatment facility.

Table 4.2 CSO: EM Waste Generation.

Waste Type		Routine	Non Routine	Total	Process Wastewaters
High Level Waste	(L)	* m3	* m3	0 m3	
	(S)	* m3	* m3	0 m3	* m3
Transuranic Waste (TRU)	(L)	* m3	* m3	0 m3	
	(S)	0 m3	- 0 m3	0 m3	* m3
Mixed-TRU	(L)	0 m3	* m3	0 m3	
	(S)	3.00 m3	0 m3	3.00 m3	* m3
Low-Level Waste (LLW)	(L)	* m3	* m3	0 m3	
	(S)	239 m3	1030 m3	1270 m3	* m3
Mixed-LLW	(L)	* m3	* m3	0 m3	
	(S)	4.40 m3	44.6 m3	49.0 m3	* m3
RCRA Regulated		11.0 mt	96.5 mt	108 mt	* m3
State Regulated		64.2 mt	484 mt	548 mt	* m3
TSCA Regulated		* mt	17.1 mt	17.1 mt	* m3
Mixed-TSCA		* mt	35.9 mt	35.9 mt	* m3

VII. CSO Specific Information

CSO: ER
Summary Statement of Operational Status and its affect on Waste Generation.

Energy Research (ER) funding accounts for 9% of the total LANL budget and supports about 5% of the workforce. Programs conducted by the Los Alamos Neutron Scattering Center (LANSCE) and the Los Alamos ER Program Office fall principally in the business area of science and technology, although these programs make significant contributions to industrial competitiveness, energy resources, and national security. ER activities contribute to a wide spectrum of fundamental and strategic research in areas such as materials science, high-performance computing, and bioscience. LANSCE is a major user facility for neutron research and applications supporting research by scientists from academia, industry, and other federal laboratories.

The LAMPF/LANSCE facility at TA-53 has been identified as a major source of waste generation requiring focused Pollution Prevention Program attention. During the reporting period, the facility successfully maintained one of its highest-powered, and longest-lived runs yet achieved. Waste streams from the facility run from activitated solids, to liquid wastes, to air emissions; in fact, this facility is the single most significant source of radioactive air emission at LANL. During the reporting period, a delay line was designed and construction was initiated. It is anticipated that, by holding air emissions for 100 minutes prior to release, enough decay of the short-lived isotopes will occur to reduce total LANL air emissions by one-third. In addition, facility personnel have undertaken the task of making the various buildings within the large site more air-tight to reduce diffuse emissions.

Also during the reporting period, an assessment was performed which examined the current method of using and discarding cooling water which is needed for various purposes within the facility. The current method of releasing the water to on-site lagoons for storage, isotope decay, and evaporation has been identified as a waste of water and a potential hazard. Facility personnel collaborated with an engineering firm to design a closed system which continuously recycles the cooling water. The lagoons have also been identified as requiring removal and remediation. An ROI Proposal for implementing the closed water recycling system, thus eliminating water release to the lagoons, was developed with the assistance of the Pollution Prevention Program and submitted in July 1995 for DOE funding consideration in Round 2 of the WMin/PP High Return on Investment program.

Other WMin/PP efforts implemented within the LAMPF facility include the replacement of ethanol with a non-hazardous solvent for ion pump cleaning in building MPF-2, the establishment of a clean lead storage area to provide for recycling/reuse and reduce the amount of lead disposed as a hazardous waste, and the replacement of all LSA radioactive dumpsters at the site with approved DOT shipping containers thus eliminating the current use of 2 cubic foot cardboard boxes as waste packaging. Also, during 1994, the LANSCE operations purchased a new FAX machine, reducing waste output, the cost per page, and the cost per call. Both the drum and the toner cartridge for the new FAX can be recycled, paper is conserved as the FAX automatically reduces page sizes printed using higher resolution printing, and phone call costs are reduced by the 5-fold increase in FAX data and printing speed.

Another ER-funded program, the LANL Medical Radioisotope Production Program, published a paper regarding their waste minimization efforts which significantly increased their isotope production efficiencies while eliminating mixed waste production and reducing the generation of other waste types. Many of these activities were discussed in the 1993 Annual Report.

Table 4.3 CSO: ER Waste Generation.

Waste Type		Routine	Non Routine	Total	Process Wastewaters
High Level Waste	(L)	* m3	* m3	0 m3	
	(S)	* m3	* m3	0 m3	* m3
Transuranic Waste (TRU)	(L)	* m3	* m3	0 m3	
	(S)	* m3	* m3	0 m3	* m3
Mixed-TRU	(L)	* m3	* m3	0 m3	
	(S)	0 m3	* m3	0 m3	* m3
Low-Level Waste (LLW)	(L)	* m3	* m3	0 m3	
	(S)	47.3 m3	0 m3	47.3 m3	* m3
Mixed-LLW	(L)	* m3	* m3	0 m3	
	(S)	0.030 m3	0 m3	0.030 m3	* m3
RCRA Regulated		0.982 mt	0.062 mt	1.04 mt	* m3
State Regulated		1.13 mt	0.156 mt	1.29 mt	* m3
TSCA Regulated		* mt	0 mt	0 mt	* m3
Mixed-TSCA		* mt	0 mt	0 mt	* m3

VII. CSO Specific Information

CSO: FE
Summary Statement of Operational Status and its effect on Waste Generation.

Fossil Energy (FE) funding provides for 0.6% of the LANL budget and supports 0.1% of the workforce. LANL teams with Lawrence Berkeley and Lawrence Livermore national laboratories, as well as Sandia National Laboratory, in FE-funded programs in coal and petroleum research. These research and development programs are frequently guided by domestic industry and costs of projects are shared with industry collaborators. FE research exploits LANL strengths in geophysics, seismic wave propagation, downhole instrumentation, computer modeling, advanced materials development, process chemistry, and fossil energy engineering.

FE activities at LANL have remained fairly stable since the last Annual Report.

Table 4.4 CSO: FE Waste Generation.

Waste Type		Routine	Non Routine	Total	Process Wastewaters
High Level Waste	(L)	* m3	* m3	0 m3	
	(S)	* m3	* m3	0 m3	* m3
Transuranic Waste (TRU)	(L)	* m3	* m3	0 m3	
	(S)	* m3	* m3	0 m3	* m3
Mixed-TRU	(L)	* m3	* m3	0 m3	
	(S)	* m3	* m3	0 m3	* m3
Low-Level Waste (LLW)	(L)	* m3	* m3	0 m3	
	(S)	0 m3	0 m3	0 m3	* m3
Mixed-LLW	(L)	* m3	* m3	0 m3	
	(S)	0 m3	0 m3	0 m3	* m3
RCRA Regulated		0.079 mt	0 mt	0.079 mt	* m3
State Regulated		0.069 mt	0 mt	0.069 mt	* m3
TSCA Regulated		* mt	0 mt	0 mt	* m3
Mixed-TSCA		* mt	0 mt	0 mt	* m3

VII. CSO Specific Information

CSO: NE
Summary Statement of Operational Status and its affect on Waste Generation.

Nuclear Energy (NE) funding represents about 1.3% of the LANL budget and supports 0.7% of the workforce. NE funding supports Laboratory programs in nuclear energy research and development and remedial action. Elements in the nuclear energy research and development program primarily include space and defense power systems and radioisotope heat sources. NE funding also supports LANL review and evaluation of Complex uranium enrichment facilities for compliance with DOE Orders and commercial standards, as well as various LANL criticality safety programs.

NE programmatic activities at LANL have remained fairly stable since the last Annual Report.

Table 4.5 CSO: NE Waste Generation.

Waste Type		Routine	Non Routine	Total	Process Wastewaters
High Level Waste	(L)	* m3	* m3	0 m3	
	(S)	* m3	* m3	0 m3	* m3
Transuranic Waste (TRU)	(L)	* m3	* m3	0 m3	
	(S)	16.0 m3	0 m3	16.0 m3	* m3
Mixed-TRU	(L)	0 m3	* m3	0 m3	
	(S)	0 m3	0 m3	0 m3	* m3
Low-Level Waste (LLW)	(L)	* m3	* m3	0 m3	
	(S)	19.8 m3	0 m3	19.8 m3	* m3
Mixed-LLW	(L)	* m3	* m3	0 m3	
	(S)	0 m3	0 m3	0 m3	* m3
RCRA Regulated		0.477 mt	0 mt	0.477 mt	* m3
State Regulated		0 mt	0.036 mt	0.036 mt	* m3
TSCA Regulated		* mt	0 mt	0 mt	* m3
Mixed-TSCA		* mt	0 mt	0 mt	* m3

VII. CSO Specific Information

CSO: RW
Summary Statement of Operational Status and its affect on Waste Generation.

Civilian Radioactive Waste Management (RW) funding represents about 1.4% of the LANL budget and supports about 0.7% of the workforce. RW funding has supported LANL involvement in the Yucca Mountain Project (YMP) which is evaluating the suitability of the Yucca Mountain site, adjacent to the Nevada Test Site, as a commercial nuclear waste repository. The Laboratory is responsible for characterizing geochemical and mineralogical aspects that can contribute to waste isolation at Yucca Mountain.

Although this is the first year that wastes have been attributed to RW activities at LANL, it is believed that this does not represent an increase in waste generating programmatic activities since the last Annual Report. Instead, identification of RW as the source of these wastes is probably due to improved data collection and reporting. In the past, RW program wastes were probably erroneously attributed to NE.

Table 4.6 CSO: RW Waste Generation.

Waste Type		Routine	Non Routine	Total	Process Wastewaters
High Level Waste	(L)	* m3	* m3	0 m3	
	(S)	* m3	* m3	0 m3	* m3
Transuranic Waste (TRU)	(L)	* m3	* m3	0 m3	
	(S)	0 m3	0 m3	0 m3	* m3
Mixed-TRU	(L)	0 m3	* m3	0 m3	
	(S)	0 m3	0 m3	0 m3	* m3
Low-Level Waste (LLW)	(L)	* m3	* m3	0 m3	
	(S)	2.04 m3	8.04 m3	10.1 m3	* m3
Mixed-LLW	(L)	* m3	* m3	0 m3	
	(S)	0 m3	0 m3	0 m3	* m3
RCRA Regulated		0.068 mt	0 mt	0.068 mt	* m3
State Regulated		0.026 mt	0.003 mt	0.029 mt	* m3
TSCA Regulated		* mt	0 mt	0 mt	* m3
Mixed-TSCA		* mt	0 mt	0 mt	* m3

Summary of Information from Site Waste Minimization and Pollution Prevention (WMIN/PP) Awareness Plan

The following information is based on the May 1994 update to the Site-wide Waste Minimization and Pollution Prevention Awareness Plan. All information has been taken directly from the plan (the appropriate sections are listed in brackets [] refer to the Plan Suggested Outline contained in guidance issued by Deputy Secretary White on March 28, 1994).

I. Site-wide Quantitative Goals for Newly Generated Wastes*
[Section IV, Goals]

Waste Type	1993	1994	1995	1996	1997	1998	1999	2000
HEW	0 m3	0 m3	0 m3	0 m3	0 m3	0 m3	0 m3	0 m3
LLW	2600 m3	-131.800 m3	0 m3	0 m3	0 m3	0 m3	0 m3	50 %
TRU	63.6 m3	-13.300 m3	0 m3	0 m3	0 m3	0 m3	0 m3	50 %
Mixed-TRU	365 m3	238 m3	0 m3	0 m3	0 m3	0 m3	0 m3	30 %
Mixed-LLW	-76.810 m3	-151.460 m3	0 m3	0 m3	0 m3	0 m3	0 m3	50 %
Mixed-TSCA	-48.100 m3	-98.100 m3	0 m3	0 m3	0 m3	0 m3	0 m3	0 m3
RCRA Haz **	84.1 mt	0.000 mt	0 mt	0 mt	0 mt	0 mt	0 mt	50 %
State Haz **	180 mt	0.000 mt	0 mt	0 mt	0 mt	0 mt	0 mt	0 mt
TSCA Haz **	12% mg	0.000 mg	0 mg	0 mg	0 mg	0 mg	0 mg	0 mg
Sanitary **	8180 mt	-560.000 mt	0 mt	0 mt	0 mt	0 mt	0 mt	25 %

II. Narrative on Qualitative Goals for Restoration and D&D Activities. [Section IV. Goals - see Table 1]

The level of Environmental Restoration and D&D activities at LANL is increasing steadily. Although the Environmental Restoration Program did establish an action plan in 1994 which has a small section regarding waste minimization, no definitive goals for waste avoidance have been adopted by the LANL Environmental Restoration/D&D programs, no formalized methodology for incorporating WMin/PP into either the planning of projects or the conduct of field work has been implementated, and Environmental Restoration/D&D management personnel do not feel it is their responsibility to implement waste avoidance actions. The few waste avoidance successes which have been achieved are the result of the personal initiative of a few individual project leaders rather than the institutionalization of WMin/PP within the Environmental Restoration/D&D process. The major barrier to more effective and widespread incorporation of WMin/PP into the conduct of remediation projects is the perception that the additional manpower, time, and cost required to divert materials from disposal is NOT SUPPORTED by the DOE customer.

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*/ Newly Generated Waste = Routine, ongoing production operations and research and development.
**/ Separate source reduction and recycling goals have been included.

Summary of Information from Site Waste Minimization and Pollution Prevention (WMIN/PP) Awareness Plan

III. Pollution Prevention Opportunity Assessment Goals:
[Section IV. Goals - see Table 1]

Completed as of the end of CY 1994:	34
Number planned for CY 1995:	50
Number planned for CY 1996:	0
Number planned for CY 1997:	0
Number planned for CY 1998:	0
Number planned for CY 1999:	0
Number planned for CY 2000:	0

IV. WMin/PP Program Budget for Site: (by Fiscal Year)
[Section V. - WMin/PP Activities and Resource Requirements]

A. Total WMIN/PP budget:	TOTAL OPERATING	TOTAL CAPITAL	TOTAL SITE
1995	$ 880K	$ 0	$ 880
1996	$ 12M	$ 3M	$ 15M
1997	$ 14M	$ 4M	$ 18M
1998	$ 15M	$ 5M	$ 20M
1999	$ 15M	$ 5M	$ 20M
2000	$ 12M	$ 3M	$ 15M
2001	$ 8M	$ 2M	$ 10M

[Section V. - see Table 2, item 5]

B. Total Budget for PPOAs:

1995	$ 0	1999	$ 400K
1996	$ 200K	2000	$ 200K
1997	$ 200K	2001	$ 200K
1998	$ 300K		

Site-wide Resources ($) Needed for Key Programmatic Elements:

C. Implement Source Reduction Opportunities for:

	FY 1995	1996	1997	1998	1999	2000	2001
Hazar	$ 0	1,400K	1,800K	2,800K	2,800K	1,400K	900K
Radio	$ 0	3,400K	6,000K	6,900K	7,300K	4,400K	3,400K
Mixed	$ 0	1,000K	1,000K	1,000K	500K	0	0

D. Implement Recycling Opportunities for:

	FY 1995	1996	1997	1998	1999	2000	2001
Hazar	$ 0	3,250K	3,250K	3,300K	3,400K	3,500K	2,500K
Radio	$ 0	5,250K	5,250K	5,400K	5,400K	5,500K	3,000K
Mixed	$ 0	0	0	0	0	0	0

E. Implement Source Reduction and Recycling Opportunities for Sanitary Wastestreams

FY 1995	1996	1997	1998	1999	2000	2001
$ DD	500K	500K	300K	200K	0	0

Summary of Information from Site Waste Minimization and Pollution Prevention (WMIN/PP) Awareness Plan

V. Narrative on Overall Program Status/Evaluation:
[Section VII. Program Status - see Table 2, item 9]

The Site Pollution Prevention Awareness Plan submitted in May 1994 for LANL does not reflect current program priorities or activities. The Plan is currently being revised. The budget requirements shown in Section IV represent the required funding level to achieve the waste reduction goals in the revised plan.

There is only one recognized funding mechanism for obtaining WMin/PP funding at LANL. This is the funding received from EM-30 to support the conduct of Site-Wide Pollution Prevention program elements through the EM Five Year Plan, Waste Management Program Baseline. The funding received through this mechanism is suffering severe decreases. For instance, the funding identified to support the Site-Wide Pollution Prevention Program in FY95 is only $880K - a 32% DECREASE from the previous FY. There is no other routinely-available funding mechanism to obtain WMin/PP implementation funding.

Although LANL submits a Pollution Prevention Program ADS through the ES&H Management Plan every year, no funding has ever been received through this mechanism.

VI. Optional Reduction Goals for Process Wastewater:
[Section IV. Goals - see Table 1]

Waste Type	1993	1994	1995	1996	1997	1998	1999	2000
Radioactive	0 m3	%	%	%	%	%	%	%
Mixed	0 m3	%	%	%	%	%	%	%
Hazardous	0 m3	%	%	%	%	%	%	%
Sanitary	0 m3	%	%	%	%	%	%	%

Appendix (optional)