

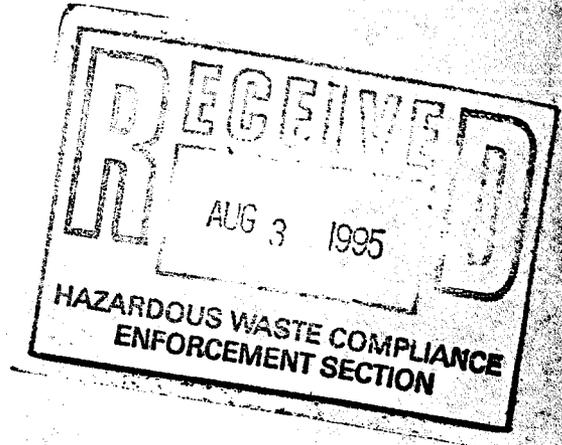


**Department of Energy**  
Field Office, Albuquerque  
Los Alamos Area Office  
Los Alamos, New Mexico 87544

JUL 27 1995

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Dr. Joel Dougherty  
Air and Waste Management Division  
U. S. Environmental Protection Agency  
Region 6  
1445 Ross Avenue  
Dallas, TX 75202-2733



Dear Dr. Dougherty:

**Subject:** Delivery of the Final Federal Facility Compliance Agreement (FFCA) Annual Report; Annual Action Plan for Off-Site Shipment; and Waste Minimization Annual Work Plan; FFCA Milestones AR-100, OSS-200, WM-200

This letter formally transmits the above-referenced documents. The Department of Energy's (DOE) submittal of these deliverables to the Environmental Protection Agency (EPA) is required to ensure compliance with milestones contained in the FFCA. This FFCA addresses hazardous and Low-Level Radioactive Mixed Wastes (LLMW) pursuant to the Resource Conservation and Recovery Act. The FFCA specified a due date for this milestone of July 30, 1995.

Draft comments from EPA were incorporated in these documents to the extent possible, as we discussed by conference call with EPA on July 12, 1995. As agreed with EPA, their other comments will be addressed under separate cover following our receipt of EPA's final letter.

Several issues are highlighted. First, revisions to the waste volume tables in Appendix A of AR-100 are proposed to parallel the Proposed Site Treatment Plan delivered to the New Mexico Environment Department (NMED) in March 1995, for ease of transition. Our intention is to provide as much consistency as possible in waste volume data, and treatment status and schedules, with the information expected to be in the Site Treatment Plan (STP) once it is incorporated into a compliance order by NMED later this year pursuant to the Federal Facilities Compliance Act. Second, discussions of the Controlled Air Incinerator, the Hazardous Waste Treatment Facility, on-site processing of lead, and off-site shipment of LLMW have been structured to reflect the current status of milestones regarding these activities and facilities, recognizing that their status may change under the STP compliance order.

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JUL 27 1995

Dr. Joel Dougherty

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Supporting documentation will be retained in DOE and Los Alamos National Laboratory files to support the FFCA, and will be made available to EPA and NMED upon request.

If you have any questions regarding this activity, please contact Jon Mack of my staff at (505) 665-5026, or Jody Plum of my staff at (505) 665-5042.

Sincerely,

*Bonnie E. Johnson for Joseph C. Vozella*

Joseph C. Vozella  
Assistant Area Manager  
Office of Environment and Projects

LAAMEP:7HJP-002

**Enclosures**

cc w/enclosures:

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**LIBRARY COPY**

**AR 100  
FY95 ANNUAL REPORT**

**FINAL**

July 30, 1995

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

Los Alamos Area Office  
U. S. Department of Energy  
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## PREFACE

This *Annual Report* (AR 100) is being submitted to the U.S. Environmental Protection Agency (EPA) by the U.S. Department of Energy (DOE) and Los Alamos National Laboratory (LANL) in fulfillment of DOE's commitment to EPA under the Federal Facilities Compliance Agreement (FFCA) developed pursuant to the Land Disposal Restrictions (LDR) requirements of the Resource Conservation and Recovery Act (RCRA), as promulgated in 40 CFR Part 268. This report is provided in compliance with Milestone AR 100 in Appendix B of the FFCA. This *Annual Report* details and evaluates LANL's success in implementing and accomplishing the goals and requirements of the FFCA from August 1994 to July 1995.

The annual report discusses the following elements:

- The annual update of Attachment A of Appendix B of the FFCA (as specified in section II. A. 1 of Appendix B of the FFCA)
- The current status of the implementation of the *FY95 Waste Minimization Annual Work Plan* and the accomplishment of its goals (as specified in Section II. C. 1. d of Appendix B of the FFCA)
- The current status and evaluation of the availability and/or applicability of off-site treatment of low-level mixed waste (LLMW) (as specified in Section II. D. 1 of Appendix B of the FFCA)
- The status of skid development, design, and construction, with progress measured against ATS 100, the *Program Management Plan for Generic Skid Design* (as specified in Section II. D. 3 of Appendix B of the FFCA)

Another three sections were added to this report to facilitate the readers' understanding of all FFCA requirements at LANL. These sections are not spelled out in the agreement as a requirement and are provided for informational purposes only. The first of these documents LANL's progress toward meeting all other FFCA milestones (section 5.0). The second (Appendix B) is a table of all LDR FFCA milestones and the nature of their interrelationships. The third is additional pollution prevention information (Appendix C).

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

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

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## LIST OF ACRONYMS AND ABBREVIATIONS

ACIS	Automated Chemical Inventory Systems
ALARA	As Low As Reasonably Achievable
ATLAS	Advanced Testing Line for Actinide Separations
BAT	Best Available Technology
BDAT	Best Demonstrated Available Technology
BEJ	Best Engineering Judgment
BIF	Boiler and Industrial Furnace
BUS	Business Operations
CAI	Controlled-Air Incinerator
CAMs	Continuous Air Monitor
CFC	Chlorofluorocarbon Solvents
CFR	Code of Federal Regulations
CLS	Analytical Chemistry Group
CMR	Chemistry and Metallurgy Research
CST	Chemical Science and Technology
CWM	Chemical Waste Management, Inc.
CWDR	Chemical Waste Disposal Request
CY	Calendar Year
D&D	Decontamination and Decommission
DOE	U.S. Department of Energy
DOE/AL	DOE Albuquerque Operations Office
DOT	U.S. Department of Transportation
DSSI	Diversified Scientific Services, Inc.
DX	Dynamic Experimentation
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ERC	Earth Resources Corporation
ES&H	Environment, Safety, And Health
FERC	Federal Energy Regulatory Commission
FFCA	Federal Facility Compliance Agreement
FHA	Fire Hazard Analysis
FY	Fiscal Year
GCP	Gas Cylinder Project
GSA	General Services Administration
HEPA	High Efficiency Particulate Air
HSWA	Hazardous and Solid Waste Amendments
HWFP	Hazardous Waste Facility Permit
HWTF	Hazardous Waste Treatment Facility
ICP	Inductively Coupled Plasma
IPA	Isopropyl Alcohol
IPO	Industrial Partnership Office
JCI	Johnson Controls Incorporated
KOP	Knowledge of Process
LAMPF	Los Alamos Meson Physics Facility
LANL	Los Alamos National Laboratory
LAO	LANL Assessment Office
LDR	Land Disposal Restrictions
LLMW	Low-Level Mixed Waste
LLW	Low-Level (Radioactive) Waste

## LIST OF ACRONYMS AND ABBREVIATIONS

(Continued)

LP	Laboratory Procedure
MSC	Material Substitution Committee
MSDS	Material Safety Data Sheets
MST	Materials Science and Technology
MWRSF	Mixed Waste Receiving and Storage Facility
NEPA	National Environmental Policy Act
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NMED	New Mexico Environment Department
NMT	Nuclear Materials Technology
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
P <sup>2</sup> /WMin	Pollution Prevention and Waste Minimization
P <sup>3</sup> O	Pollution Prevention Program Office
PCB	Polychlorinated Biphenyls
PHA	Preliminary Hazard Analysis
PPAC	Pollution Prevention Awareness Campaign
PPOA	Pollution Prevention Opportunity Assessment
PRD	Program Required Document
PSTP	Proposed Site Treatment Plan
PTS	Project Tracking System
PWA	Process Waste Assessment
QA	Quality Assurance
QAP	Quality Assurance Plan
RCRA	Resource Conservation and Recovery Act
R&D	Research and Development
R&M	Redistribution and Marketing Center
RES	Rollins Environmental Services
RMMA	Radioactive Material Management Area
ROD	Record of Decision
RSWD	Radioactive Solid Waste Disposal Record
SOP	Safe Operating Procedure
SSP	Site Specific Plan
SWDA	Solid Waste Disposal Act
SWEIS	Site Wide Environmental Impact Statement
TA	Technical Area
TCLP	Toxicity Characteristic Leaching Procedure
Title I	Preliminary Design Summary Report
Title II	Definitive Design
Title III	Final Design
TRU	Transuranic
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage, and Disposal Facility
UBC	Uniform Building Code
UL	Underwriters Laboratories
ULISSES	Uranium Line for Special Separation Sciences
VE	Value Engineering
WAC	Waste Acceptance Criteria
WBS	Work Breakdown Structure

**LIST OF ACRONYMS AND ABBREVIATIONS**  
(Continued)

WIPP	Waste Isolation Pilot Plant
WMC	Waste Management Coordinator
WPF	Waste Profile Form

**AR 100**  
**FY94 ANNUAL REPORT**

**1.0 INTRODUCTION**

This *Annual Report* (AR 100) details and evaluates Los Alamos National Laboratory's (LANL's) success in implementing and accomplishing the goals and requirements of the Federal Facilities Compliance Agreement (FFCA) from August 1994 to July 1995. This *Annual Report* follows the format outlined in the FFCA and used previously. "Waste Minimization and Pollution Prevention," Section 2.0, documents the implementation of the *Fiscal Year (FY) 95 Waste Minimization Annual Work Plan* and accomplishment of its goals. "Off-Site Treatment," Section 3.0, documents and updates the status of off-site facilities capable of and available for treatment of LANL's low-level mixed waste (LLMW). "Treatment Skids," Section 4.0, details skid development progress. "Status of Other FFCA Milestones," Section 5.0, is not required as part of AR 100 by the FFCA, but is provided to document the progress of other FFCA milestones.

The annual update of Attachment A of Appendix B of the FFCA is provided as Appendix A of this report. It is proposed that the summary tables prepared for LANL's site treatment plan required by the Federal Facilities Compliance Act replace the appropriate tables in Attachment A of the FFCA. It documents and updates waste types, estimated volume, category, waste codes, and other information that was reported in the original Attachment A of Appendix B of the FFCA. Appendix B summarizes the interrelationships among the FFCA milestones. Appendix C provides additional pollution prevention information.

The focus of certain FFCA activities have been redirected in accordance with new regulatory requirements that are being put in place and because of the reductions in DOE operating budgets. These changes are spelled out in detail in the sections in which they apply. The DOE, and consequently LANL, are required by section 3021(b) of RCRA, as amended by the Federal Facilities Compliance Act, to prepare site treatment plans describing the development of treatment capacities and technologies for treating mixed waste. DOE/AL has prepared the *Albuquerque Mixed Waste Treatment Plan*, a comprehensive plan covering treatment of all LLMW generated at the DOE/AL complex. The *Albuquerque Mixed Waste Treatment Plan*, together with the FFCA, formed the basis of LANL's Proposed Site Treatment Plan (PSTP) delivered to the New Mexico Environment Department (NMED) in March of 1995. The termination of the FFCA between the DOE and the EPA will occur when the State of New Mexico issues an order requiring DOE compliance with LANL's plan for treatment of mixed waste (per Section XV of the FFCA). In the event that the FFCA does not terminate in FY96, the DOE will continue to fulfill all of the requirements as stated in the FFCA.

**2.0 WASTE MINIMIZATION AND POLLUTION PREVENTION**

This section details and evaluates the success of the LANL Pollution Prevention Program (formerly Waste Minimization Program) in implementing and accomplishing the goals of the *Waste Minimization Plan* (WM 100) and the *FY95 Waste Minimization Annual Work Plan* (WM 200) for mixed and hazardous waste at LANL during FY95. The *Waste Minimization Plan* and *FY95 Waste Minimization Annual Work Plan* were transmitted to the U.S. Environmental Protection Agency (EPA) in fulfillment of Milestone WM 100 and WM 200 respectively of the FFCA. The first *Annual Report* (AR 100), submitted on April 14, 1994, outlined the process used to analyze waste generation problems, identified possible solutions, discussed the support efforts that augment the basic program, and addressed proposed funding solutions to facilitate the implementation of the program's goals. The second *Annual Report* submitted on July 28, 1994, detailed the specific waste minimization actions that occurred from April to July in 1994. LANL has received draft comments from EPA on this report. They are being addressed herein and in a separate transmittal.

This third *Annual Report* details the specific pollution prevention and waste minimization (P<sup>2</sup>/WMin) actions that occurred from August 1994 to July 1995. The status and accomplishments for this period have been compiled under the general headings of "Reporting," "Recycling," "Training and Pollution Prevention Awareness," "Evaluation of New Waste Generation Activities," and "Waste Minimization Annual Work Plan." It continues to report on all aspects of these LANL programs as documented in Appendix B to the FFCA, according to the approach and format established in the previous *Annual Reports*. Although it is recognized that the non-mixed waste programs are not strictly within the scope of the FFCA, to the extent that they are catalogued in FFCA Appendix B, Attachment B, accomplishments and progress are reported herein.

## 2.1 Reporting

In a continual effort to improve operational efficiencies, the monthly reporting process to the DOE was revised (see Appendix C for a sample of a recent monthly status report). As result of these improvements, the monthly reports have eliminated the need for the quarterly reports that were previously required. The monthly reports are then summarized in an annual report provided to the DOE. In addition, the LANL Pollution Prevention Program (P<sup>3</sup>O) manages three P<sup>2</sup>/WMin performances measures established for LANL in the University of California operating contract with DOE. An example of a survey of LANL P<sup>2</sup>/WMin activities conducted by the P<sup>3</sup>O as part of these performance measures is provided in Appendix C.

### 2.1.1 Program Management

The P<sup>3</sup>O takes a process systems approach to identifying problems, identifying possible technically and economically sound solutions, implementing solutions, and evaluating results. P<sup>2</sup>/WMin is a cooperative effort between the LANL P<sup>3</sup>O and LANL's waste generators. The P<sup>3</sup>O collects, analyzes, and collates relevant data on waste generation rates, pollution prevention opportunity assessments (PPOAs, formerly process waste assessments or PWAs); and site-specific plans (SSPs); successes and problems with individual waste minimization efforts; and new program starts. The P<sup>3</sup>O also conducts and facilitates PPOAs. The P<sup>3</sup>O has established an Action Plan and Site Pollution Prevention Plan which establishes priority waste types and generating facilities for focusing P<sup>2</sup>/WMin implementation support. Projects are identified and funding opportunities are pursued to establish waste reduction actions at LANL. The P<sup>3</sup>O provide program management of projects by tracking progress and milestones, assuring deliveries are met, reporting to LANL and DOE management, and providing budget oversight. P<sup>3</sup>O also prepares the *Waste Minimization Annual Work Plan* (WM 200), as discussed in more detail in Section 2.5 of this report. It is important to note that as the 39 mixed waste stream PPOA investigations were completed, the PPOA efforts were redirected to non-RCRA-regulated low-level (radioactive) wastes (LLW) and Transuranic (TRU) waste.

The P<sup>3</sup>O completed *The Waste Minimization and Pollution Prevention Awareness Plan*, required by DOE Order 5400.1, *General Environmental Protection Program*, in May 1994. This plan defines the mandates and requirements for waste minimization, defines the resources and specific methodologies to implement waste minimization, and provides a plan to accommodate the specific issues for site-wide and generator-specific implementation at LANL.

### 2.1.2 Pollution Prevention Opportunity Assessments

A PPOA (formerly PWA) is a systematic review of a process or operation to identify specific opportunities to prevent or minimize the potential for release of hazardous or non-hazardous emissions to the air, water or land. The PPOA consists of a careful review of a process operation (including raw material input) and resulting waste streams to identify how the process steps interact and how they contribute to waste generation. The results of a PPOA provide the basis for identifying and prioritizing specific opportunities for waste reduction.

The budget requests to perform PPOAs were not funded in FY95. However, P<sup>3</sup>O funded the PPOA activities via the P<sup>3</sup>O chargeback system. The P<sup>3</sup>O chargeback system was developed to fund implementation of P<sup>2</sup>/WMin activities and was successfully initiated in FY95. The 39 mixed waste generating functions at LANL initially received the primary attention of the PPOA program. All 39 mixed waste generating areas have been addressed through the PPOA investigations. It was found that many of these areas no longer produce mixed wastes, due in part to shutdown of some processes, and in part to the mixed waste moratorium at LANL from May 8, 1992, until signing of the FFCA on March 15, 1994. LLMW for routine mission-related generation at LANL is down to less than 10% of the annual generation rate reported in 1989. A total of 12 PPOA reports covering mainly the 19 mixed wastes processes at TA-55 Nuclear Materials Technology (NMT) Division, TA-3 Chemistry and Metallurgy Research (CMR), and the Chemical Science and Technology (CST) Division areas have been completed and are on file for queue to the P<sup>3</sup>O PPOA computer database. NMT Division has been proactive in mixed waste minimization and has greatly reduced, by materials substitution, their generation of LLMW. Although not as much progress has been made with Transuranic (TRU) mixed waste minimization, material substitution and treatment opportunities have been identified for each of the three major waste streams in this category. An additional 16 processes were the responsibility of the Analytical Chemistry Group (CST-3). However, it was determined that these processes were better described as projects with 9 analytical operations performed to carry out the project objectives. Consequently, a PPOA was performed on each of the nine analytical task areas. Of the four remaining processes identified, the two entitled Plutonium Compounds Chemistry and Metals Separation no longer exist. The two entitled Metal Forming and Hot Cells have completely eliminated the generation of mixed wastes by material substitutions. A rewritten PPOA on Material Technology Metallurgy (MST-6) electroplating activities has detailed large waste minimization accomplishments in this area. A facility-wide PPOA effort is underway for all of the wastes produced at Sigma Facility, which will include updated details of MST-6 waste minimization accomplishments on the metal forming process.

During the completion of the 39 mixed waste stream PPOA investigations, P<sup>3</sup>O began its planning process to refocus on non-RCRA LLW and TRU waste streams. Identification of the largest waste-generating functions have been completed through the use of LANL's Waste Management databases. P<sup>3</sup>O reviewed the databases and identified the wastes and generators disposing the largest volumes sent to the TA-50 and TA-54 facilities. In the area of non-hazardous radioactive wastes, 12 PPOA investigations and reports are underway and in various stages of development. Waste generating areas include the Los Alamos Meson Physics Facility (LAMPF), Dynamic Experimentation (DX) Division facilities, Environmental Restoration (ER) sites, CMR facility, TA-55 facility, TA-48 facility and TA-50 facility.

### 2.1.3 Site Specific Plans

Work on SSPs will continue in some of the 39 mixed waste areas where relevant P<sup>2</sup>/WMin implemented. SSPs are underway and are in various stages of completion for radioactive waste streams in four areas, three of which are currently being funded and implemented under the P<sup>3</sup>O chargeback system (discussed below). These included: (1) The demonstration of an in-line, high-gradient magnetic separation unit for TA-55 actinides solids caustic wastewater for recycle to the TA-55 processes and transformation for TRU wastewater to low-level wastewater. Engineering of the technology at TA-55 is planned for 4th quarter of 1995. Success on the project will greatly minimize TRU wastes at TA-55, and greatly minimize operating costs and wastes/production at TA-50. (2) The demonstration of a solid LLW radioactivity counting equipment for a 2 ft<sup>3</sup> box. Implementation of this counting equipment will allow improved segregation of non-radioactive waste from LLW. It is suspected that large amounts of wastes currently disposed of as LLW, are in fact non-radioactive. If this project is successful, it will have direct application at CMR and many other sites around LANL. (3) The building and demonstration of a LLW 2 ft<sup>3</sup> box compacting unit, which allows an operator to compact the material in the box without being directly exposed to the wastes. This project has direct application at TA-50 and many other LANL sites. Other areas under SSP investigation are being considered for chargeback-funded implementation during this fiscal year.

#### 2.1.4 Miscellaneous Technical Issues

This section will address two aspects of the LANL pollution prevention program that do not specifically fit into the PPOA and SSP process scheme. These are technology transfer and administrative approaches.

**Technology Transfer** - LANL procedures are in place to exchange technical information through EPA/DOE-sponsored databases on waste minimization and pollution prevention technologies with other DOE sites, industrial and trade associations, educational institutions, private corporations, and government agencies. These procedures are being developed through the LANL Industrial Partnership Office (IPO), DOE waste reduction workshops, and private companies.

**Administrative Approaches** - Administrative approaches to P<sup>2</sup>/WMin include the following:

- P<sup>3</sup>O review of new projects, and of substantial changes to existing projects, through the LANL Environment, Safety and Health (ES&H) Questionnaire Committee, which reviews these projects for all regulatory and procedural concerns. The ES&H project summary is currently being revised to provide a mechanism to ensure that the project proponent has diligently pursued minimization opportunities for hazardous, mixed, and other wastes. This process is an on going P<sup>3</sup>O endeavor which strives to be involved with any LANL project which either has the potential to produce waste volumes, is changing a waste volume or waste type, or is currently producing waste volumes. If any of these situations are identified in the review process, a review of Pollution Prevention Procedures is requested to ensure that Pollution Prevention measures are properly addressed and implemented. Safe Operating Procedures (SOP) that fall short of good Pollution Prevention practices must be modified.
- The P<sup>3</sup>O review of SOPs has been successful in increasing the awareness of P<sup>2</sup>/WMin in the planning process; however, the requirement for including and implementing P<sup>2</sup>/WMin practices is difficult to enforce. Over 135 SOP documents were reviewed by P<sup>3</sup>O during FY95. For each, the P<sup>3</sup>O reviewer verified that the SOP (1) acknowledged P<sup>2</sup>/WMin as an active and ongoing part of the procedure and (2) identified specific procedures or practices that will be routinely used in the operation to minimize waste and/or reduce the use of materials. Written comments were provided for each SOP reviewed, identifying additional P<sup>2</sup>/WMin practices that could/should be considered by the operating division for the procedure. During FY95, P<sup>3</sup>O expanded its SOP log-in/tracking system to include a data column that identifies if the original SOP document did or did not include P<sup>2</sup>/WMin at the time they were submitted for review. This data allows P<sup>3</sup>O to monitor increases in P<sup>2</sup>/WMin awareness at the operating divisions, under the assumption that increased awareness of P<sup>2</sup>/WMin will be reflected in the written operating procedures. Of the SOPs reviewed in 1995, 29% appropriately addressed P<sup>2</sup>/WMin (when submitted for review), 8% did not address P<sup>2</sup>/WMin in any form, and the remaining 63% had included P<sup>2</sup>/WMin at some level but required additional input to fully identify specific waste reduction opportunities. As part of the SOP review effort, the P<sup>3</sup>O has provided the operating divisions and the waste management coordinators with guidelines on the scope and criteria for the SOP review and a list of potential P<sup>2</sup>/WMin practices that could be considered for inclusion in the SOP (called the *Pollution Prevention/Waste Minimization Potential Practices to Prevent the Generation of LLW, Mixed or Hazardous Waste*). The list includes about 40 P<sup>2</sup>/WMin practices and it is routinely distributed to the operating divisions with each SOP reviewed.
- The Radioactive Material Management Area (RMMA) Plan was approved by DOE in 1995, however to enhance the plan's useability, it is being revised. Implementation of the RMMA Plan is continuing. P<sup>3</sup>O will be testing a number of procedural changes designed to reduce waste generation at RMMAs. As part of LANL's continuing initiative to further develop and administratively reduce the volume of suspect LLW generated and disposed of on site, a Facility Wide Materials Segregation, the RMMA Project, was initiated. The RMMA Project tasks implement improved work practices and

segregation practices similar to the "Green is Clean" program employed by the commercial nuclear power industry. Implementation activities include training, procedures development, and the quality assurance/quality control documentation of detection equipment used to support the segregation effort. This activity is a cooperative effort with the RMMA program manager, ES&H health physics, ES&H training, and ES&H environmental protection. This program will continue in FY96.

- The P<sup>3</sup>O is currently working on an assessment of alternative disposal options for materials free of radioactive contamination (clear materials). The assessment report will identify the options available to LANL for disposal of verified clean materials that have been generated in RMMAs. The report will be distributed to LANL management for future planning of disposal options.
- In FY95 a comprehensive P<sup>2</sup>/WMin options assessment and implementation plan for CMR upgrades was initiated. The project involves the assessment and pilot implementation of near-term P<sup>2</sup>/WMin options to reduce the amount of LLW from the facility upgrade activities at the CMR Building (TA-3). The project has identified P<sup>2</sup>/WMin options including elimination, reduction, recycling and reuse of selected LLW wastes. Implementation of pilot activities will continue in FY96 together with post-implementation assessment to identify and quantify realized benefits, including demonstrated waste disposal avoidance.
- In FY95 an evaluation of potential solid waste reduction technologies applicable to the radioactive liquid waste treatment facility (TA-50) was initiated. Project activities include the evaluation, assessment, and pilot scale testing of alternative technologies for the LANL's radioactive liquid waste treatment facility to reduce solid waste generation and improve the quality of effluent water. Bench-scale testing and pilot-scale implementation of technology approaches will continue in FY96, including the testing of commercially-available mobile treatment equipment. Data expected from this project will provide information useful to the integration of P<sup>2</sup>/WMin approaches into new facilities designs, and influence best management practices for existing radioactive liquid waste treatment facilities. Concurrently, the evaluation of alternatives will include liquid LLW processing at other DOE weapons complex facilities with the goal to implement successful pilot projects complex-wide.
- The pollution prevention procurement program is working to establish and implement an environmentally conscious procurement program that facilitates: (1) the elimination or substitution of materials that result in the generation of mixed wastes, or pose complex or cost ineffective regulatory compliance concerns in disposal; (2) maximum reuse and recycling of materials to drive source reduction; (3) optimum treatment for disposal through materials selection criteria (compactability, incineration, reforming, decomposition, etc.); (4) low environmental impact in treatment and disposal; and (5) low cost in disposal as newly generated waste. The applicability and feasibility of each alternative identified are evaluated and the results will be incorporated into the development of procurement policies and procedures used in the acquisition of materials used at LANL. Work to continue in FY96 includes examination of waste containers to characterize waste forms and testing of replacement materials. LANL has recently completed all of the physical site chemical inventories required to fully implement the use of Automated Chemical Inventory System (ACIS). These physical inventories enabled LANL to complete its Chemical Vulnerability Study and they are used as part of the Chemical Exchange Program to identify potential users for unused chemicals that have been declared excess by the original owners.
- LANL is the lead site for a DOE complex-wide project team that is testing the effectiveness of P<sup>2</sup>/WMin applied to ER Project activities. Activities include working with ER field project leaders and waste coordinators to utilize available information on P<sup>2</sup>/WMin opportunities; assist decommissioning projects with the implementation of recycling and decontamination opportunities; and incorporate P<sup>2</sup>/WMin into project plans for facility upgrades or decommissioning. P<sup>3</sup>O will continue this effort in FY96 providing P<sup>2</sup>/WMin expertise to the ER and decontamination and decommission (D&D) programs.

- During the past year the Solvent Substitution Working Group merged with the Materials Substitution Committee (MSC) in order to maximize efforts. The MSC continues to assist waste generators in the selection of environmentally acceptable alternatives. Samples of solvent substitutes are supplied to generators for testing and verification. Substitution efforts are also integrated with other programs, such as Industrial Hygiene, Purchasing and Waste Management. The Committee also serves as a clearinghouse for information on available technologies and substitutes. The Waste Minimization/Materials Substitution Resource database, which is a multimedia bibliography of available information and resources, is one of the information exchange methods used by the MSC. A Materials Substitution Homepage is also maintained on the World Wide Web of the Internet.
- P<sup>3</sup>O participated in quarterly meetings for Waste Management Coordinators (WMCs) during 1994-1995. The meetings are used for information exchange and questions and answers about P<sup>2</sup>/WMin, recycling, and waste management.

## 2.2 Recycling

LANL has established many recycling activities throughout its facilities. To integrate and expand recycling services across LANL the Recycle Task Force was formed. The task force identified a single point of contact for recycling requests and developed a hit list of items currently recycled and those targeted for recycling. These activities focus on areas where the greatest return can be obtained in relation to the expenditure of resources (see Appendix C, "Pollution Prevention Opportunities Identified for Operations at Los Alamos National Laboratory" for details of material and quantities); therefore, it must be noted that at present, few are applicable to LANL's LLMW or TRU-Mixed Waste streams. LANL's recycling activities during FY95 included the following:

- The continuing support recycling efforts managed by Johnson Controls Inc. (JCI) for LANL through JCI's Redistribution and Marketing Center (R&M) salvage operation. The operation serves to recycle programmatic waste such as stainless steel, lead, phone books, electric cable, copper, brass, scrap steel, waste oil, tires, 75% of white paper, and lead-acid batteries.
- JCI is exploring the possibility of obtaining a company-wide contract for the laundering of hazardous and non-hazardous cloth rags. This will decrease the cost of paper towel and cloth rag purchases, reduce the volume of paper waste sent to the landfill, and reduce the costs of hazardous waste storage, disposal, and satellite storage maintenance.
- Construction of a salvage yard facility to serve as a central transfer point for reusable construction stock such as rebar, wood, paint, and pipe.
- The JCI maintenance facility has started rebuilding automotive parts, such as radiators, regulators, alternators, starters, and hydraulic cylinders instead of routinely replacing these items. During the first quarter of FY95, a waste reduction of 1420 lbs. has been realized.
- P<sup>3</sup>O sponsored the expansion of the JCI waste oil recycling program. Previously, JCI collected and transferred waste oil for recycling that was generated from JCI operations only. The program was expanded to address all non-hazardous waste oils generated at LANL. LANL is recycling 9,000 gallons of oil per year.
- Recycling other oils through the JCI Environmental Division, which contracts with a local (off-site) recycling facility. The facility is routinely audited for compliance with EPA, DOT, and DOE requirements.

- In a collaborative effort, DOE Headquarters and LANL are working with the Nambé Pueblo, (the Pueblo) an American Indian community located about twenty-five miles from LANL, to address environmental issues faced by both entities, such as solid waste processing. The Pueblo, in its desire to deal with environmental issues relating to waste disposal, and in order to improve its economic status, has planned the development of a recyclable materials collection center on its land. LANL is viewed as a source of recyclable materials, together with other organizations doing business with LANL and the rest of the northern New Mexico community, including the eight northern Indian Pueblos. The P<sup>3</sup>O is supporting this cooperative effort with the Pueblo to establish a recyclable materials collection center and compactor/baler facility.
- Recycling precious metals through precious metal banks.
- P<sup>3</sup>O is currently pursuing the development of an Affirmative Procurement Program for LANL. This effort will conduct evaluations of LANL wastes to identify viable alternatives for constituents which are not readily treated, decontaminated, or reused and provide guidance for future procurements to the LANL purchasing organizations.
- LANL machine shops have begun recycling the coolant used for machining equipment after the recent installation of a coolant recovery/recycling system. It is estimated that this will result in an 80% reduction in the number of drums of hazardous coolant waste generated annually. The machine shops have also begun returning their empty machine oil drums to the vendor. This has reduced the number of empty drums destined for disposal by two-thirds.
- Lead brick and shielding recycling (including both uncontaminated material as well as lead decontaminated in compliance with FFCA milestone LD 200). Radioactively contaminated lead bricks are being reclaimed on-site, as discussed in Sections 5.1.9 and 5.20 of this Annual Report.
- The chemical exchange program is a formal program for the internal exchange and external recycling of chemicals at LANL. Surplus chemicals are offered to LANL personnel instead of being sent offsite for recycling or disposal. All the transfer arrangements and costs for the transfer of these chemicals are handled by the program in order to encourage exchanges. The external program is being expanded to include DOE facilities and other government entities, such as state agencies and schools. A cooperative effort is also being implemented to integrate the programs at Los Alamos and Sandia National Laboratories.

The chemical exchange program has increased the recycling of chemicals internally and externally at Los Alamos. The volume of used chemicals, that have required disposal because of the lack of recycling opportunities has decreased. The proactive marketing and networking practices of the program have increased the exchange of the multitude of chemicals ordered. The risk of exposure during hazardous operations, such as transportation of chemicals to and from the LANL, is also being reduced. The project is linked to the ACIS and the list of surplus chemicals is automatically downloaded to the Internet. The Internet is also used to advertise the program, maintain the list of chemicals available for exchange, and send electronic mail to exchange chemicals. These activities minimize the amount of paperwork required for the recycling of chemicals.

CHEAPER is a user friendly recycling program, which requires little effort and involves no cost for internal users at LANL. This program is unique because of the awareness, educational, marketing campaigns that are part of the project and the integration with other programs at Los Alamos. "Wishlists" are maintained so that there is a ready market for chemicals as soon as they become available for exchange. Another novel element of the program is the use of the Internet for publicity, awareness, education and marketing of the chemical exchange program. This project is part of the pollution prevention efforts at Los Alamos and involves other programs such as Purchasing,

Industrial Hygiene Transportation, Materials Substitution and Waste Management. The existence of an integrated program has increased the efficiency and effectiveness of chemical recycling at LANL.

### 2.3 Training and Pollution Prevention Awareness

The P<sup>3</sup>O continues pollution prevention awareness activities that provides general waste minimization information to LANL employees and training support to the LANL Training Office. Initially, all employees receive waste minimization training as part of the LANL Training Office's General Employee Training course. P<sup>3</sup>O also provides waste minimization training to all WMCs and provides updates during quarterly WMC meetings. The P<sup>3</sup>O completed a waste minimization training package in FY94 (including a pollution prevention video and handbook) that has been sent to all group offices and continues to provides manager training per DOE Order 5480.20, *Personnel Selection, Qualifications, Training and Staffing Requirements at DOE Reactor and Non-Reactor Facilities*. Additionally, the P<sup>3</sup>O is designing a P<sup>2</sup>/WMin self-paced training course which will be made available to LANL employees through the P<sup>3</sup>O Internet Homepage. The P<sup>3</sup>O also provides a staff member who participates on the JCI Waste Minimization Committee to assist with technical direction and funding issues related to JCI waste minimization activities.

The P<sup>3</sup>O Pollution Prevention awareness efforts also include: articles in the LANL *Newsbulletin*, publication of the *P<sup>2</sup> Reporter* newsletters funding environmental science competitions in the public schools, (conduct of the first LANL P<sup>2</sup> pollution prevention showcases held in January 1995, presentation of exhibits on Earth Day and at conferences, and an incentive program that provides cash awards for employee suggestions on minimizing waste (see Appendix C for a sample of an article from the LANL *Newsbulletin* and awards given to employees). Suggestions are separated into large and small projects and then judged on creativity, applicability, cost savings, and minimization potential. The 1995 awards are scheduled to be made in August 1995, with award presentation scheduled for September.

The P<sup>3</sup>O chargeback system implemented at LANL was designed to require waste generators to pay fees based on volume and weight of waste generated. The purpose of chargeback is to provide financial incentives to waste generators to reduce, eliminate, or minimize their wastes generated for disposal. The funds collected from P<sup>3</sup>O chargeback system are used for preparation and implementation of PPOAs and SSP's; all as services returned to waste generators. Chargeback funds collected represent a very small fraction of the total costs incurred in handling, treating, packaging, administering, storing, and disposing of wastes. If groups were paying directly for these waste services, the costs to groups would be very large. Ultimately, this situation may change, as DOE and LANL implement internal incentives toward reducing costs of doing business. On a monthly basis, the P<sup>3</sup>O chargeback system queries the Waste Management databases. The program retrieves waste volumes (for LLW, LLMW, TRU, and mixed TRU wastes) and weights (for all other hazardous waste) and captures funds from the programs which generated these wastes).

The P<sup>3</sup>O also manages P<sup>2</sup>/WMin performances measures in the University of California contract. To make LANL generators aware of these measures, the P<sup>3</sup>O has created a performance measurement tool to inform divisions of their monthly and cumulative annual waste generation quantities in graphical format. The information is put on the P<sup>3</sup>O Homepage on a World Wide Web server to allow the division leaders to view the information. The graphical information provides the prior year generation rate, the required 5% reduction in quantity, and the 50% level of the current year's goal. Over the past two years, P<sup>3</sup>O has been successful in meeting the goal of reducing site wide waste by 10% a year. This meets the goal established in the FFCA Appendix B of reducing LANL's total waste by 20%.

### 2.4 Evaluation of New Waste Generation Activities

A pollution prevention opportunity assessment was conducted on the design of the hazardous waste management units at the TA-63 Hazardous Waste Treatment Facility. The pollution prevention assessment identified design requirements and best management practices that provide for pollution

prevention, from the design phases through construction and operations. The assessment identified components of a Stormwater Pollution Prevention Plan.

P<sup>3</sup>O continued to integrate with the waste management customer service office for technical assistance on P<sup>2</sup>/WMin issues and work with the waste management coordinators. A representative from P<sup>3</sup>O has been made available in the customer service office on a routine basis each week to interact with the waste management customer service representatives and to answer questions from WMCs or generators. Each week the representative provided guidance and implementation assistance for recycling and chemical exchange requests directly to the WMC and the waste generators. The P<sup>3</sup>O representative also participated in information exchange sessions with the waste management services groups and the waste management coordinator meetings.

P<sup>3</sup>O also provided support to the WM waste certification effort, initially called the *RMMA/Waste Certification Program for Hazardous, LLW, LLMW, and TRU Wastes*. P<sup>3</sup>O representatives participated with the Waste Management certification team during three facility walk-through and data collection efforts. As waste streams were evaluated for certification, the P<sup>3</sup>O representative subsequently evaluated the generator's P<sup>2</sup>/WMin program through a review of SOPs, waste minimization plans and reports, and waste profile/characterization forms. The P<sup>3</sup>O support to this effort was canceled in March 1995 due to funding constraints. P<sup>3</sup>O participated and partially funded the effort to integrate waste projections and treatment, storage, and disposal facility requirements. This ongoing effort will allow LANL to coordinate and efficiently address future requirements.

The P<sup>3</sup>O reviews approximately 10 new potential waste-generating programs each week through the LANL ES&H Questionnaire Committee and approximately 15 new and revised SOPs each week. All new potential waste generating projects, major modifications to existing projects, and SOPs are evaluated for waste minimization requirements.

The P<sup>3</sup>O data management efforts facilitate:

- Identification of discrete waste generating processes through the Process-ID effort,
- Waste generation tracking, particularly to provide generators with monthly charts showing progress against UC contract performance measure,
- Cost accounting that provides accurate numbers on the cost of waste management,
- Conduct of the P<sup>2</sup>/WMin chargeback program,
- Waste generation normalization that provides data comparing waste generation to the dynamic level of effort at LANL

## 2.5 Waste Minimization Annual Work Plan

The *Waste Minimization Annual Work Plan* (WM 200) is prepared annually. The third such work plan is submitted concurrently with this annual report. The work plan provides details on how LANL's *Waste Minimization Plan* (WM 100) will be implemented for the upcoming fiscal year. The proposed FY95 work plan addresses the shifting goals of P<sup>2</sup>/WMin due to the completion of LLMW activities, as discussed in Section 2.0 of this report. It identifies how waste minimization and pollution prevention priorities will be developed and implemented to ensure that new mixed waste streams will be promptly identified, their PPOAs and SSPs are completed on a timely basis, and corrective actions are completed or the necessary Research and Development (R&D) activities are initiated to resolve any problems identified.

### 3.0 OFF-SITE TREATMENT

LANL's initial effort to identify and evaluate off-site facilities under the terms of the FFCA was described in the *Feasibility of Treatment of Los Alamos National Laboratory Low-Level Mixed Waste at Diversified Scientific Services, Inc. (DSSI)* (FFCA Report OSS 100). Additional facilities identified specifically for the treatment of gas cylinders were reviewed in the *Gas Cylinder Work-Off Plan* (FFCA Deliverable GAS 100). LANL's efforts to identify appropriate facilities are ongoing and documented in the *Annual Action Plan for Off-Site Shipment of Low-Level Mixed Waste* (FFCA Deliverable OSS 200). LANL's progress during FY95 towards treating and disposing of waste off-site is reported to the EPA in this *Annual Report*. LANL has received draft comments from EPA on this report and has arranged to respond to its comments in a letter after July 30, 1995.

#### 3.1 Status of OSS 100

OSS 100 included schedules for two cases or scenarios for sending waste to DSSI. Case 1 assumes that LANL's waste treatment residues will be disposed of at an off-site commercial disposal site by DSSI. Case 2 assumes that LANL's waste treatment residues will be segregated by DSSI and returned to LANL. In either case, the activities prior to shipment of the residues to a commercial facility or back to LANL are the same. The status of these activities is as follows.

- **Fate of DSSI Treatment Residues.** The DOE has not yet determined the fate of the residues that are generated at DSSI during treatment of LANL mixed wastes. The exemption package required for shipment of LLW or LLMW off site under DOE Order 05820.2A, *Radioactive Waste Management*, must be prepared by LANL and approved by DOE prior to shipment to DSSI. The exemption package must address all aspects of the off-site shipment including whether treatment residues will remain at DSSI and be disposed of by DSSI or whether treatment residues will be returned to LANL for disposal. At this time, LANL is proceeding with its exemption package to the DOE assuming that treatment residues will not be returned to LANL (Case 1).
- **Inspection Trip to DSSI.** LANL has been in contact with DSSI, and has confirmed DSSI's current regulatory status. LANL is characterizing its waste stream for compliance with DSSI's waste acceptance criteria (WAC), and preparing a DOE Order 5820.2A exemption package. LANL toured DSSI in 1994 and has recently conducted its inspection of DSSI (June 13, 1995).
- **Selection of Specific Wastes to be Shipped.** LANL has selected scintillation fluids for its first shipment to DSSI. LANL had received a cost proposal from DSSI for disposing of this waste and is now in the process of completing DSSI's waste profile documentation to obtain approval from DSSI that it will accept the waste for treatment. Two additional waste streams that are not covered by the FFCA have also been selected for shipment and exemption packages are being prepared for radioactively contaminated oils, isopropyl alcohol (IPA), and Polychlorinated Biphenyls (PCBs). Efforts are ongoing to identify additional waste streams and prepare exemption packages for them.
- **Inspection Trip to the Recommended Commercial Disposal Facility.** The facility identified by DSSI as the residue disposal facility is Envirocare, Inc. DSSI has a contract in place with Envirocare for Envirocare to accept solidified ash for disposal. The DOE conducted an audit of Envirocare August 16-19, 1993, in response to the DOE's solicitation for contractors for its nation-wide mixed waste commercial disposal contract. The scope of the audit was to evaluate Envirocare's management and operations and to verify that the facility could meet DOE's requirements. LANL has chosen to use DOE's audit results.

- **Bulking vs. Non-Bulking of Wastes.** The scintillation fluids have already been bulked. However, when other liquid waste streams are identified, the advantages and limitations of bulking them will have to be examined.
- **Agreements with DSSI.** LANL and DSSI are still finalizing the schedule for the initial shipment of wastes to DSSI.

In addition to the specific activities described above, LANL must also, as part of its exemption package to the DOE, audit the commercial transporter, complete DOE and LANL required checklists to comply with National Environmental Policy Act (NEPA) documentation, and establish contracts with the off-site facility. LANL has completed sampling and analyzing the scintillation fluid and has determined that it meets DSSI's WAC specifications.

### 3.2 Impediments to Off-site Shipment of LLMW

LANL has been diligent in its efforts to ship LLMW off-site for treatment/disposal. During this reporting period LANL has developed a process for ensuring the paperwork and documentation necessary to satisfy both DOE and EPA is prepared and approved. The ER waste stream was the subject of compliance negotiations until early June 1995, which delayed its progress toward off-site shipment. Working through the exemption package process to meet DOE's requirements demonstrated that an additional level of characterization is required to meet not only DOE's needs, but also the off-site facility WAC.

### 3.3 Status of Off-Site Shipments from August 1994 through July 1995

The first annual action plan to update information regarding off-site facilities capable of and available for treating LLMW was submitted last year concurrently with the 1994 Annual Report as OSS 200, as specified by the FFCA in Appendix B (Section II.D.1). OSS 200 described the activities planned for the period from August 1994 through July 30, 1995. The two commercial facilities selected to treat and dispose of LLMW from LANL during 1995 were DSSI and Envirocare. See Table 3.1 for wastes streams reviewed to date for off-site shipment. The status of the 1994-95 activities is described below.

- FFCA waste streams identified to be disposed of at Envirocare were D005 barium wastes, D006 cadmium wastes, D008 lead wastes, D009 and F001 contaminated soil, and D011 silver waste. These wastes were scheduled to be shipped off-site by March 31, 1995. No action has been taken on the barium, cadmium and RCRA contaminated soil wastes. The barium, cadmium, and RCRA contaminated soils will be reviewed during this next reporting period. The silver waste was analyzed for the toxicity characteristic using the Toxicity Characteristic Leaching Procedure (TCLP). The silver waste did not exhibit the toxicity characteristic and was recharacterized as LLW. It has been buried at Area G in a LLW disposal shaft. The lead waste stream has been reviewed and is being sorted into different types of lead waste. Treatment technologies will be identified that fit each lead waste type or form and off-site treatment/disposal options will continue to be explored. Processes being examined now are CO<sub>2</sub> blasting, acid bath, smelting, macroencapsulation, and recycling and reclamation opportunities. The lead wastes will be worked off through these processes.
- ER waste streams identified to be disposed of at Envirocare, and not part of the FFCA, have been sampled and characterized, and are awaiting final analytical results. When final analytical results have been received and validated, the exemption package will go to the DOE for final approval.
- Liquid characteristic and listed wastes scheduled for DSSI are being reviewed. An exemption package for the scintillation fluids is being prepared. A cost estimate from DSSI has been received and sampling for characterization to DSSI's waste acceptance criteria has been completed. An additional waste stream, IPA, is being reviewed for shipment to DSSI. The exemption package for

the scintillation fluid shipment is being prepared using the Case 1 scenario described in OSS 100, which assumes that DSSI will segregate and dispose of treatment residues.

- Additional waste streams under review for shipment off-site, but not covered under the FFCA, are radioactively contaminated oils and PCBs, as discussed in Section 3.1.

TABLE 3.1  
 Low-Level Mixed Waste Streams Reviewed To Date For Shipment Off-Site  
 For Treatment Or Disposal

LLMW CATEGORIES	STATUS
Lead contaminated wastes (D008)	LANL is reviewing the universe of LLMW lead waste in storage at TA-54, to determine which technologies are best suited to specific forms of lead waste.  Technologies being pursued are CO <sub>2</sub> blasting, grit blasting, sponge blasting, chemical or solvent decontamination, chemical chelation, smelting, and microencapsulation
Barium wastes (D005)	Scheduled to be reviewed in FY96
Cadmium wastes (D006)	Scheduled to be reviewed in FY96
Contaminated soils (D009, F001)	Scheduled to be reviewed in FY96
Silver (D011)	Radioactively activated silver. Silver was analyzed for the toxicity characteristic using the Toxicity Characteristic Leaching Procedure; and determined not to be characteristic for toxicity. Silver was recharacterized as LLW and disposed of on-site at TA-54, Area G in a LLW disposal shaft.
Liquid characteristic and listed wastes (D001)	LANL has separated scintillation fluids out of this waste category to review for shipment to DSSI. Initial sampling has been conducted and analytical results are being validated. Additional sampling may be necessary to determine if the waste stream meets DSSI's waste acceptance criteria. Shipment is expected in early FY96.  IPA is another waste stream in the D001 waste category that is being reviewed for off-site shipment in FY96.
Radioactive liquid waste treatment facility sludges (F001, F003)	This waste stream was reviewed for shipment to Envirocare, however, the transuranic isotope concentrations are above the limits acceptable under Envirocare's radioactive materials license.
Radioactively-Contaminated Bulk oils - non-regulated (not FFCA)	This waste stream is being reviewed for shipment to DSSI in FY96
Radioactively-Contaminated PCBs (not FFCA)	This waste stream is being reviewed for shipment off-site in FY96
ER Contaminated soils from cleanups (F001) (not FFCA)	LANL has conducted extensive sampling on this waste to determine if it meets Envirocare's waste acceptance criteria. An exemption package has been prepared for DOE's approval, final comments from DOE have been incorporated and LANL is awaiting final approval.

## 4.0 TREATMENT SKIDS

This section details the status of skid development, design, and construction, and evaluates the success of implementing and accomplishing the goals of ATS 100, the *Program Management Plan for Generic Skid Design*, for treatment skid development at LANL during August 1994 to July 1995. As stipulated in Appendix B of the FFCA, LANL was to initiate two new treatment processes on an annual basis until the LLMW that can not be shipped off site or treated in the CAI is addressed. During FY95 LANL and the other DOE/AL sites developed mixed waste treatment plans to address all LLMW in the DOE/AL complex to comply with the Federal Facilities Compliance Act.

Consequently, the treatment skids for addressing are wastes specified in the FFCA were all selected during FY95. The *Albuquerque Mixed Waste Treatment Plan* is a cooperative effort between all DOE/AL sites where each site is responsible for developing certain skids that all DOE/AL sites will utilize in addressing their LLMW. LANL will continue to coordinate its effort to initiate additional treatment skids for new LLMW issues as they occur in the future, and to address secondary waste to be generated (see section 4.2, "Development of Additional Treatment Skids," for more information).

This portion of the annual report conforms to the format outlined in the program management plan and in FFCA Appendix B (Section II.D.3). It outlines how the program analyzed LDR requirements through characterizing and prioritizing of waste, identifies the methodology of developing treatment technologies and equipment, and discusses the support efforts that augment the basic program. The status and accomplishments for the period are compiled under the general headings of "Treatment Skids Under Development" and "Development of Additional Treatment Skids." For information regarding the Hazardous Waste Treatment Facility, see section 5.0, "Status of Other FFCA Milestones." LANL has received draft comments from EPA on this report and has arranged to respond to its comments in a letter after July 30, 1995.

### 4.1 Treatment Skids Under Development

The development of treatment processes, and pilot studies, and the design of several skids are currently under way. A review of actual completion performance as compared to the original ATS 100 schedule indicates that some skid development work is behind schedule and some is ahead of schedule. Some processes that require considerable research and design at the bench scale stage will have longer overall schedules. The length of any research program to optimize a process is always a best guess. A basic change to the ATS 100 schedule was implemented in FY95. Where possible, it is planned that skid fabrication and testing under treatability studies will precede receipt of the RCRA Part B permit application. The program as a whole is progressing well (although the DETOX skid is one exception). The following section summarizes the status of the development effort.

#### 4.1.1 Reactive Metals Skid

The reactive metal skid development is proceeding on schedule. Technology selection, and bench scale testing have been accomplished in 1993 and 1994. Some additional bench scale testing will be still conducted to address wastes at other DOE sites. In 1995, Preliminary Design Summary Report (Title I) and Definitive Design (Title II) have been completed. The draft operating manual has been written and is undergoing quality review. The NEPA documentation for skid testing has been initiated. Fabrication of a full sized unit, the completion of the operating manual, and the completion of permits necessary to conduct treatability studies are planned for 1996.

#### 4.1.2 Plating Waste, Acids, and Bases Skid

Title II for the plating waste, acids, and bases skid has been completed, permitting is in progress, safety documentation has been initiated, and the preliminary hazard assessment (PHA) has been finalized. The FY95 budget and schedule have been reviewed and are being updated. The RCRA Part B permit application will be resubmitted in September of 1995, due to design charges. National Emissions Standards for Hazardous Air Pollutants (NESHAPs) & NEPA reviews have been approved but will need to be reissued for operating at a new location. The Sampling ES&H questionnaire has been returned for additional information. An acquisition plan has been submitted to for the fabrication of the skid. However, budget cuts have required a review of the schedule associated with this treatment skid. In order to continue the project with available funding the project may be delayed up to two years. The RCRA Part B permit application, which also included the Hazardous Waste Treatment Facility (HWTf) storage tanks and other storage pads, will be revised and resubmitted to the state. This delay means the RCRA Part B permit may not be available until at least September of 1997.

#### 4.1.3 DETOX Process Skid

Bench scale testing and an independent review of the DETOX test data generated during the last three years were completed in 1994. It was concluded that the process is capable of treating a wide variety of organic compounds with destruction efficiencies approaching 99.99 percent or greater. However, most of the ATS 100 completion dates for specific activities for the DETOX project are at least two years and as much as four years delayed. Most of the delay in completion can be attributed to the outcome of the Value Engineering (VE) studies for the DETOX and hydrothermal processes held in October of 1994. As a result of the VE studies, the scopes and project schedules for both projects were modified. The hydrothermal skid (Section 4.1.6) was elevated to a first choice for treatment of the planned DETOX waste streams based on a demonstration of the hydrothermal technology. It was determined that further bench-scale testing is necessary for the DETOX process due to the corrosive nature of the process solution and lack of demonstrated success at sustaining process conditions at the temperature range of 150 to 175 C. Budget cuts incurred in FY95 have resulted in overall delays to the schedule of another one to two years. The additional bench scale study is to be concluded in FY97. Title II is scheduled for completion in FY99.

#### 4.1.4 Scrubbable Gas Skid and Recontainerization Skids

The gas scrubbing skid will treat toxic and corrosive gases by scrubbing with acid or caustic solutions. Based on analysis, the resulting caustic or acid liquid wastes can be pumped to the liquid treatment plant; neutralized and evaporated; or stored and treated in another treatment skid. Title I and Title II design were completed in FY95. Construction and permitting will begin in FY96.

Development of a gas recontainerization skid is proceeding in parallel to the gas scrubbing skid. The purpose of this skid is to provide the capability to sample and stabilize gas cylinders which cannot be safely opened. The gas recontainerization system does not treat waste. The system analyzes waste gases before other treatment procedures are initiated. The system includes a pressure vessel where cylinders with damaged or corroded valves can be cut open in an inert environment. The cylinder contents can then be analyzed and, depending on the analysis, the gas can be compressed into a new cylinder, or vented (if inert). The analytical equipment that has been purchased can analyze gas samples for other treatment skids. The recontainerization system is under construction and it should be ready to test at the vendor's facility in late FY95. The PHA will be complete by the end of FY95. The ES&H questionnaire procedure, including NEPA permitting, has been initiated. Permitting, operating documentation, and equipment testing will be completed in FY96.

#### 4.1.5 Lead Soil Washing Skid

A lead soil washing skid (not included in the March 1995 PSTP) is under development to treat lead-contaminated soil and other materials that cannot be decontaminated or sent off site for treatment. A review of the actual completion performance as compared to the original ATS 100 schedule indicates that the lead soils washing skid is about one year behind its original schedule, because the bench scale testing did not remove all contamination from soils. While lead salts are efficiently removed, pieces of lead metal are not. A different technology is being added to the process to separate the metallic lead from the soil and treat it in another skid-mounted treatment. The bench-scale work has been extended accordingly and no engineering work will take place until it is completed, probably by mid FY96. The standard ATS 100 schedule will then resume, with Title I design completion planned to be one month ahead of schedule.

#### 4.1.6 Hydrothermal Process Skid

The hydrothermal process skid is intended to treat a variety of halogenated and non-halogenated organic wastes and nitrated wastes. During FY94, the hydrothermal process was successfully demonstrated for treatment of simulated Hanford wastes containing non-halogenated oil, nitrate, and nitrite. Initially this process was selected as a generic skid treatment process, but after a VE study at LANL in October 1994, the process status was elevated to a first-choice treatment process.

During FY95, the process was demonstrated on a bench-scale for treating halogenated and non-halogenated organic wastes, which is an acceleration of one year from the standard ATS schedule. The Waste Management databases were used to develop a sampling and analysis plan for wastes amenable for treatment by the hydrothermal process. A treatability study using wastes with low solids content is currently underway. Additional bench testing will be done in FY95 and FY96. In FY96, waste sampling, analysis, and characterization will be conducted and Title I design completed.

#### 4.1.7 Activated Lead Treatment Skid

The objective of the activated lead treatment skid is to process activated lead into nonactivated lead compounds, or to a recyclable lead product. The project began in 1995. The literature review and technology evaluation have been performed. Bench scale testing has commenced ahead of schedule and will continue. Title I design is scheduled to be complete by the end of FY96. However, further development of this skid will not continue if it is determined at the conclusion of bench scale testing that there is no advantage of this technology over macroencapsulation, which is a treatment skid being developed by another DOE/AL site and available for use by LANL.

### 4.2 Development of Additional Treatment Skids

The DOE is required by section 3021(b) of RCRA, as amended by the Federal Facilities Compliance Act, to prepare site treatment plans describing the development of treatment capacities and technologies for treating mixed waste. DOE/AL has prepared the *Albuquerque Mixed Waste Treatment Plan*, a comprehensive plan covering treatment of all LLMW generated at the DOE/AL complex. The DOE/AL plan, together with this FFCA, formed the basis of the PSTP delivered to the NMED in March of 1995. Under the PSTP, all treatment units are mobile (skid-mounted). Most sites in the DOE/AL complex are assigned one or more skids to design. Each skid developed will be available for treatment of waste at any of the nine sites. In some cases, more than one example of a given skid design may be fabricated. The Grand Junction Project Office manages the overall program and maintains a schedule of mobile treatment availability.

Termination of the FFCA between DOE and EPA will occur when the State of New Mexico has issued an order requiring DOE compliance with a plan for treatment of mixed waste (Section XV of the FFCA). Concurrent with development of a compliance order between the DOE and the NMED, skid development is progressing on schedule at all sites under the GJPO management plan. According to this plan, LANL

will begin development of one skid in FY96 for treatment of oxidizable gases that cannot be neutralized by scrubbing. In the event that the FFCA does not terminate in FY96, DOE will fulfill the requirement to initiate development of two skids per year by reporting on the development of a second treatment skid initiated at another DOE/AL site in FY96 for use to treat LLMW stored at LANL. LANL will continue to coordinate its effort to initiate additional treatment skids for new LLMW issues and to address secondary waste issues. Under the compliance order, the requirements established and outlined in the *Characterization Plan for Historical LLMW* (HLL 100) and the *Formal Plan for Prioritizing LLMW Treatment* (HLL 200) will be replaced with those specified in the PSTP. The PSTP will then be used to plan and schedule all future skid development. This process is further described in the *DOE Site Treatment Plan*, in accordance with the Federal Facility Compliance Act.

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

- Waste sampling
- Waste characterization
- Identification of available technologies
- Selection of applicable technologies
- Preconceptual Design
- Bench scale testing
- Treatment skid design (Title I and Title II)
- Environmental permitting
- Document Preparation (safety and operational)
- Final design (Title III)
- Skid testing
- Waste treatment

A rearrangement of development tasks called out in ATS 100 was made in FY95 and was proposed to the NMED in the March, 1995 PSTP. Full sized skids will be constructed where possible prior to RCRA permitting and tested first on simulated wastes and then on real waste as appropriate under the treatability study requirements of the RCRA regulations. The scale of these full sized skids is small enough to meet the requirements of treatability studies under 40 CFR 261.4. Under this scenario, results of the treatability studies, proven operating procedures, and improvements to skid design will be incorporated into the RCRA Part B permit application for each specific skid. The original ATS 100 schedule was based on receipt of the RCRA operating permit prior to construction. Design improvements would require permit modifications. Bench-scale testing precedes skid design in most cases to confirm that the treatment is appropriate and to generate design data.

## 5.0 STATUS OF OTHER FFCA MILESTONES

This section details the status of all milestones that are not specifically addressed in Section 2.0, "Waste Minimization and Pollution Prevention," Section 3.0, "Off-Site Treatment," and Section 4.0, "Treatment Skids" of this report. The information provided here is not a requirement of AR 100, but is provided to document the progress of other FFCA milestones. Some FFCA projects and milestones represent stand-alone projects, while others strongly depend upon each other for successful completion. A table summarizing the interrelationships among the FFCA milestones is provided as Attachment B to this report.

### **5.1 IFLL 100**

The preconceptual study to identify options for interim LLMW storage facilities/upgrades was submitted to the EPA on April 14, 1994. The preconceptual study presented options for modifying current LLMW storage facilities to meet 40 CFR part 264 requirements for permitted storage facilities in the near term. LANL has received draft comments from EPA on this report and has arranged to respond to its comments in a letter after July 30, 1995.

### **5.2 IFLL 200**

The implementation schedule for the final upgrades to the interim LLMW storage facilities was submitted to the EPA on September 9, 1994. The RCRA Part B permit application for TA-54, Area G is in progress. The proposal and design phases of the mixed waste dome at Area L have been completed, and approval received from NMED for a change during interim status. Construction of the mixed waste dome has begun. The RCRA Part B application for mixed waste storage at Area L is scheduled to be submitted in FY02. The Fire Hazards Analysis (FHA) for Area G and L is in progress and will be completed in FY96. The non-RCRA regulated uranium chips and turnings stored in TA-54, Area G, dome 49 will remain there until the skid mounted treatment unit comes on-line. Title I and the RCRA Part B permit application for the Mixed Waste Receiving and Storage Facility (MWRSF) are under development. The schedule for construction of the MWRSF will be determined upon completion of Title II and receipt of a RCRA operating permit from the NMED. LANL has received draft comments from EPA on this report and has arranged to respond to its comments in a letter after July 30, 1995.

### **5.3 STRU 100**

This preconceptual study identified any short- and long-term TRU storage facility modifications required to conform with 40 CFR Part 264, Subpart I requirements for the waste contained in Transuranic (TRU) Pads 1, 2, and 4 as well as other LANL TRU storage areas, and was submitted to the EPA on September 30, 1994. The preconceptual study also identified target dates for new facilities that are required. The RCRA Part B permit application for TA-54, Area G, which includes TA-54-48 and TA-54-153, is in progress. There is currently no anticipated delivery date for the application. Certification of compliance with 40 CFR Part 264 Subpart I will be provided to the EPA upon completion of the stipulated upgrades, of Pad 1, 2, and 4 wastes as deliverable STRU 200 in Appendix B of the FFCA.

### **5.4 STRU 200**

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

### **5.5 HLL 100**

This plan was submitted to the EPA in April 14, 1994. The characterization plan presents both the methodology and the schedule for characterizing LANL's legacy waste. This characterization effort was completed in March of 1995. The characterization effort included 7,546 items of LLMW. 189 items (2.5%) were identified as having insufficient information for complete characterization. The plan for further characterization of these wastes was included in the final report on the LLMW characterization activities. LANL has received draft comments from EPA on this report and has arranged to respond to its comments in a letter after July 30, 1995.

## 5.6 HLL 200

The *Treatment Prioritization Plan for Low-Level Mixed Waste* was submitted to the EPA on May 31, 1994. The plan presented a formal procedure for prioritizing LLMW streams based on the risk associated with long-term storage of these wastes. The plan outlined a three-pronged approach for dealing with LLMW streams: (1) any wastes for which off-site capacity is available (in the short term) will be shipped to that off-site treatment and disposal facility as soon as practicable, regardless of the ranking score; (2) LLMWs for which off-site capacity is not available were to be evaluated for treatment in the Controlled-Air Incinerator (CAI); and (3) LLMWs which cannot be treated in the CAI were to be evaluated for development of skid mounted treatment units. Those LLMWs presenting the highest risk, according to the matrix, will be given priority for development of skid mounted treatment units.

Shipping waste off-site for treatment and disposal remains the first priority. The *Annual Action Plan for Off-Site Shipment of Low-Level Mixed Waste (OSS 200)* describes the activities planned during the next reporting period. It describes waste streams to be reviewed for potential off-site treatment and disposal. Accomplishments and problems of the previous year's action plan were reported in Section 3.0 of this annual report. The second priority, to evaluate those waste streams for which off-site treatment/disposal is not available, for treatment at the CAI, has changed (see sections 5.7-5.9 below for more discussion). Evaluation of LLMWs for which off-site options do not exist will be covered by LANL's Site Treatment Plan currently being developed with the NMED, which, when approved, will replace the prioritization scheme developed in HLL 200. Progress toward completion of previously identified treatment skids is reported on in Section 4.0 of this annual report. LANL has received draft comments from EPA on this report and has arranged to respond to its comments in a letter after July 30, 1995.

## 5.7 CAI 100

There have been significant developments relating to CAI series milestones. Reduced DOE funding and the inclusion of the CAI and the associated trial burn in LANL's planned Site Wide Environmental Impact Statement (SWEIS) led to requests by DOE to renegotiate all CAI series milestones with the EPA. Options currently being reviewed by DOE include extending the time frames for the completion of the milestones until sometime after the ROD is issued for the SWEIS, total elimination of the CAI series milestones, and changing the milestones to address other potential future activities, including possible closure of the CAI or redirection to other uses.

Due to reduced funding support from DOE, operating personnel for the CAI are taking other positions within LANL. Current staffing levels are below those outlined in CAI 100 as of May 8, 1995.

## 5.8 CAI 200

A draft trial burn plan was prepared prior to work being stopped by the DOE. In December 1994, DOE requested that a destruction and removal efficiency test replace the trial burn. EPA turned down this request but stated that it was willing to change the CAI 200/300 schedule. DOE then requested that milestones CAI 100/200/300 be pushed back until after the completion of the SWEIS Record of Decision (ROD). This was due to the inclusion of the trial burn in the SWEIS, which resulted in significant cuts in the CAI's FY95 operating budget. Shortly thereafter DOE directed that the CAI be placed into a "mothballed" condition while options for the CAI's future are being reviewed, as discussed in Section 5.7. EPA stated that it was willing in principle to modify the CAI milestones, but needed additional information about the effect of this move on other milestones. A response was provided to the EPA on May 8, 1995. No response from EPA has been received.

## **5.9 CAI 300**

The due date for the CAI work off plan for applicable LLMW is currently under re-negotiation due to the future mission uncertainties.

## **5.10 HW 100**

This milestone has been completed. The notice of completion of Title I was submitted to the EPA on April 14, 1994.

## **5.11 HW 200**

This milestone has been completed. Waiver to start Title II engineering was received from DOE-headquarters on May 24, 1994. A contract was established with a subcontractor to begin Title II engineering on June 1, 1994. Also, supplemental Title I work was started on May 18, 1994. The notice of completion of the definitive design (Title II) for the HWTF was submitted to the EPA on 1/30/95.

## **5.12 HW 300**

This milestone has been completed. The RCRA Part B permit application for the HWTF was submitted to the NMED on October 12, 1993. The notice of submittal of the RCRA Part B application was sent to the EPA on April 14, 1994. A modified application is planned to be resubmitted to the NMED, but this resubmittal is on hold while options for the future of the HWTF are being reevaluated.

## **5.13 HW 400**

This milestone has been completed. It calls for submission of a construction schedule for the HWTF. The definitive schedule for HW 500, HW 600, and HW 700 was submitted to the EPA on 4/30/95.

## **5.14 HW 500**

The beginning of the HWTF construction is dependent on NMED approval of the RCRA Part B permit. Per HW 400, construction was scheduled to begin October 1, 1996.

## **5.15 HW 600**

The Site Treatment Plan schedule is planned to address and replace the LLMW work-off plan for the HWTF.

## **5.16 HW 700**

Per HW 400, construction of the HWTF is planned to be completed January 1999.

## **5.17 HW 800**

Per HW 400, operations is planned to begin January 2, 1999.

## **5.18 HW 900**

Completion of LLMW treatment in the HWTF pursuant to HW 600 will be scheduled and implemented according to LANL's Site Treatment Plan.

### 5.19 LD 100

This milestone has been completed. It called for commencement of LANL's project to use a mobile unit to decontaminate lead bricks previously used for shielding in various projects at LANL within 30 days of FFCS signature (i.e., by April 01, 1994). Earlier drafts of the FFCA specified a due date of April 8, 1993. Although the FFCA was not in effect, the DOE and LANL were complying with all milestones specified in the draft FFCA at that time.

The EPA Hazardous Waste Management Division was notified on April 15, 1993, and the Air, Pesticides, and Toxics Division was notified on April 21, 1993 that operations of the lead decontamination trailer began April 8, 1993.

Beginning on April 12, 1993, containers of lead bricks were retrieved from storage at TA 54, Area G a few at a time, and maintained just before processing in an interim status container storage area at TA-50-114, near the decontamination operation. Following decontamination, the lead bricks are being returned to service throughout LANL, sent off-site for reuse/salvage, or placed in storage at TA-54, Area G.

### 5.20 LD 200

LANL began lead decontamination activities in the lead decontamination trailer on April 8, 1993. From April 8, 1993 through October, 1994, approximately 58 tons of lead was examined to determine its potential for decontamination for reuse within LANL. Of that 58 tons, 3.8 tons were returned to storage as unsuitable for decontamination because radiation was higher than acceptable for workers or the lead shapes were not suitable for decontamination in the trailer. 15.25 tons was decontaminated to free release criteria and sent for off-site salvage. 20.799 tons was distributed for LANL reuse. 18.15 tons was surveyed and determined to either be LLMW requiring further processing, or suitable for reuse without further processing. The decontamination process generated 3.45 tons of secondary waste in the form of grit, which was stabilized and is stored at to TA-54, Area G.

Since October 1994, LANL has been actively surveying the lead that has been decontaminated to ensure it meets the radioactivity standard for reuse within LANL, reviewing its database to determine if lead remaining in storage as LLMW is suitable for decontamination at the lead decontamination trailer, and identifying customers for the decontaminated lead in storage.

Based on LANL's evolving understanding of how its lead waste inventory compares with the milestones term "applicable LLMW", operational issues with the lead decontamination trailer, and changing status of the lead market during the last reporting period, LANL has become aware that there may be additional unprocessed lead in the inventory that may meet the criteria of "applicable LLMW" according to the terms of milestone LD 200. While this lead continues to be surveyed and processed, DOE and LANL are reviewing whether a need exists to request an extension to the milestone due date or an amendment to the FFCA.

### 5.21 TRU 100

The TRU waste work-off plan will be submitted to the EPA within 26 months of issuing the WIPP waste acceptance criteria (WAC) for the operational phase. According to the schedule set by the DOE Carlsbad Area Office, the operational phase will begin in 1998. This date is based on the WIPP continuing to meet milestones and on receiving regulatory approval from EPA and NMED. The operational phase WAC is scheduled to be issued in 1997. In the interim, the groundwork necessary to develop the work-off plan and to assure that TRU waste is ready for shipment to WIPP is underway.

A revised waste analysis plan (WAP) covering TRU waste was formally submitted to the NMED on March 31, 1995 in response to a Notice of Deficiency issued March 31, 1994. The revised WAP includes a schedule for retrieving and characterizing a portion of the TRU wastes under earthen cover (wastes on

Pads 1, 2, and 4). Although the WIPP WAC has yet to be issued in final form, characterization activities defined in the WAP meet many applicable requirements of the current WIPP TRU waste characterization QAPP (DOE/CAO-94-1010, rev. 0) and QAPP for legacy and newly generated TRU waste. The LANL QAPP for characterization of newly generated and retrievable TRU waste is also under development.

LANL has designed and is currently assembling specialized equipment needed to allow safe waste characterization and analysis. This equipment will be used to perform nondestructive waste testing (including radioassay and radiography); vent drums and collect headspace gas samples; visually characterize heterogeneous waste; and collect core samples from homogeneous waste matrices. Required operating documentation is in place for existing waste processing facilities. The documentation for the new characterization facilities is being developed concurrently with design and assembly of those systems.

As well as preparing the necessary waste characterization program systems and documentation, computer models have been developed to define the most cost efficient process flow and systems requirements to work off the waste and ship it to the WIPP. These models evaluate a suite of processing scenarios, factoring in regulatory requirements, capacity, and cost and schedule. The information obtained from the models will be instrumental in developing a TRU waste work-off plan which is efficient and achievable. Useful waste characterization experience was gained from the execution of the Actinide Source Term Test Project (ASTTP). Portions of the TRU waste work-off plan will come directly from processes developed and lessons learned during the ASTTP.

## 5.22 GAS 100

This milestone has been completed. The *Gas Cylinder Work-Off Plan* (GAS 100) was submitted to the EPA on April 14, 1994 and the activities defined in that work-off plan were completed by June 1, 1994. The *Gas Cylinder Work-Off Plan* defines the approach and schedule for treatment of legacy gas cylinders. During fiscal year 1994, 545 RCRA-regulated gas cylinders were determined to have no measurable added radioactivity and were shipped off-site for treatment, disposal, or recycling. The net volume reduction in gaseous mixed waste streams was from 808.99 ft<sup>3</sup> to 205.81 ft<sup>3</sup>, a 603.18 ft<sup>3</sup> (or 74.56 percent) reduction in the inventory of gaseous mixed waste. Although there was a net volume reduction in the gaseous mixed waste streams, certain waste codes exhibited an increase in volume. In addition, new waste codes were added to the gaseous mixed waste inventory, as is the case for waste codes D003 and U135. The reason for these changes is that improved waste characterization information (generated as part of GAS 100) indicated that certain gaseous waste streams in storage should be reclassified. The reclassification of certain waste streams resulted in a net increase for certain waste codes and the addition of new waste codes in the inventory.

In addition, during FY94, 190 legacy gas cylinders requiring characterization were sampled and analyzed on-site by a qualified subcontractor. The cylinders were evaluated for their RCRA constituents and the database was updated accordingly. Radioactive analyses for these cylinders were completed. The waste tables in Attachment A, Appendix B to the FFCA were revised in the last Annual Report (submitted July 28, 1994) to reflect the work-off and reclassification of these gas cylinders.

As of June 1, 1994, all characterized legacy RCRA-regulated gas cylinders were shipped off-site with the exception of those cylinders which fall into one of the following three categories: (1) cylinders with added radioactivity, (2) non-DOT specification cylinders, and (3) cylinders which contain gases that are not approved for treatment at any available commercial off-site facility. LANL will continue to update the list of gas cylinders in storage and explore both internal and external treatment, disposal, and recycling options. Two skid mounted treatment units have been identified for development to work off mixed waste gas cylinders and gas cylinders in non-DOT specification containers. The scrubable gas and recontainerization skids are scheduled for construction and permitting in FY96 (see section 4.1.4 for more details).

### 5.23 CNC 100

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

Appendix A  
Update of Attachment A of Appendix B of the FFCA

This is the second AR 100 to update information regarding Attachment A of Appendix B of the FFCA. Table I, Low-Level Solid Mixed Waste; Table II, Low-Level Liquid and Gaseous Mixed Waste and; Table III, Transuranic Solid Mixed Waste are being replaced in this Annual Report with the excepted information from summary tables in the PSTP. This Table I-II, Summary of LANL Low-Level Mixed Waste and Preferred Treatment Options, groups waste streams into treatability groups, lists waste stream volume, identifies preferred and alternative treatment option, and specifies treatment sites. Table III, Summary of Transuranic Waste, has the same waste categories as FFCA Table III, but the treatment options and disposal options reflect DOE's current strategy for managing mixed TRU waste. Since the Federal Facilities Compliance Act does not cover hazardous waste, Table IV, Hazardous Waste, will remain and has been updated to reflect that the dioxin wastes (F027) have been disposed of off site. Some specific mercury wastes continue to have no off-site treatment options as illustrated by Table IV.

The PSTP contains DOE's preferred options developed after evaluation and integration of the site-specific treatment options contained in the plans of other sites that have DOE mixed waste. DOE believes the treatment options contained in its various site treatment plans represent a sensible national configuration for mixed waste treatment systems that balances DOE's interest and concerns and the input DOE received during public comment periods from regulatory agencies and the general public. The primary components of the PSTP and the FFCA are improved waste characterization and treatment. The PSTP further refines the waste categories identified in the FFCA to more effectively evaluate, select, and implement treatment processes. DOE evaluated its individual waste, separated its wastes into categories, then waste streams, and finally waste substreams that were treatability groups. Each progressive step recognized the characteristics that affect treatment. A base treatment was selected for each waste substream, which was a treatment approach appropriate for all the waste in the substream.

Table I-II Summary of Low-Level Mixed Waste and Preferred Treatment Options

Treatability Group	Inventory as of 9/30/94 (m3)	Preferred Treatment Option*	Alternative Treatment Option*	Disposal Site
IPA wastes	15.89	DSSI	CAI	Off-site
scintillation fluids	2.47	DSSI	CAI	Off-site
<b>subtotal</b>	<b>18.36</b>			
lead blankets	0.74	Commercial Treatment	Macroencapsulation	Off-site
soil with heavy metals	10.53	Commercial Treatment	Chelator Extraction	Off-site
ER soil	39.32	Commercial Treatment	Macroencapsulation	Off-site
<b>subtotal</b>	<b>50.59</b>			
aqueous organic liquids	1.65	Evaporative Oxidation	CAI	On-site
halogenated organic liquids	16.58	Hydrothermal	CAI	On-site
nonhalogenated organic liquids	14.34	Hydrothermal	CAI	On-site
PCB wastes w/ RCRA solvents	0.74	Hydrothermal	CAI	On-site
bulk oils	3.75	Hydrothermal	CAI	On-site
<b>subtotal</b>	<b>35.41</b>			
organic-contaminated combustible solids	28.32	Thermal Desorption	CAI	On-site
combustible debris	13.82	Macroencapsulation	CAI	On-site
aqueous wastes with heavy metals	1.85	Chemical Plating Waste Skid	Evaporative Oxidation	On-site
corrosive solutions	1.36	Chemical Plating Waste Skid	Evaporative Oxidation	On-site
aqueous cyanides, nitrates, chromates and arsenates	0.13	Chemical Plating Waste Skid	Evaporative Oxidation	On-site
<b>subtotal</b>	<b>3.34</b>			
water-reactive wastes	6.03	Water-Reactive Metals Skid	TBD	On-site
compressed gases requiring scrubbing	0.35	Gas Scrubbing Skid	TBD	On-site
compressed gasses requiring oxidation	0.08	Gas Oxidation Skid	CAI	On-site
organic-contaminated noncombustible solids	7.82	Thermal Desorption	TBD	On-site
elemental mercury	0.50	Amalgamation	Triple Distillation	On-site
activated or inseparable lead	15.60	Macroencapsulation	TBD	On-site
noncombustible debris	5.62	Macroencapsulation	TBD	On-site
<b>subtotal</b>	<b>21.22</b>			
inorganic solid oxidizers	0.20	Hydrothermal	TBD	On-site
lead wastes- TBD	51.44	TBD	TBD	TBD
mercury wastes - TBD	18.30	TBD	TBD	TBD
biochemical laboratory wastes	1.34	TBD	TBD	TBD
compressed gases - TBD	1.25	TBD	TBD	TBD
dewatered treatment sludge	268.17	TBD	TBD	TBD
<b>subtotal</b>	<b>340.50</b>			
nonradioactive or suspect waste items	14.24	Sort, Survey and Decontaminate	Appropriate Treatment	On-site
surface contaminated lead	56.20	Lead Decontamination Trailer	TBD	On-site
lead requiring sorting	9.97	Sort by Treatment	NA	On-site
<b>Total</b>	<b>608.6</b>			

\*Waste volumes and treatment options are subject to change based on uncertainties regarding the PSTP which has yet to be issued by the State of New Mexico.

Table III Summary of Transuranic Waste

Waste Category	Inventory as of 12/92 (m3)	Preferred Treatment Option	Alternative Treatment Option	Disposal Site
scrap metal - Na	110.1	WIPP WAC	TBD	WIPP
debris - Ba	15.0	WIPP WAC	TBD	WIPP
process residue - Cr	115.9	WIPP WAC	TBD	WIPP
shielding	2,050.7	WIPP WAC	TBD	WIPP
cemented process sludges - Pb	15.2	WIPP WAC	TBD	WIPP
decontamination waste	276.4	WIPP WAC	TBD	WIPP
cemented process sludges	183.9	WIPP WAC	TBD	WIPP
dewatered treatment sludges	1,088.3	WIPP WAC	TBD	WIPP
<b>Total</b>	<b>3,855.5</b>			

**APPENDIX B, ATTACHMENT A, TABLE 4 - HAZARDOUS WASTES**

Waste Category	Waste Code	Waste Component	Treatment Standards	Stored (ft <sup>3</sup> )	Rate (ft <sup>3</sup> /yr)	Subject to LDR (ft <sup>3</sup> )	Storage Location	Treatment Select/Available	Treatment Facility																																																												
1. Spent chemical wastes	D009	mercurous acetate mercurous chloride	0.2 mg/L 3rd thirds	0.07	0.0	0.0	TA-54 Area L	6,7	2,4																																																												
<p><b>Key to Codes</b></p> <table border="0"> <tr> <td colspan="5"><b>A. Treatment Techniques</b></td> <td colspan="5"><b>B. Treatment Facility</b></td> </tr> <tr> <td>1. - Amalgamation</td> <td>6. - Chemical Precipitation</td> <td>11. - Biodegradation</td> <td>1. - Controlled Air Incineration</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2. - DETOX (Chemical Oxidation)</td> <td>7. - Stabilization</td> <td>12. - Leaching</td> <td>2. - Hazardous Waste Treatment Facility</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3. - Deactivation</td> <td>8. - Decontamination</td> <td>13. - Macroencapsulation</td> <td>3. - Mobile Trailer</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4. - Incineration</td> <td>9. - Chemical Oxidation</td> <td>14. - Thermal Treatment and Slagging</td> <td>4. - Offsite Capabilities</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>5. - Neutralization</td> <td>10. - Chemical Reduction</td> <td>15. - Not Determined</td> <td>5. - Not Determined</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>										<b>A. Treatment Techniques</b>					<b>B. Treatment Facility</b>					1. - Amalgamation	6. - Chemical Precipitation	11. - Biodegradation	1. - Controlled Air Incineration							2. - DETOX (Chemical Oxidation)	7. - Stabilization	12. - Leaching	2. - Hazardous Waste Treatment Facility							3. - Deactivation	8. - Decontamination	13. - Macroencapsulation	3. - Mobile Trailer							4. - Incineration	9. - Chemical Oxidation	14. - Thermal Treatment and Slagging	4. - Offsite Capabilities							5. - Neutralization	10. - Chemical Reduction	15. - Not Determined	5. - Not Determined						
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<p><b>Note</b></p> <p>The Los Alamos National Laboratory has been unable to locate commercial treatment capacity for these hazardous wastes.</p>																																																																					

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Appendix B  
FFCA Milestone Interrelationships

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

Appendix B  
(Continued)  
LDR FFCA Milestones

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

Appendix B  
(Continued)  
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	TRU 100	Information developed from the TRU waste work-off plan will be reviewed to ensure that treatment and disposal problems created by generating particular LDR or MW waste streams are used as lessons learned for waste streams currently being generated and new waste streams.
HLL 100	OSS 200	Information developed from the waste characterization plan will be reviewed for its applicability to selecting off-site treatment/disposal facilities and will be used to develop action plans for off-site shipment of wastes.
	CAI 200	Information developed from the waste characterization plan will be reviewed to support selection of wastes to be used for the RCRA trial burn.
	CAI 300	Information developed from the waste characterization plan will be reviewed for its applicability to the CAI work-off plan.
	ATS 100	Information developed from the waste characterization plan will be used to further develop and refine LLMW treatment skids and to support the selection of new skids for development (reported in AR 100).
	HW 200	Applicable information developed from the waste characterization plan will be incorporated into the definitive design (Title II) for the HWTF.
	HW 300	Information developed from the waste characterization plan will be reviewed to determine whether any modifications to the RCRA MW permit application to the NMED are required.
	HW 400	Applicable information developed from the waste characterization plan, such as waste segregation information, will be used to develop the schedule for bringing the HWTF into use.
	HW 500	Applicable information developed from the waste characterization plan, such as waste segregation information, will affect construction components of the HWTF.
	HW 600	Applicable information developed from the waste characterization plan will affect the LLMW work-off plan for the HWTF.
	HW 700	Applicable information developed from the waste characterization plan, such as waste segregation information, will affect construction components of the HWTF.
	HW 800	Applicable information developed from the waste characterization plan will affect treatment operations at the HWTF.

Appendix B  
(Continued)  
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	HW 900	Applicable information developed from the waste characterization plan will affect information compiled for the LLMW work-off plan for the HWTF.
	HLL 200	Information developed from the waste characterization plan will be the basis for developing the formal plan for prioritizing LLMW treatment.
HLL 200	OSS 200	The formal plan for prioritizing LLMW treatment will incorporate applicable off-site treatment/disposal facilities and will be used to develop action plans for off-site shipment of wastes..
	CAI 200	The formal plan for prioritizing LLMW treatment will be reviewed to support selection of wastes to be used for the RCRA trial burn.
	CAI 300	The formal plan for prioritizing LLMW treatment will be reviewed for its applicability to the CAI work-off plan.
	ATS 100	The formal plan for prioritizing LLMW treatment will be used to further develop and refine LLMW treatment skids and to support the selection of new skids for development (reported in AR 100).
	HW 200	Applicable information from the waste prioritization plan will be incorporated into the definitive design (Title II) for the HWTF.
	HW 300	The formal plan for prioritizing LLMW treatment will be reviewed for its applicability to the RCRA MW permit application to the NMED.
	HW 400	Applicable information developed from the waste prioritization plan such as waste segregation information will be used to develop the schedule for bringing the HWTF into use.
	HW 500	Applicable information developed from the waste prioritization plan such as waste segregation information will affect construction components of the HWTF.
	HW 600	Applicable information developed from the waste plan will affect the LLMW work-off plan for the HWTF.
	HW 700	Applicable information developed from the waste plan, such as waste segregation information, will affect treatment operations at the HWTF.
	HW 800	Applicable information developed from the waste plan will affect treatment operations at the HWTF.
	HW 900	Applicable information developed from the waste plan will affect information compiled for the LLMW work-off plan for the HWTF.

Appendix B  
(Continued)  
LDR FFCA Milestones

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

Appendix B  
(Continued)  
LDR FFCA Milestones

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

Appendix B  
(Continued)  
LDR FFCA Milestones

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

Appendix B  
(Continued)  
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	HW 400	Information from the Title I report will contribute to developing the schedule for completion of subsequent milestones.
	HW 500	Information developed for the Title I report will be incorporated in the construction of the HWTF.
	HW 700	Information developed for the Title I report will be incorporated in the construction of the HWTF.
HW 200	HLL 200	Applicable information developed from the waste prioritization plan will be incorporated into the definitive design (Title II) for the HWTF.
	ATS 100	Information developed from the program management plan for the LLMW treatment skids will be reviewed for applicability to the Title II design elements.
	HW 100	The definitive design (Title II) will incorporate information developed in the Preliminary Design Summary Report (Title I).
	HW 300	Information from the Title I report will be incorporated into the RCRA mixed waste permit application or subsequent modifications of the application.
	HW 400	Information from the Title I report will contribute to developing the schedule for completion of subsequent milestones.
	HW 500	Information developed for the Title II report will be used in the construction of the HWTF.
	HW 700	Information developed for the Title II report will be used in the construction of the HWTF.
HW 300	HLL 100	Information developed from the waste characterization plan will be reviewed to determine whether any modifications to the RCRA MW permit application to the NMED are required.
	HLL 200	The formal plan for prioritizing LLMW treatment will be reviewed for its applicability to the RCRA MW permit application to the NMED.
	OSS 200	Action plans for off-site shipment of wastes will provide valuable information on required storage periods of waste, potential problem waste streams, untreatable waste streams, etc., to determine if modifications to the RCRA MW permit application are required.

Appendix B  
(Continued)  
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	ATS 100	The program management plan for the LLMW treatment skids will provide information to be incorporated into the RCRA MW permit application.
	HW 100	Information from the Title I report will be incorporated into the RCRA MW permit application or subsequent modifications of the application.
	HW 200	Information from the Title II report will be incorporated into the RCRA MW permit application or subsequent modifications of the application.
	HW 500	The RCRA MW permit application must be approved and a permit issued before activities beginning construction.
	HW 800	The RCRA mixed waste permit must be approved before beginning treatment.
HW 400		
	ATS 100	The program management plan for the LLMW treatment skids will provide information to be incorporated into the time line for completing the HWTF.
	HW 100	Information from the Title I report will contribute to developing the schedule for completing subsequent milestones.
	HW 200	Information from the Title II report will contribute to developing the schedule for completing subsequent milestones.
	HW 500	The schedule has a definitive time line for beginning construction.
	HW 600	The schedule has a definitive time line for completing the LLMW work-off plan for the HWTF.
	HW 700	The schedule has a definitive time line for completing construction.
HW 500		
	ATS 100	The program management plan for the LLMW treatment skids will provide information to be used in constructing the HWTF.
	HW 100	Information developed for the Title I report will be used in constructing the HWTF.
	HW 200	Information developed for the Title II report will be used in constructing the HWTF.

Appendix B  
(Continued)  
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	HW 300	The RCRA mixed waste permit application must be approved and a permit issued before construction begins.
	HW 400	The schedule has a definitive time line for starting construction.
	HW 700	The construction must begin before it can be completed.
	HW 800	The construction of the facility must be completed before treatment can begin.
HW 600	HLL 100	Applicable information developed from the waste characterization plan will affect the LLMW work-off plan for the HWTF.
	HLL 200	Applicable information developed from the waste prioritization plan will affect the LLMW work-off plan for the HWTF.
	OSS 200	Wastes not addressed in action plans for off-site shipment of wastes must be addressed in the LLMW work-off plan for the HWTF and/or the CAI.
	CAI 300	Applicable information developed from the CAI work-off plan for applicable LLMW will be reviewed while developing the LLMW work-off plan for the HWTF.
	ATS 100	The program management plan for the LLMW treatment skids will provide information to be incorporated in the LLMW work-off plan for the HWTF.
	HW 400	The schedule has a definitive time line for completing the LLMW work-off plan for the HWTF.
	HW 800	The LLMW work-off plan for the HWTF must be completed before beginning treatment of the waste.
	HW 900	The LLMW work-off plan must be completed before the waste can be worked off.
	GAS 100	Information developed from implementing the gas cylinder work-off plan may need to be incorporated into the LLMW work-off plan for the HWTF.
HW 700	ATS 100	The program management plan for the LLMW treatment skids will provide information to be used in constructing the HWTF.
	HW 100	Information developed for the Title I report will be used in constructing the HWTF.

Appendix B  
(Continued)  
LDR FFCA Milestones

PRIMARY MILESTONE	RELATED MILESTONE	NATURE OF INTERRELATIONSHIP
	HW 200	Information developed for the Title II report will be used in constructing the HWTF.
	HW 400	The schedule has a definitive time line for completing construction.
	HW 500	The construction must begin before it can be completed.
	HW 800	The construction must be completed before operation may begin.
HW 800	HLL 100	Applicable information developed from the waste characterization plan will affect treatment operations at the HWTF.
	HLL 200	Applicable information developed from the waste prioritization plan will affect treatment operations at the HWTF.
	ATS 100	The program management plan for the LLMW treatment skids will provide information to be incorporated in the plans for operation of the HWTF.
	HW 300	The RCRA MW permit must be approved before beginning treatment.
	HW 500	The facility must be constructed before treatment can begin.
	HW 600	The LLMW work-off plan for the HWTF must be completed before beginning treatment of the waste.
	HW 700	The construction must be completed before operation may begin.
	HW 900	Treatment operations must begin before waste work-off may be completed.
HW 900	ATS 100	The program management plan for the LLMW treatment skids will provide information to be incorporated while implementing the LLMW work-off plan for the HWTF.
	HW 800	Treatment operations must begin before waste work-off may be completed.
LD 100	LD 200	Operation of the lead decontamination trailer must begin before it can be completed.
LD 200	LD 100	Operation of the lead decontamination trailer must begin before it can be completed.

Appendix B  
(Continued)  
LDR FFCA Milestones

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

Appendix C Pollution Prevention

## Waste Management (CST-7) Monthly Status Update

Project:	TDD 0050 Pollution Prevention
Manager:	Micheline Devaurs
Reporting Period:	March, 1995

### 1. Significant Problems/Issues/Concerns:

The LANL Pollution Prevention Program Office has been involved with DOE-AL WMin team members in an effort to reprioritize FY95 special projects funds as the result of a loss of the 20% DOE-HQ funding holdback. We are still waiting guidance from DOE-AL regarding: (1) the actual FY95 funding level, (2) whether or not the base program will also suffer a 20% cut, and (3) whether or not to implement the funding reprioritization proposed for the special projects.

### 2. Corrective Actions:

3. Summary Assessment:       Satisfactory       Minor Concern       Major Concern

During the month of March, the LANL EM Program Director, Tom Baca, reorganized the Waste Management and Pollution Prevention Programs. The two programs were collapsed into a single Waste Management program, with the Pollution Prevention program included as a staff function to the WM Program Manager. This organizational change will not have any impact on the LANL site-wide special WMin/PP projects or their accomplishment and may, in fact, provide for better incorporation of WMin/PP efforts within WM operations as a productivity improvement initiative.

On March 9, members of DOE EM-334, DOE-AL, and DOE-LAAO came to LANL to receive briefings on WMin/PP program efforts, special projects progress, Chargeback program status, and to participate in discussions of WMin/PP issues and tours of LANL facilities. LANL impressions of this visit were very favorable.

The FY97 EM Five Year Plan ADS submittal was accomplished in March. As requested, a new TDD was written describing pollution prevention implementation actions. However, rather than being placed in the Waste Operations ADS (4172), this new implementation TDD was added to the current pollution prevention base program ADS (0050).

On March 31, Mark Weidler, Secretary, New Mexico Department of Environment, visited LANL. The Pollution Prevention Program was asked to make a presentation regarding LANL efforts to reduce wastes and LANL capabilities which the State may be able to leverage to solve other New Mexico problems.

### Mosaic Server:

A mosaic server has been successfully installed and implemented on a SPARC workstation to distribute Pollution Prevention Information to other LANL programs. Information about the P3O programs (UC Chargeback Program, UC Performance Measures, the Chemical Exchange Program) are the highlights of this server, as well as a list of Mosaic sites that LANL users can go to for more Environmental / Pollution

## Waste Management (CST-7) Monthly Status Update

Prevention information. The advantage of this server is that it has the capability of reaching a growing audience of Mosaic/World Wide Web/Internet users at LANL with a dynamic multi-media presentation. This server has been configured to restrict access to LANL users only, but it may be opened to other DOE, government, and educational sites, and possibly the general public, in the future. This server can be accessed using NCSA Mosaic, Netscape, or another Mosaic browser by LANL users at the following URL Address:

<http://perseus.lanl.gov>

### Waste Management Database:

Previously, Michelle Burns of P3O had been tasked with gathering information from LANL's Waste Management Databases. With her assignment to Program Manager of P3O, Ms. Burns has handed the task of leading the P3O database/report team to Julius Din on March 20.

One current project of the database/report team has been to assign Process ID's to wastes that are being sent to TA-54 for disposal. The Process ID system has been established to track, over a period of years, the research and production processes that produce waste, possibly identifying and recommending changes in their program to reduce waste.

Other tasks of the P3O database/report team include the regular creation of status charts and graphs for the 29 divisions involved with the UC Performance Measures. These status charts and graphs will be distributed to the division leaders on a monthly basis to ascertain their waste management improvement. These charts and graphs will eventually be incorporated onto the Mosaic Server for weekly update and access by each division office. The UC Chargeback program is also being reviewed for possible improvements to the reporting procedure used by waste generators and waste management coordinators to assure the integrity of data entered into the Waste Management Databases.

### PPOA Database and RMMA Certification Efforts:

The leaders of the Pollution Prevention Opportunity Assessment (PPOA) and Radioactive Material Management Area (RMMA) team were brought together to coordinate efforts and to share data on two projects that have similar goals. The teams will work together to reduce the man-hours used to conduct "walk-throughs" of process areas and hold meetings with the process owners / waste generators. The two complete teams will meet on April 5th to discuss their individual objectives and brainstorm on ways to integrate work and data collected by both programs.

### CHARGEBACK WASTE MINIMIZATION WORK

PPOA reports are completed in electroplating and analytical operations, drafts have been written in several other areas. Final formats are approved by P3O and the first truly completed reports will be filed, issued and entered to database in the next reporting period. Site specific plans are being assembled in two areas of electroplating and analytical work. The initial work targeted for the program's first 6 months is almost completed. The focus of the program's resources for the rest of the FY has narrowed to investigation of low-level waste, TRU wastes, and mixed wastes. Special emphasis on TA55 waste processing and Pu stabilization processes is planned, with even narrower focus on wastewater operations, toward funding and completion of a process waste minimization project at TA55 this year. Two other areas are under consideration for implementation of waste minimization projects by the end of the FY.

## Waste Management (CST-7) Monthly Status Update

### ADS ALHQ-3530-4D: FY94 HQ FUNDED SPECIAL PROJECTS

#### Contractor Coordination Group

**Progress:** Attended planning meeting, March 3rd, Phoenix AZ. Logistics and agendas were finalized for the Wmin CCG workshops scheduled for May 17, 1995 in Knoxville TN (during the DOE XI conference). Environmental restoration scenarios and a data collection format for applicable waste minimization tools was developed. Site representatives were contacted to solicit input and interested participants for the June 1995 workshop ("Programmatic Incentives for Waste Minimization")

**Planned activities:** No activity planned (for LANL representatives), due to budget constraints.

**Issue:** LANL representatives may be scaling back efforts related to Wmin CCG activities, due to budget considerations.

#### Radioactive Liquid Waste Treatment Facility

We acquired the use of a total organic carbon analyzer. We will use this to determine if the organics in the waste water are affecting our polymer's performance. Also we are looking into using a Laser particle counter to help optimize the polymer. Three times during the last month dye was found in the waste water. This dye doesn't allow for the polymer to be optimized with turbidity.

Procedures were modified for the pilot plant at TA-21 to account for the new recirculation pump. The pump was added to the pilot plant last month. Its function is to recirculate the waste water with the polymer addition while the precoat is being added to the bag filter. This pump will also allow the waste water to be immediately feed to the bag filter when the precoating of the bag filter is complete. More Precoat and Body Feed material, for the pilot plant at TA-21, arrived.

Bench scale tests were continued to be performed to provide additional information for the optimization of the polymer. Jar tests and pressure tests were performed. BETZ 1175 polymer and DE-HYFLO Super-Cel was used in the bench tests. The pressure tests were performed to determine the amount of water that could be processed and the amount of waste generated. The initial results have shown that the waste produced with this process will significantly reduce the waste being generated with the current treatment technology at TA-50.

### ADS AL/LANL-4172: WMIN PRODUCTIVITY PROJECTS

#### Plasma Beam

Work continued to develop the algorithms that provide the basis for a cost analysis of plasma based plutonium decontamination. Cost factors such as vacuum chamber and pumps, radiofrequency power and sources, feed gas consumption, electrical power, and robotics are being studied. The data will be analyzed by calculating cost per unit surface area of decontaminated material as a function of surface area throughput. The cost is expected to decrease as the throughput increases because cost for the non-consumable items, such as the vacuum chamber and pumps, labor, etc., that remain rise less than linearly as throughput is increased. We are also looking at research costs. Here we have developed a plan to experimentally address the technical risks in plasma based cleaning of plutonium surface

## Waste Management (CST-7) Monthly Status Update

contamination, and assessed the cost and personnel requirements for the first phase of a feasibility study done with plutonium surrogates.

### Nitric Acid Still

Most of the nitric acid test distillation column system has been received from Germany (Schott, Inc.) In addition to a glass plate distillation column, an empty column for use with random column packing has been purchased. The system will be assembled for cold testing at TA-55, building 3, room 170. The HCl evaporator/membrane separator system has been assembled and is being set up in a hood at TA-35, building 2. Initial experiments will include testing of heater controls and vaporization of water.

A poster session on project progress will be presented at the first annual SERDP (Strategic Environmental Research and Development Program) Symposium in April. SERDP provides partial support for the acid recycle effort using DoD funds.

### Tritium Processing

We are in the process of developing project schedules on the technical credibility and the systems study for the Tritium/Metal Reclamation Project. Our current plan is to perform a small experiment to melt some tritium contaminated parts to prove the technical aspects of the process. For the systems study, we plan to develop a database of users; make cost comparisons with other methods; and review regulations (both federal and state) in order to justify the portable process. We will also address the application of the process to aid in the cleanup of plutonium, uranium, and other hazardous materials.

### Hazardous Chemical Recycling

Now under a new name, Chemical Exchange Assistance Program and External Recycling -- CHEAPER!

This project was combined with the Internal Chemical Exchange project. The rescope of the old Hazardous Chemical Recycling and Internal Chemical Exchange programs was submitted to DOE/AL. Efforts were started to integrate the rescoped program with existing programs. The Automated Chemical Inventory System is being used to generate lists of available chemicals for exchange. A list of chemicals for exchange is available on-line in the test area of the Lab's web server. The supported chemical exchange, phase I, is continuing with assistance from the transportation group using the new acceptance criteria. The education and awareness activities were continued with an article in the Los Alamos Newsbulletin and a presentation to Waste Management personnel.

### **ADS ALHQ-0334-1A: FY95 HQ FUNDED SPECIAL PROJECTS**

#### Nambe Recycling project

The Small Business Development Center at the Northern New Mexico Community College has been contacted to either provide support, or completely write, a detailed business plan.

\$125K from EM-5 has been promised in this months April FIN Plan and \$100K plus \$25K operating matching funds have been promised from LANL.

State permitting is not required for building this operation because State Agencies have no authority on pueblo properties.

Requirements for EPA permitting have yet to be determined.

## Waste Management (CST-7) Monthly Status Update

Requirements for sole sourcing of LANL recycling products is currently being researched by a LANL contract administrator. Received ABQ-DOE requirements for Grant Funding to Nambe.

### WMIN/PP in Environmental Restoration

Progress toward Milestones

*Milestone: Strategic Plan* -- COMPLETED (January 1995).

*Milestone: Sites Evaluate WMin/P2 Tools* - IN PROGRESS

Site representatives finalized case studies detailing wastes avoided from P2/WMin in ER projects. LANL representatives began summarizing the case study results into a quarterly report for DOE HQ. Information on ER waste avoided was provided to M. Kennicott for assistance with the EM-1 Milestone.

*Milestone: Insert WMin/P2 representative into Site ER Program* -- IN PROGRESS

Project team meeting and tour of the Fernald/FERMCO site, originally scheduled for March 24, was postponed. Site representatives continued to integrate in ER and D&D planning, assessment, and implementation activities at the respective sites: team members are working directly with decommissioning projects at RFTES and LANL; coordinating WMin activities with ER operable unit managers at RFTES and LANL; integrating PPOAs into D&D/ER planning activities at Hanford; integrating P2/WMin into remedial design training modules and records of decisions at INEL; and other similar activities.

Planned activities: Team conference call will be held in April and tour of Fernald/FERMCO site will be rescheduled. Quarterly report will be submitted to HQ in April summarizing the case study results on waste avoided from P2/WMin. Status reports on site specific integration efforts will be prepared.

Issues: Michelle Burns (LANL) and Paul Deltete (ARI/DOE HQ) have been identified as the Principal Investigator(s) for the task, succeeding Micheline Devaurs.

### EM-1 Milestone Field Support

LANL completed its deliverables in support of the EM-1 Milestone on schedule during the month of March. The LANL input to this project was forwarded to the project lead at INEL for compilation into a Complex-wide response to DOE EM-334 in support of their efforts to meet this DOE EM Milestone.

### Internal Chemical Exchange

This activity has been included in the CHEAPER program activity. In the future it will be reported under that title. However, emanating from this activity is the -- Materials Substitution effort:

Materials Substitution The rescope of this project was submitted to DOE-AL in March. Resources on the Internet were added to the Waste Minimization/Materials Substitution Resources database. A updated version of the database software was received from the manufacturer and the database is in the process of being converted.

### WMIN Certification

Please note that his project was identified as one which would be eliminated, and its funding reprioritized to other special projects, if LANL is required to sustain a 20% reduction in special project funding for

## Waste Management (CST-7) Monthly Status Update

FY95. LANL is still awaiting guidance from DOE-AL regarding whether or not the funding reprioritization plan is submitted during March has been approved and should be implemented.

### Progress toward Milestones

*Milestone: Provide WMin/P2 technical assistance to WM Customer Service Office -- IN PROGRESS*

A P3O representative continues to be available on the WM Customer Service hotline on Tuesday mornings. Progress has been made re-routing usable chemicals from WM disposition to reuse/redistribution

*Milestone: WMin/P2 support to RMMA/Waste Certification -- IN PROGRESS*

Continued data reconciliation efforts for TA 48 and 55. The CST-17/waste services certification team modified the scheduled for waste certifications, identifying TA 48 and TA55 for completion by June 1995 and deferring completion of other TAs until FY 1996. TA 55 and 48 are estimated at 50% complete. P2 certification team met with PPOA team members for information exchange; and proposed completion of TA 53 certification by June 1995, in conjunction with PPOA for TA 53.

### Planned activities:

Continue to support above efforts; quarterly summary of chemical exchanges and technical assistance will be prepared.

Issue: Level of effort on the certification team may be reduced due to budget constraints.

### Affirmative Procurement

P3O met with Robyn Davis and Terri Wilkins of Sandia National Laboratories to discuss the affirmative procurement program at their facility. An agreement was struck to share information about both programs in this area, and further joint site meetings to address common affirmative procurement issues.

P3O has received many samples of products that may be applicable to the work performed at LANL. In particular, efforts to provided additional support for the new INS leasing contract for protective clothing at LANL. This new contract will reduce our waste from these products considerably, at a reduced total cost to the Laboratory.

### CMR Building Upgrade Project

1. Attended the Sandia National Laboratory led Health Physics(HP) Best Practices group meeting in Charlotte, North Carolina. During this meeting potential best practices for implementation at CMR were identified. A visit to a commercial nuclear power plant (Cawtawba) was made where we had the opportunity to observe HP Practices in application and had discussions with personnel from the plant on implementation of the practices.
2. Visited Scientific Ecology Group (SEG) at Oak Ridge, Tennessee to inspect metal remelt and radioactive waste incineration operations and to have discussions for the implementation of the movement of materials for LANL to SEG.
3. Met with Tommy Hernandez, LANL Environmental Restoration Project, Decommissioning Project Leader, to discuss the possibility of applying recycling and decontamination and free release to materials from a D&D project. A feasibility study will be conducted to determine what the possibilities may be for decontaminating some of the metals the group has already staged.

## Waste Management (CST-7) Monthly Status Update

P3O has been working closely with Phil Tubesing, building manager for the Sigma Complex, to determine a cost-effective mechanism for disposing of the large volume of contaminated metal located at his site. P3O has planned a visit to the Idaho National Engineering Laboratory (INEL) next week, where we will be participating in a tour of their facility and meeting with Colleen Owens, also an SEG employee. The topics of discussion include waste acceptance criteria that INEL used for compliance, procedures for segregation, packaging, and transporting the waste to SEG's facility in Tennessee.

### RMMA Material Segregation

During March, activities on the RMMA special project included the development of a task list to bring the WAND instrument to demonstration status. Personnel were identified and assigned this work scope and a 3-week progress review meeting scheduled for April 6. Needed equipment and supplies were also identified and obtained to support this effort. A portable assay instrument supplied by Canberra was also demonstrated during March. P3O is currently investigating the incorporation of this instrument with the segregation procedures already developed by the WAND Project for a cost savings over R&D efforts. Waste segregation procedures written by TA-55 personnel, in anticipation of RMMA materials segregation, were also obtained and reviewed during the month.

### Ultra-High Pressure Water Decontamination System/Glovebox Decontamination

We have assembled information from manufacturers, consulted with personnel experienced with this type of equipment, completed the specification document, and generated a purchase request, which we have sent out for competitive bids. The due date for the bids to be returned to us is March 27, 1995. We have begun writing a standard operating procedure (SOP) for the safe operation of this equipment. This project is currently on schedule.

### Future Plans:

As soon as possible after March 27, we plan to evaluate the bids and order the system components. We are hoping for delivery in late April or early May. We will continue work on the SOP. In addition to decontaminating a glove box in-situ, we plan to also make test stainless steel panels, with various finishes, that can be contaminated with measured amounts of a variety of special nuclear materials (SNM). These panels will then be decontaminated using this system and then re-measured for SNM. This will provide a quantitative measure of the effectiveness of the decontamination system.

#### Remaining FY-95 Schedule:

- \* Write a specification document, and purchase UHPWDS (March-April)
- \* Develop procedure for design and operation of system (May)
- \* Test decontamination of some hoods & glove boxes (June-July-August)
- \* Finalize operational procedure and document test results (September)

## Waste Management (CST-7) Monthly Status Update

4. Cost Variance:

Satisfactory

Minor Concern

Major Concern

5. Schedule Variance:

Satisfactory

Minor Concern

Major Concern

6. Technical Status:

Satisfactory

Minor Concern

Major Concern

7. Major Accomplishments:

P2 PEPORTER Volume II No. 1 has been completed and distributed to Waste Management Coordinators, Division Directors, and Group Leaders. It has also been provided to the EPIC News Bulletin through the INTERNET.

8. Waste Quantities: N/A

## Pollution Prevention/Waste Minimization

### Potential Practices to Prevent the Generation of LLW, Mixed, or Hazardous Waste

Waste Minimization begins in the planning stages of any task and follows through to the final disposition of products and by-products. The following are examples of practices that Laboratory personnel can use to prevent or reduce the generation of LLW and mixed waste. This list is not comprehensive; personnel are encouraged to identify and implement waste minimization practices that are appropriate and cost effective for their own day-to-day operations.

#### Early Planning

- Identify potential waste streams and waste minimization options in project planning stages.
- Identify specific P2/WMin practices or strategies in project plans, SOPs, Special Work Permits and waste management plans.
- For potentially large waste generating operations (e.g. construction, demolition, remediation, or others) include a P2 program and waste management representative in the planning stages.
- Designate areas properly to limit the size and number of areas where radioactive contamination is possible.
- Plan tasks carefully; consolidate or reschedule work activities to limit wastes generated from entry/exit of work areas or start/stop of processes.

#### Laboratory Techniques

- Plan experiments carefully to avoid unnecessary repetition of experiments that use HM or generate waste. Review experiment or procedure specifications to determine if lesser sample volumes and/or reagent volumes may be used. Check existing inventory of materials to determine if on-hand inventory may be used instead of buying new.
- Refine experimental techniques using non-radioactive surrogates before performing procedures that will generate LLW or mixed waste. Use only proven experimental techniques for operations involving radioactive materials, especially for those materials that are more difficult to reprocess, recycle, and reclaim.
- Use microchemistry techniques, when possible.
- Use the minimum amount of hazardous materials and rinse waters as possible in controlled areas and gloveboxes.

#### Purchasing Controls

- Before buying new materials, check the chemical inventory and the ACIS for existing stock. Contact ESH-5 for a list of others in the lab that have needed chemicals on hand. Contact P30 for a list of available chemicals for exchange.
- Purchase only the minimum amount of chemicals needed for the planned task - avoid bulk purchases except where the bulk volume is needed to meet scheduled demands for the next 60 days.

#### Provide Training

- Include P2/WMin practices and policies in training/lesson plans

#### Limit the areas where radioactive materials will be handled

#### Control items (equipment, material, etc) allowed into controlled areas

- Establish procedures to prevent unintended and unnecessary items from entering control areas and glove boxes.
- Bring in only items that are to be used soon; do not stock or stage supplies in controlled areas.
- Use material/inventory controls including minimizing on-hand inventory and establishing an authorized material lists.
- Dedicate frequently used equipment and reusable containers to the area and reuse/refill as needed. Do not bring in unopened bottles of materials that will not be totally consumed during operation; use refillable containers and refill in uncontaminated staging areas.

Univeristy of California  
ES&H Performance Measures for FY 95

Appendix F: Objective Standards of Performance, Section A

1.1.e Process Waste Minimization

Under this measure, the Laboratory is expected to reduce its waste generation by 5 percent in CY94 as compared to CY93 for the following three waste types: Low-Level Radioactive waste (LLW), Low-Level Mixed waste (Mixed), and RCRA-Hazardous (RCRA) waste.

The LANL Pollution Prevention Program Office (P30) is managing this measure and provides the following data:

Waste Category	CY93 Quantity	CY94 Quantity	Percent Difference
LLW	2122.2 m3	1754.0 m3	17% Reduction
Mixed	25.6 m3	24.3 m3	5% Reduction
RCRA	73001 kg	58280 kg	20% Reduction

1.1.f Solid Waste Minimization

Under this measure, the Laboratory is expected decrease the aggregate weight of all waste generated sitewide by 10% per calendar year. In accordance with an agreement with the DOE-Los Alamos Area Office, the "weight" of LANL wastes is reported as the volume of radioactively-contaminated waste and the mass of nonradioactive waste.

The LANL P30 is managing this measure and provides the following comparison of CY93 and CY94 waste generation:

Waste Type	CY93	CY94	Difference
Radioactive	3028.0 m3	1862.3 m3	38% Reduction
Nonradioactive	634,271 kg	418,044 kg	34% Reduction

1.1.h Source Reduction and Pollution Prevention

The Laboratory had several deliverables under this measure. The activities performed under this measure were conducted by the LANL P30. The results are presented here.

First, LANL was to conduct a survey of its operations for pollution prevention opportunities by January 31, 1995. This was accomplished and delivered on time.

Second, by March 1, 1995, LANL was to prioritize the opportunities identified above, select several of the identified activities, and apply milestones/metrics to measure the progress

made in each activity. This deliverable was also accomplished and submitted on time.

Metrics were established for measuring waste minimization/pollution prevention (WMin/PP) progress in three areas: Reduction of ER/D&D Wastes, Waste Minimization Incentives, and Reduction of Radioactive Wastes. The metrics identified were intended to measure LANL activities during CY95. Provided below is a discussion of LANL progress in each of these three WMin/PP opportunity areas.

#### Reduction of ER/D&D Wastes

The LANL P30 has a large WMin/PP special project addressing the first two metrics identified for this area. It is anticipated that these two metrics, dealing with waste generation activities in the CMR Building, will be accomplished during CY95. Additionally, the P30 is also leading a DOE Complex-wide study of the effectiveness of incorporating WMin/PP techniques in ER/D&D projects. A final report, to be generated by the end of CY95, will fully address this third metric. Therefore, at this time, LANL anticipates accomplishing all three metrics established for this WMin/PP opportunity area, qualifying for an excellent rating.

#### Waste Minimization Incentives

At this time, the Laboratory has accomplished the first three metrics identified under this measure: a WMin/PP Chargeback system was established at the beginning of FY95, feedback is provided on a monthly basis to the line managers of waste generating organizations, and a portion of the funds captured by the Chargeback system have been utilized to conduct a PPOA on all 39 LANL mixed-waste-generating processes. Also, it is anticipated that the Laboratory will achieve the fourth metric established here by the end of September, 1995. Accomplishment of all 4 metrics will qualify for an excellent rating.

#### Reduction of Radioactive Wastes

Five metrics were established for this area. At the time of this report, LANL has identified commercially-available mobile liquid waste treatment equipment for possible application at the TA-50 plant, alternative liquid waste treatment technologies have been identified and are being bench-tested, a draft affirmative procurement plan has been completed, a "green is clean" materials segregation procedure is under development, and a disposal options assessment is underway. Conservatively, LANL anticipates achieving 4 of the metrics by the end of CY95, qualifying for an excellent rating.

# Waste minimization, pollution prevention, sustainability

## Environmental stewardship forum held in Santa Fe

In the best of all worlds, after a product has reached the end of its useful life, you can feed it to the baby, said Ralph Ponce de Leon, a vice president and director of supply and environmental management for Motorola. Ponce de Leon's remark came during a recent presentation at the Lab's Environmental Stewardship Information Exchange Forum held in Santa Fe. Such was the tone of the two-day forum during which words like sustainability, waste minimization and pollution prevention were common. People representing industry and other organizations came to view Lab technologies and discuss future ways in which the Lab can help to protect and preserve the environment.

Among the topics presented was environmental stewardship as it relates to the Lab, the Department of Energy and other federal agencies, and to large and small businesses. The Lab has a role in environmental stewardship, said Director Sig Hecker during his presentation, not only to help the Lab and other federal facilities clean up their "legacy waste" but also to help American industry remain competitive through using cost-efficient ways to deal with waste.

"Everybody in our society understands the issues we face at some level," said Bruce Twining, manager of the Department of Energy's Albuquerque Field Office, during his remarks. "They don't understand the great detail of what we do, and they don't understand a lot of the technical arguments about how clean is clean enough ... but they know we live on a big planet with a lot of people, and we're developing environmental problems." He also said DOE is looking forward to working with the Lab on partnering with industry and trying to make that partnering easy.

From the state's point of view, government needs to protect the safety of citizens but shouldn't blindly demand compliance in such a way that destroys business and still doesn't achieve the desired outcomes, said John Vuksich, Gov. Gary Johnson's science adviser. He also stressed prevention rather than repair as the most cost-effective approach toward environmental protection. Vuksich cited figures from the Galvin report that the nation has 385,000 cubic meters of high-level radioactive waste and that sometimes the disposal costs can approach \$6 million per meter. "The arithmetic is not pleasant," he stated. The current approach of waste disposal is not affordable, but new technology, such as that being developed by the Lab, could make it more manageable.

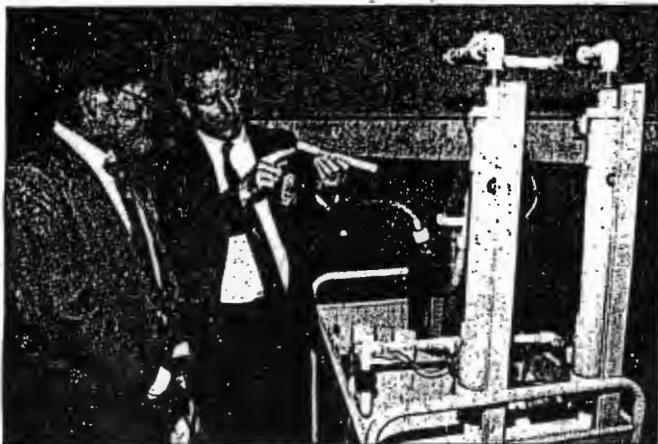
A company like Motorola is not only concerned with national issues of environmental stewardship but also those of international commerce, said Ponce de Leon, citing the European concept of "take back." Take back, he explained, deals with proposed government regulations that could require a company to be responsible for the collection and disposal of its products at the end of their useful lives. Such policies could work if you design the product for eventual disassembly, continually work to replace hazardous materials with benign ones and have the legal flexibility so if you do come up with a safer alternative, you can use it without regulatory problems, he said.

Also included in the presentations were the perspectives of Fred Johnson, chairman of Environmental Research Systems Corp., on his experience in technology transfer with the Lab and Don Panther, a staff member with the Inter-agency Environmental Technologies Office, who gave examples of cooperative federal efforts to develop environmental technologies. Pete Lyons, director of the Industrial Partnership Office (IPO), and Tom Baca, director of Environmental Management Programs (EMP), spoke in detail about what the Lab has to offer and how it is prepared to help organizations make the best use of its assets.

Taking advantage of the occasion, the Lab and the New Mexico Environment Department announced a cooperative venture to help the state prepare to close old solid-waste landfill sites throughout the state and open new ones that conform to current regulatory requirements. Initially developed by the Chemical Science and Technology (CST) Division for DOE, the Landfill Environment Decision Support System will help communities generate the information needed to close or open a landfill, said Mark Weidler, secretary of NMED.

The need for such a system arises from the impending closure of approximately 45 active landfills in the state within the next five years. Both closing existing landfills and opening new ones can impose an economic strain on small communities, he said. The new system should help communities prepare the necessary plans through user-friendly computer software. Implementation is expected in two months followed by a four- to six-month test. If successful, the system will be expanded later to other sites in New Mexico.

—Linda Anderman



Tom Robinson, right, of Health Physics Operations (ESH-1) demonstrates for Song Huang, left, of Parsons Engineering Sciences some of the technology involved in polymer filtration. The process is designed to recover metal ions using water-soluble polymers. Huang and others attended the Lab's Environmental Stewardship Information Exchange Forum last week to learn more about what technologies the Lab has to offer to assist in environmental cleanup and protection. Photo by Fred Rick.

## Public involved in strategic thinking process

The Laboratory recently hosted a town meeting at the Los Alamos Inn to inform and involve the public in its strategic thinking process. Before a capacity crowd, Lab Director Sig Hecker and Deputy Director Jim Jackson answered questions and listened to public comments. It was all about openness.

The strategic thinking process is designed to help visualize Laboratory processes, respond to Department of Energy future requirements, and handle issues responsively and responsibly by gathering suggestions and listening to the public's ideas.

Before introducing the director, Rich Bastian of the Quality and Planning Office, explained, "The

The director addressed the crowd by explaining the central mission of the Lab, how the Galvin Task Force Report could affect the Lab and the Lab's national security focus. He also commented on the recent headlines regarding job cuts at the Lab. "I have read the headlines in the papers, and if I go back and add up all of the jobs they tell me we are going to lose, I think we are pretty close to negative employment," he quipped.

Hecker said reducing the nuclear danger is the Lab's core mission, but he noted that the core mission also supports technical competencies, science, civilian concerns, defense and

Hecker took questions from the audience on solar energy, nuclear weapons and closing the Lab, and he acknowledged that "everyone has a different opinion, a vision of the Lab and what we should or should not be doing on things as emotional as nuclear weapons. We recognize that and respect that."

One individual questioned how the Galvin report was going to affect the direction of the Lab. "Clearly, Congress will do something about Galvin. But, don't ask me what," laughed Hecker. "We can make a significant contribution to the environment, sustain growth, develop energy

## Online swap shop

A great way to cut costs — and meet Department of Energy regulations — is to reuse equipment within the Laboratory rather than buying new items. Now there's an easy way to accomplish this. The first electronic version of the property "Swap Shop" is open for business.

The Swap Shop is an online listing of items no longer needed by the Lab user. The listing includes the item's description, property number, manufacturer, model, cost center, location and the property administrator to contact along with a phone number. Lab workers can look for items using a search function just like those on word-processing systems.

There are five ways to access the Swap Shop listings:

- 1) ALL-IN-1 Mail System — from the Main Menu, enter SW (If you enter BB first, for "Bulletin Board," you'll see the SW option listed.)
- 2) Gopher — from the Main Menu
  - 19 — Network News (USENET)
  - 3 — LANL Specific Newsgroups
  - 41 — Property
  - 1 — Swap Shop
  - select the last (latest document)
- 3) Mosaic — click on "Network news (USENET)," then follow the same steps as for Gopher
- 4) Any news-reader software (such as Trumpet) — subscribe to the news group *lanl.property.swap-shop.all*
- 5) PAIRS — LSW menu (List Property in Swap Shop)

EMVAX users are out of luck unless they have access to one of the routes above because this system will shut down soon. Swap Shop is not accessible on this system.

For now, only property-numbered (bar-coded) items are listed. By next January, you will be able to enter nonproperty-numbered items into Swap as well.

If you have an item you no longer need, contact your property administrator. The property administrator will get some information from you about the property, such as its condition and potential hazards, to fill out an Excess Property Information Sheet. Then the property administrator will enter the item in Swap. If the item isn't requested by someone in the Lab within 21 days, it will be picked up by Johnson Controls World Services Inc. Redistribution and Marketing and made available to schools, if appropriate, then other federal and state agencies.

sole purpose was to project accumulations in the 403(b) plan. The Lab has been advised that UC's Benefits Office will not reissue these statements. The problem has been identified and the correct amounts will appear on next year's statements.

## It's not too late to give

The Northern New Mexico/Los Alamos United Way is about a month into its 1995 fund-raising campaign to raise \$540,000, the organization's most ambitious goal ever. As of Oct. 18, it had reached about 41 percent of that goal.

United Way President Pete Bussolini said that slightly less than half the contribution envelopes distributed throughout the Laboratory have been returned. "Although we will gladly accept contributions at any time, we would really appreciate it if everybody returned the envelopes to their designated representatives by the end of October," he said.

Bussolini also said the organization is striving to meet its goal and end the campaign sometime in mid-November.

Money raised by the United Way goes to 24 community agencies throughout northern New Mexico and Los Alamos and serves



# Showcase geared toward reducing waste at the Lab

By the year 2000, the Lab's goal is to reduce the amount of waste it generates 95 percent, by among other things, developing new technologies to treat radioactive waste and encouraging recycling, according to Micheline Devaurs of the Pollution Prevention Program Office.

While the goal is admittedly ambitious, Devaurs says it is achievable. "We're optimistic," Devaurs said at a two-day pollution prevention showcase last week in Santa Fe. The showcase also featured exhibits, presentations on some of the projects under way at the Lab geared toward reducing waste, technical papers and roundtable discussions on topics ranging from the application of magnetic separation to effluent and soil cleanup, to high-explosive wastewater minimization.

The showcase was attended by about 50 Lab employees, Department of Energy representatives, environmental contractors and state Environment Department officials.

The Pollution Prevention Program is part of the Environmental Management (EM) Program Office at the Lab.

The Lab's Institutional Plan for fiscal years 1995-2000 established the 95 percent waste reduction goal to minimize the environmental impact of Lab operations and create incentives for reducing waste, said Devaurs, the Pollution Prevention Program manager. A presidential executive order also requires the Lab by 1999 to reduce by 50 percent the amount of toxic chemicals and materials it treats and disposes using source reduction practices.

The program's priorities are reducing low-level and transuranic waste, but also includes other types of waste such as hazardous, mixed-waste and sanitary waste.

Devaurs said the Pollution Prevention Program is spending about \$2.5 million of its \$4 million budget this fiscal year implementing programs "that make waste go down." She cited operational improvements at the Lab's radioactive wastewater treatment facility and the testing of alternative technologies to reduce solid waste and improve the quality of effluent. The alternative technologies can lead to dramatic savings for companies and municipalities that spend millions of dollars treating wastewater, she said.

The Lab is also looking at what others are doing to reduce their waste, Devaurs said. A contingent from the Lab recently traveled to California's Diablo Canyon nuclear power plant to observe its waste-reduction programs. She said Diablo's "Green is Clean Program," in which clean, uncontaminated waste is placed in green barrels and segregated from contaminated waste, can be applied at the Lab. "There are things we can learn in terms of approaches to waste segregation," said Devaurs.

Devaurs also cited a Laboratorywide program to recycle waste oil, a program being run jointly with Johnson Controls Inc. She said last year 13,800 gallons of waste oil from the Lab were recycled and sold to an Albuquerque company. The Lab also recycles paper and numerous other materials, she said.

The Pollution Prevention Program Office also initiated a charge-back program in October as an incentive to raise awareness of waste reduction and control or reduce waste management costs, she said. The chargeback program applies to all Laboratorywide generators of solid waste, said Devaurs, explaining that currently waste generators don't pay for the management of the waste they generate. She said a fee is assessed to waste generators and the money collected is used to conduct pollution-prevention opportunity assessments — a type of review of the waste generator's processes to identify ways to reduce the amount of waste generated.

—Steve Sandoval

...viable waste treatment alternative for some waste streams," he said. "Our assessments pertain to a qualitative appraisal of return on investment to the Lab in operating the CAI."

"There are strong attributes to incorporation as a technology," Gonzalez added. "We're looking at the business question of how to optimize the Lab's waste-management system [and how the CAI would fit into that overall system]. We are not making irrevocable decisions at this time."

For the planned expansion of Aventa, the Red Team determined that, with improved waste-management techniques and stricter waste-acceptance criteria — in particular, eliminating suspect waste that is nominally radioactively contaminated — the reactor expansion could be postponed for several years. "The Lab could delay an expansion even more significantly if we really endorsed a waste-minimization program," Bennett said. "The team felt the Lab's existing programs are not aggressive enough."

Gonzalez said. "We are not fully assuming that the CAI system was a solution to all our waste problems. We have pushed hard for a year to compel the reduce the volume of the waste before disposal. We've developed new techniques for more efficient utilization of the disposal pits at Aventa and were working with regulators in other ways to increase the amount of water waste can be stored in a pit."

"By making more efficient use of the current space, we have bought time to work out evaluation and make some decisions," Gonzalez said. "But the next is to move more of the responsibility and accountability upstream to the waste generators. We need incentive to make people more accountable for the waste they create."

Waste management is key to the Lab's ongoing missions, Bost said. Meeting responsibility to stockpile stewardship, addressing the plutonium legacy, including environmental restoration activities, and looking at recovery of resources for tritium production and consumption of radioactive waste.

"Exciting things are happening in waste management and the field could be quite busy," Bost said.

—Don R. Gustafson

# Canberra, Laboratory to develop new standard for waste assay

The Laboratory and Canberra Industries will work together to develop an instrument that should become the industry standard for measuring plutonium-contaminated waste.

Under a cooperative research and development agreement, the partners plan to produce a passive neutron barrel counter that will permit accurate assay of plutonium in transuranic and low-level waste without breaching the waste containers. The counter will give more reliable measurements with lower error rates than present-day technology and will meet the increasingly stringent regulations set by the Department of Energy and the Environmental Protection Agency.

The \$1.2 million agreement to develop the instrument grew out of a strong need from the government and the nuclear waste disposal industry, said Mark Pickrell of Nonproliferation and International Security (NIS) Division.

"Basically, if you want to get rid of nuclear waste, you have to be able to measure it with a high degree of accuracy," Pickrell said.

The passive neutron barrel counter will combine several technologies developed by the Lab over many years for the Department of Energy's nuclear materials safeguards program, whose goal is to develop control and accountability methods that can deter attempts to divert nuclear materials.

The goal of the agreement is the integration of these technologies into a single, commercially available unit that will improve precision and sensitivity. The instrument typically will be used to assay 55-gallon drums of transuranic or low-level waste.

Accurate measurements are needed to distinguish between barrels classified as low-level waste and those that meet the transuranic waste standard for eventual acceptance at disposal facilities such as the Waste Isolation Pilot Plant near Carlsbad.

The partners plan to apply advanced nondestructive assay techniques developed to meet safeguards requirements for the measurement of plutonium waste, thereby satisfying both waste assay and safeguards objectives simultaneously.

These technologies include a high-efficiency neutron detector, a cosmic-ray veto system, a statistical filter that rejects background radiation, a passive neutron multiplicity counter and a unique "add-a-source" technique for correcting errors introduced by the nonradioactive component of nuclear waste, generally called the matrix material.

"Add-a-source" introduces a known neutron source into the measurement process and measures the effect of the nonradioactive matrix on that source. With "add-a-source" measurement, inspectors can correct for the effect of the nonradioactive matrix on radiation from the plutonium in the drum, permitting much more accurate assays.

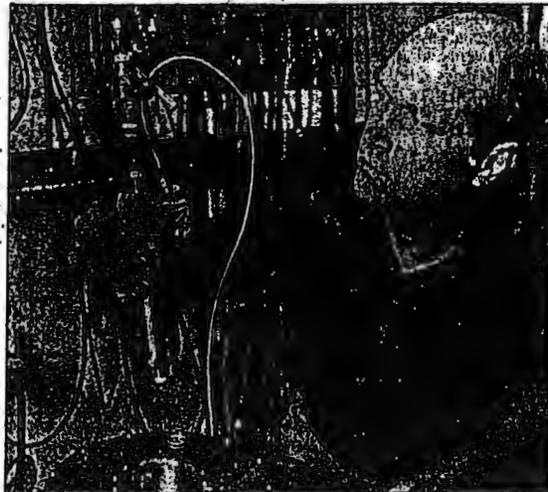
The technique was developed by Laboratory Fellow Howard Menlove of NIS.

The instrument also will make it easier to detect possible shielding of material inside the drum, which will help those using the counter to detect attempts to divert nuclear materials.

"Both Canberra and the Department of Energy will benefit from this agreement," said George Serrano, president of Canberra Nuclear Products Group.

"We will improve and expand upon our existing product line of waste assay systems, and DOE, as well as the marketplace, will benefit from the availability of an instrument that will reliably and accurately assay plutonium-bearing waste according to the regulatory prescription."

Serrano pointed out that the cooperative agreement will produce the sensitive instruments needed to characterize the large quantities of nuclear waste stockpiled nationwide at DOE facilities.



Howard Menlove of Nonproliferation and International Security (NIS) Division developed the technique for measuring plutonium-contaminated waste. Photo by John Finner of Photo Video (OC-9)

The Lab will use its Monte Carlo computer codes to design the system and optimize it for maximum performance, after which Canberra will fabricate the prototype. Both partners will evaluate results of the product testing and share fully in use of the new technology, Serrano said.

"Canberra will bear the cost of the fabrication of the prototype and the product development, which will save Los Alamos and DOE this expense," he said.

"Worldwide acceptance of this assay technique supports our decision to develop a new passive neutron counter capable of improved accuracy and sensitivity for plutonium measurement," Serrano said.

Canberra and the Lab in 1991 signed one of the DOE's first cooperative research and development agreements, which led to a more reliable continuous air monitor that is now used to protect workers in several DOE facilities.

Canberra Industries, with sales of over \$150 million, is the world's commercial leader in the manufacturing of nuclear radiation detection equipment. Canberra products perform critical services in waste characterization, nuclear energy, decommissioning and decontamination, environmental monitoring and restoration, as well as worker health and safety and special nuclear material safeguards.

In addition to Menlove and Pickrell, other members of the team who are working on the Canberra project are Jacobo Baca, David Beddingfield and William C. Harker, all in NIS.

—Jim Dannefeldt

## Sen. Domenici outlines mission of national labs

Sen. Domenici outlined the mission of the national laboratories during a hearing on the National Science Foundation's budget. He emphasized the importance of these labs in conducting basic research and developing new technologies. He noted that the labs are essential for the nation's economic and technological growth. He also mentioned the need for increased funding to support these critical research efforts.

The three labs and the Nevada Test Site will probably be for the next three to five decades the principal

## Trading ideas on environmental stewardship

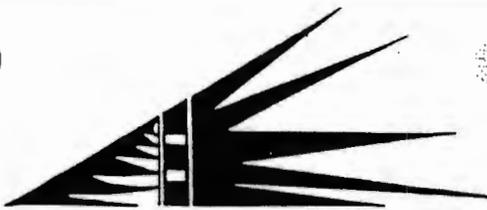
A two-day conference in Santa Fe next week continues the Lab's and the Department of Energy's outreach to industry, government and other stakeholders to partner in the area of environmental stewardship. More than 50 technology poster sessions and exhibits representing 14 Lab divisions and program offices will be presented to an estimated audience of more than 200 people from both national and international organizations, said Sarah Hayes, a program manager with Environmental Management (EM).

Scheduled topics and speakers for "Environmental Stewardship for A Sustainable Future" include Gov. Gary Johnson on the subject of environmental stewardship, Ralph Ponce de Leon of Motorola with an industry perspective, Fred Johnson of Santa Fe Technologies with a small business perspective and Don Panther of the Inter-agency Environmental Technologies Office with the federal agency perspective. Also presenting are Bruce Twining with DOE's Albuquerque Field Office, Lab Director Sig Hecker; Pete Lyons, head of the Industrial Partnership Office (IPO); and Tom Baca, director for Environmental Management Programs.

"One of the important aspects of this conference is the opportunity to engage in dialogue with potential partners," said Hayes. "We don't just want to tell organizations what Los Alamos can do for them, we also want to hear about where they are heading in the future. Only through active discussion will we be able to find out how to best serve each other."

Dialogue will come, in part, through breakout sessions scheduled on environmental challenges, industrial ecology and how to solve problems in air, water and soil characterization, she explained.

While the conference is limited to those registered, a display of the Lab's environmental technologies is planned for interested members of the public and will include 10 technical staff members to answer questions. The display is scheduled for the Sweeney Center in Santa Fe from 11 a.m. to 3 p.m. Wednesday, Feb. 8. For more information, contact Carmen M. Rodriguez at 5-6770.



**SOUTHWEST RESEARCH AND INFORMATION CENTER**  
P.O. Box 4524 Albuquerque, NM 87106 505-262-1862

MEMORANDUM

August 24, 1993

To: Hilary Noskin

From: Frances T. Ortega, E-2000 Project Director

Re: Environment 2000 Sponsorship

Los Alamos National Laboratory's (LANL) Waste Minimization Program Office participated as a cosponsor for the environmental focused essay scholarship and poster competition "Environment 2000" (E-2000) 1993. The assistance provided by LANL was instrumental in the success of the project and provided environmental education outreach to students and teachers. E-2000 is coordinated by Southwest Research and Information Center and aimed to promote awareness of environmental issues such as waste minimization and reduction and involve young people in future solutions to environmental problems. The competition invites students of New Mexico, El Paso, Texas, and the Navajo Nation. High school students compete in an essay scholarship competition and students grades K-12 in a poster contest. A panel of judges awards cash prizes in five age categories to winners.

The E-2000 1993 awards presentation took place at the Governor's Earth Day Awards Banquet and provided positive exposure for cosponsors LANL and Bank of New Mexico. The community relation opportunities brought forth by the competition such as the awards banquet, was an excellent opportunity to illuminate programs like LANL's Waste Minimization Program.

The following is a budget for E-2000 1993 and a projected budget for the year 1994:

<u>E-2000 1993</u>		<u>E-2000 1994</u>	
<u>Grades</u>	<u>Award</u>	<u>Grades</u>	<u>Award</u>
K-5	\$50	K-5	\$100
6-8	\$100	6-8	\$200
9-10	\$250	9-10	\$500
11	\$600	11	\$800
12	\$1000	12	\$1000
Subtotal	\$2000	Subtotal	\$2600

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Pollution Prevention joins forces with Property and Transportation

# Program recycles chemicals 'CHEAPER'

When it comes to the thousands of chemicals Los Alamos uses every day, the Pollution Prevention Program Office (EM/P<sup>3</sup>O) has a goal: to find new homes for those surplus chemicals that otherwise would be sent to a landfill for disposal, an action that carries an environmental consequence that can last for hundreds or even thousands of years.

Pollution Prevention offered about 1 1/2 years ago such an alternative for those who otherwise had no choice but to prepare surplus chemicals for landfill disposal. Under an informal program that didn't have a name, Pollution Prevention offered to find new owners for surplus chemicals, such as acetone, photochemicals, toluene and many others.

The program showed promise, so Pollution Prevention decided to formalize and fund it completely. It is officially called the Chemical Exchange Assistance Program and External Recycling (CHEAPER), and there is no cost for those using the service.

The office also recently joined forces with Property and Transportation (BUS-6) to ship the chemicals from donor to recipient via BUS-6's mobile packaging van.

Monica Spontarelli of BUS-6 said, "When the current program first started, P<sup>3</sup>O called us and asked if there was a way to keep transportation costs down. We worked together and came up with a funding mechanism."

"The cost savings in chemical purchases could be tremendous," said Jay Stimmel of Pollution Prevention. "Instead of throwing out unused chemicals, which produces an expensive waste stream, all a person has to do is call and let us know what the chemical is and how much of it there is."

"We're not even going to wait anymore for someone to call us. We're going to contact various Lab organizations and ask what chemicals they use regularly and what we have available."

Spontarelli said if someone does call Pollution Prevention to place a chemical on the donation list, an initial query will be done over the phone. "The office would ask if the chemical's in its original container, if it's mixed with other chemicals and other related questions.

"If we determine that the chemical can be donated and safely transported, then all the donor has to do is sign a document certifying that everything he told us about the chemical is true," she emphasized. "The donor doesn't need to fill out any paperwork; BUS-6 and P<sup>3</sup>O handle all of it, making the program completely user-friendly."

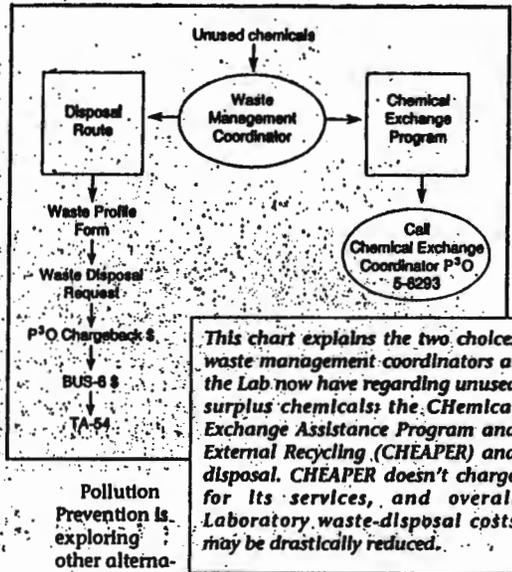
To let people know Labwide what donated chemicals are available, along with the quantities and grades, Stimmel said Pollution Prevention currently is setting up a "browser list" server in its office that is scheduled to be online on the Laboratory Gopher sometime in March.

Stimmel also is currently looking for a location to store the donated goods, preferably one that does recycling, waste handling and disposal onsite, should a surplus chemical eventually have to go through either process.

Once a site has been chosen, Pollution Prevention preliminarily will place a self-imposed, one-year time frame for its office to find a new home for a chemical once it's received. "We already have a couple of ways of finding homes for them," he pointed out.

For instance, if a chemical is still in storage after eight months, its name will be placed on the Department of Energy's online excess system, where all other DOE labs can check to see if it's something they can use.

"Also, we're looking into the possibility of the General Services Administration holding a 'sale' for us, with 15 percent of the revenue going to GSA," Stimmel said.



This chart explains the two choices waste management coordinators at the Lab now have regarding unused surplus chemicals: the Chemical Exchange Assistance Program and External Recycling (CHEAPER) and disposal. CHEAPER doesn't charge for its services, and overall Laboratory waste-disposal costs may be drastically reduced.

Pollution Prevention is exploring other alternatives as well, such as beginning a chemical exchange program with Sandia National Laboratories and allowing New Mexico universities and colleges to purchase the donated chemicals.

"I want to emphasize, however, that no matter how many alternatives there are or will be, Lab employees will get priority access to the chemicals," Stimmel stated.

He hopes that within a year 75 percent of all surplus chemicals are used up or recycled. "This really is a team effort on the part of P<sup>3</sup>O, BUS-6, Procurement (BUS-5) and Industrial Hygiene and Safety (ESH-5), not to mention the individual users. It has to be, if we're to make this program work," he said.

"We're comparing our program's performance to a similar program at Lawrence Livermore Laboratory. Their program has been around a few years, and it's very successful," he noted. "That's our goal — to have our program be even better than Livermore's."

For more information on CHEAPER, contact the Pollution Prevention Program Office at 5-8293. You also may contact P<sup>3</sup>O at [cheaper@lanl.gov](mailto:cheaper@lanl.gov) through electronic mail.

—Temel Martinez

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# Cooling without harming the ozone

## Thermoacoustic refrigeration

The Laboratory is using technology it developed to help a South African research team that has built an environmentally friendly refrigerator. The technology for thermoacoustic refrigeration could lead to commercial and domestic uses.

The thermoacoustic refrigerator doesn't use chlorofluorocarbons, or CFC's, which have been identified as being harmful to the ozone. Instead, the refrigerator uses helium and argon inert gases, said Greg Swift of Condensed Matter and Thermal Physics (MST-10).

The Lab patented the thermoacoustic refrigeration technology and has licensed the technology to three U.S. companies using it for cooling electronics, mobile and stationary air conditioning and liquifying natural gas, said Swift.

"Environmentally it's really sweet because it doesn't use any chlorofluorocarbons," said Swift. The federal Environmental Protection Agency has banned CFC's and domestic automakers are now required to use hydrofluorocarbons in car air conditioners.

The South African engineers, Neels Babst and George Waplennik, of Aerotek CSIR, have been at the Lab since March 23 working with Swift on their refrigerator. But they began developing their device last year at the South African Council for Scientific and Industrial Research (CSIR).

They initially contacted a scientist at the Naval Postgraduate School in Monterey, Calif., who also is Swift's colleague. Because the Lab has the capability to machine parts much more quickly than the Naval Postgraduate School, Babst and Waplennik came to the Lab to test and fine tune their refrigerator, said Swift.

South African businessman Peter Bland heard about the technology several years ago, Swift said, and is negotiating with the Lab to license to him the patent for the technology. Bland is funding the South African engineers' research and development costs.

The refrigerator is powered by two loudspeakers on each end of the unit. Babst said the original design of their refrigerator was U-shaped.

A long, conical-shaped resonator holds the helium and argon gases and connects the loudspeakers. Separating the loudspeakers and the resonator is



Greg Swift of Condensed Matter and Thermal Physics (MST-10), right, examines a thermoacoustic refrigerator built by South African engineers George Waplennik, left, and Neels Babst. The Laboratory invented the thermoacoustic refrigeration technology. Photo by Fred Rick

The loudspeakers supply the acoustic energy that compresses and decompresses the gases, creating the cooling effect, Babst explained.

Two tubes connected to the loudspeakers circulate water or other type of liquid that cools the unit so it doesn't overheat, Waplennik added.

Babst said preliminary tests at the Lab last week produced sustained periods of cooling down to 5 degrees Celsius (41 degrees Fahrenheit). Other no-load tests produced cooling down to minus 32 degrees Celsius (minus 25.6 degrees Fahrenheit).

The next step for the South African pair is to design a refrigeration unit



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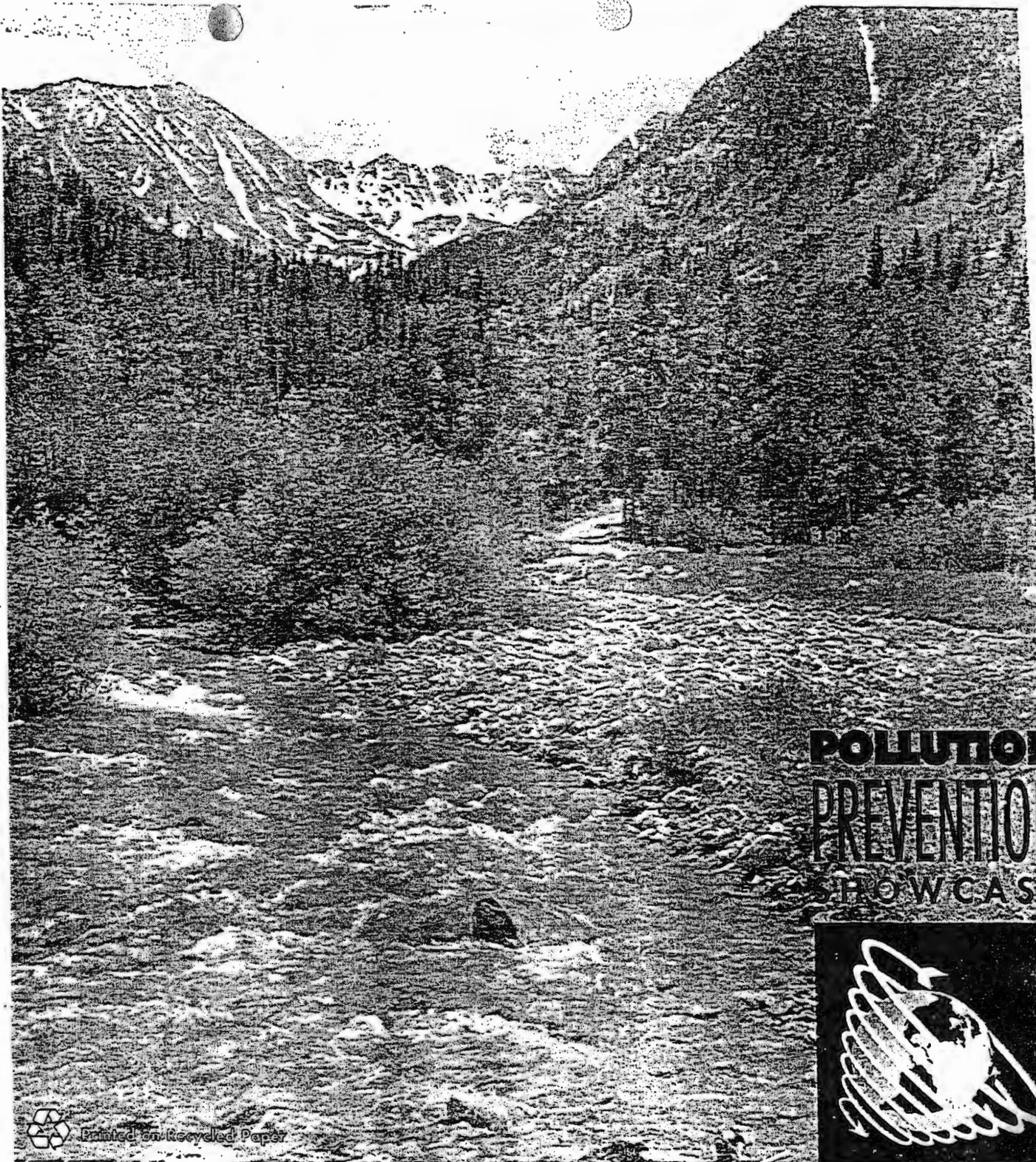
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*Fran MacPoland*

*Fran MacPoland*  
*National Environmental Executive*

*April 22, 1995*



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**Los Alamos**  
NATIONAL LABORATORY

**OSS 200**  
**FY96 ANNUAL ACTION PLAN FOR OFF-SITE SHIPMENT**  
**OF LOW-LEVEL MIXED WASTE**

**FINAL**

July 30, 1995

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

Los Alamos Area Office  
U.S. Department of Energy  
528 35th Street  
Los Alamos, New Mexico 87544

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## PREFACE

This *FY96 Annual Action Plan for Off-site Shipment of Low-Level Mixed Waste (OSS 200)* is being submitted to the United States Environmental Protection Agency (EPA) by the Department of Energy (DOE) and Los Alamos National Laboratory (LANL) in fulfillment of DOE's commitment to EPA under the Federal Facility Compliance Agreement (FFCA) developed pursuant to the land disposal restriction (LDR) requirements of the Resource Conservation and Recovery Act (RCRA), as promulgated in 40 CFR Part 268. This *FY96 Annual Action Plan for Off-site Shipment of Low-Level Mixed Waste* is provided as a deliverable in compliance with Milestone OSS 200 in Appendix B of the FFCA.

The FFCA Appendix B, Section II.D outlines the actions necessary to bring LANL into compliance with LDR storage prohibitions. The *FY96 Annual Action Plan for Off-Site Shipment of Low-Level Mixed Waste (LLMW)* describes the LLMW streams which LANL plans on shipping to off-site treatment and disposal (T&D) facilities during the period August 1995 through July 1996. This plan presents the process used to select the wastes to be shipped, and identifies the T&D facilities capable of treating and disposing of LANL waste streams. Administrative developments in support of the FFCA and off-site shipments are also described.

The following table presents the LDR FFCA milestones that relate to OSS 200 and the nature of each inter-relationship:

PRIMARY MILESTONE	SECONDARY MILESTONE	NATURE OF INTERRELATIONSHIP
OSS 200	OSS 100	The T&D facility technology and capacity identified in this document will be used for planning off-site shipments. The waste acceptance criteria for this facility will be used as criteria for selecting LLMWs for shipment.
	HLL 100	Information generated as part of the waste characterization plan will be used to determine which LLMW streams can be shipped to particular off-site T&Ds.
	HLL 200	LLMW streams not able to be shipped to an off-site T&D facility for treatment and disposal are planned to be evaluated for treatment in the Controlled-Air Incinerator (CAI) and for development of skid mounted treatment units.
	CAI 300	LLMW streams not able to sent to off-site T&D facilities for treatment and disposal are planned to be evaluated for treatment in the CAI.
	HW 300	LLMW streams not amenable for off-site treatment or disposal, or treatment in the CAI (if available) will be evaluated for development of skid mounted treatment units. The RCRA mixed waste permit for the Hazardous Waste Treatment Facility (HWTF) will be modified as appropriate to accommodate the new skid mounted treatment unit technologies to treat these LLMWs.
	HW 600	Those LLMW streams which cannot be sent to off-site T&Ds for treatment and disposal, and which cannot be treated in the CAI (if available) will be included as appropriate in the LLMW Work-Off Plan for the HWTF.

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## LIST OF ACRONYMS AND ABBREVIATIONS

ACIS	Automated Chemical Inventory Systems
ALARA	As Low As Reasonably Achievable
ATLAS	Advanced Testing Line for Actinide Separations
BAT	Best Available Technology
BDAT	Best Demonstrated Available Technology
BEJ	Best Engineering Judgment
BIF	Boiler and Industrial Furnace
BUS	Business Operations
CAI	Controlled-Air Incinerator
CAMs	Continuous Air Monitor
CFC	Chlorofluorocarbon Solvents
CFR	Code of Federal Regulations
CLS	Analytical Chemistry Group
CMR	Chemistry and Metallurgy Research
CST	Chemical Science and Technology
CWM	Chemical Waste Management, Inc.
CWDR	Chemical Waste Disposal Request
CY	Calendar Year
D&D	Decontamination and Decommission
DOE	U.S. Department of Energy
DOE/AL	DOE Albuquerque Operations Office
DOT	U.S. Department of Transportation
DSSI	Diversified Scientific Services, Inc.
DX	Dynamic Experimentation
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ERC	Earth Resources Corporation
ES&H	Environment, Safety, And Health
FERC	Federal Energy Regulatory Commission
FFCA	Federal Facility Compliance Agreement
FHA	Fire Hazard Analysis
FY	Fiscal Year
GCP	Gas Cylinder Project
GSA	General Services Administration
HEPA	High Efficiency Particulate Air
HSWA	Hazardous and Solid Waste Amendments
HWFP	Hazardous Waste Facility Permit
HWTF	Hazardous Waste Treatment Facility
ICP	Inductively Coupled Plasma
IPA	Isopropyl Alcohol
IPO	Industrial Partnership Office
JCI	Johnson Controls Incorporated
KOP	Knowledge of Process
LAMPF	Los Alamos Meson Physics Facility
LANL	Los Alamos National Laboratory
LAO	LANL Assessment Office
LDR	Land Disposal Restrictions
LLMW	Low-Level Mixed Waste
LLW	Low-Level (Radioactive) Waste
LP	Laboratory Procedure
MSC	Material Substitution Committee

**LIST OF ACRONYMS AND ABBREVIATIONS**  
(Continued)

MSDS	Material Safety Data Sheets
MST	Materials Science and Technology
MWRSF	Mixed Waste Receiving and Storage Facility
NEPA	National Environmental Policy Act
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NMED	New Mexico Environmental Department
NMT	Nuclear Materials Technology
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
P <sup>2</sup> /WMin	Pollution Prevention and Waste Minimization
P <sup>3</sup> O	Pollution Prevention Program Office
PCB	Polychlorinated Biphenyls
PHA	Preliminary Hazard Analysis
PPAC	Pollution Prevention Awareness Campaign
PPOA	Pollution Prevention Opportunity Assessment
PRD	Program Required Document
PSTP	Proposed Site Treatment Plan
PTS	Project Tracking System
PWA	Process Waste Assessment
QA	Quality Assurance
QAP	Quality Assurance Plan
RCRA	Resource Conservation and Recovery Act
R&D	Research and Development
R&M	Redistribution and Marketing Center
RES	Rollins Environmental Services
RMMA	Radioactive Material Management Area
ROD	Record of Decision
RSWD	Radioactive Solid Waste Disposal Record
SOP	Safe Operating Procedure
SSP	Site Specific Plan
SWDA	Solid Waste Disposal Act
SWEIS	Site Wide Environmental Impact Statement
TA	Technical Area
TCLP	Toxicity Characteristic Leaching Procedure
T&D	Treatment and Disposal
Title I	Preliminary Design Summary Report
Title II	Definitive Design
Title III	Final Design
TRU	Transuranic
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage, and Disposal Facility
UBC	Uniform Building Code
UL	Underwriters Laboratories
ULISSES	Uranium Line for Special Separation Sciences
VE	Value Engineering
WAC	Waste Acceptance Criteria
WBS	Work Breakdown Structure

**LIST OF ACRONYMS AND ABBREVIATIONS**  
**(Continued)**

WIPP	Waste Isolation Pilot Plant
WMC	Waste Management Coordinator
WPF	Waste Profile Form

OSS 200  
**FY96 ANNUAL ACTION PLAN FOR OFF-SITE SHIPMENT  
OF LOW LEVEL MIXED WASTE**

## **1.0 INTRODUCTION**

This document satisfies the requirement for developing an *Annual Action Plan for Off-Site Shipment of Low Level Mixed Waste* (OSS 200) pursuant to the Federal Facilities Compliance Agreement (FFCA) signed on March 15, 1994 between the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE). This agreement placed the Los Alamos National Laboratory (LANL) on a compliance schedule to treat low-level mixed waste (LLMW) in accordance with the land disposal restrictions (LDR). An agreement was needed because of a lack of available DOE and commercial treatment capacity for appropriate treatment of LLMW and a consequent exceedance of the LDR storage prohibition.

OSS 200 requires LANL to investigate the availability of off-site capacity for the treatment of LLMW on an ongoing basis. If off-site capacity has been found, LANL is required to project the amount of LLMW planned to be shipped during the next reporting period in this annual action plan. Each year, LANL reports the mixed waste shipped off site for treatment and or disposal during the previous reporting period in the *FFCA Annual Report* (AR 100), submitted concurrently with this action plan.

Other milestones which either contribute to or benefit from the annual action plan include *Feasibility of Treatment of LANL LLMW at Diversified Scientific Services, Inc.* (OSS 100), *Characterization Plan for LLMW* (HLL 100), *LLMW Treatment Prioritization Plan* (HLL 200), *RCRA Mixed Waste Permit for the HWTF* (HW 300), and *Work-Off Plan for LLMW at the HWTF* (HW 600). In accordance with HLL 200, LLMW remaining on site will be evaluated to determine if off-site treatment and disposal capacity is available. If so, LLMW streams will be shipped to the appropriate off-site treatment and disposal (T&D) facility, and such shipment plans will be reflected in future OSS 200 deliverable. LLMW streams for which no off-site treatment and disposal capacity could be identified will be evaluated for development of skid mounted treatment units. The future of the CAI is currently being re-evaluated by DOE due to declining budgets and other considerations. At this time, it is not being considered as one of LANL's primary treatment options. DOE's request to revise the CAI milestones is being reviewed by EPA. DOE requested that the requirements to test and operate the CAI be delayed until after the Site-Wide Environmental Impact Statement (SWEIS) Record of Decision (ROD) is issued. At that time, options for future use of the CAI will be reconsidered based on the ROD outcome.

This annual action plan is divided into six sections. Section 2.0 describes DOE administrative developments which support shipment of LLMW to off-site T&D facilities. Section 3.0 describes the process used to identify off-site T&D facilities with the available technology, capacity, and permits for treating and disposing of LANL LLMWs. Section 4.0 describes how the LANL waste streams to be shipped were selected. Section 5.0 presents the volume of waste types and schedule for the planned LLMW shipments, and Section 6.0 lists the references used in the preparation of this document.

## **2.0 DOE POLICY CONCERNING OFF-SITE SHIPMENTS**

In an effort to promote the use of off-site commercial facilities for treatment and disposal of LLMW, DOE issued a memorandum (October, 1993) which relaxed the restrictions, established in DOE Order 5820.2A, *Radioactive Waste Management*, for releasing radioactive materials off site. The memorandum authorizes DOE facilities to use commercial facilities for the treatment and disposal of LLMW, and establishes the conditions to be met so that DOE can approve off-site shipments. The conditions are designed to ensure that before a shipment is initiated, the appropriate shipping and manifesting documentation has been prepared and the receiving permitted facility has been evaluated to determine the compliance status with applicable local, state and federal regulatory programs. The information gathered to comply with DOE's memorandum constitutes an exemption package. In addition, the applicable National Environmental Policy Act (NEPA) documentation must be prepared and approved before an

exemption is granted. The issuance of the memorandum supports the FFCA goal of shipping LLMW to off-site permitted facilities as soon as available capacity has been identified.

### 3.0 SELECTION OF OFF-SITE TREATMENT AND DISPOSAL FACILITIES

Off-site treatment is the treatment of LLMW at a location other than LANL. These off-site treatment facilities include both DOE facilities and private commercial enterprises. At the present time, treatment capacity for LANL LLMW at other DOE sites is being reevaluated to determine the compatibility of LANL wastes with the available treatment processes, and regulatory barriers to receipt of LANL wastes at other sites. DOE's Savannah River Site's (SRS's) and Oak Ridge National Laboratory's (ORNL's) incinerators have the potential to treat certain LANL LLMWs. LLMW streams known to be suitable for treatment at SRS and ORNL are the FFCA waste streams such as ignitable liquids, spent solvents, and debris (organic contaminated and combustible only). The State of New Mexico and the states in which SRS and ORNL are located must first establish equitable reciprocal agreements. Operating permits at SRS and ORNL must also be modified to allow these facilities to accept out-of-state wastes. SRS could not actually accept waste from LANL until at least FY97 or FY98; ORNL could not accept LANL waste until FY99. Commercial treatment/disposal options are discussed below.

LANL and DOE have used a variety of information sources to identify those commercial off-site treatment/disposal facilities with the technology and capacity to treat LLMW. The DOE complex has conducted surveys of available off-site DOE and commercial treatment and disposal facilities and their capabilities. These surveys have been published in such documents as *Albuquerque Mixed Waste Treatment Plan* (DOE 1994a), and *Alternatives for Mixed Waste Management Prior to Completion of the Los Alamos Mixed Waste Disposal Facility* (LANL 1993). In addition, EPA has published in the Federal Register (Volume 59, No. 76) the results of a national profile on commercially generated LLMW, which identified LLMW T&D facilities and included treatment capacity information. A more recent survey, *Review of Private Sector Treatment, Storage and Disposal Capacity for Radioactive Waste*, (EG&G Idaho, Inc. 1994) is being used by LANL to identify new facilities which can treat and dispose of LLMW.

Commercial LLMW treatment facilities are limited in number, capacity and waste streams they can accept. LANL has been gathering and using all available information and surveys to select the facilities capable of treating and disposing of LANL LLMWs. To date, the commercial facilities found to have the capability to treat or dispose of some LANL LLMWs are Diversified Scientific Services, Inc. (DSSI) of Kingston, Tennessee, SEG of Oak Ridge, Tennessee, and Envirocare Inc. (Envirocare) of Utah.

Any off-site facility selected has limitations on the waste it is willing or allowed by its operating permit to receive, as each facility has unique waste acceptance criteria (WAC). In selecting wastes for shipment, these limitations of the WAC must be taken into account. For example, the DSSI facility may only be capable of accepting certain liquid LLMWs for thermal destruction, while Envirocare may only be capable of treating through encapsulation and/or accepting certain solid or stabilized LLMWs for land disposal. Fact sheets describing these facilities were presented in Appendix A of the *FY95 Annual Action Plan for Off-Site Shipment of Low-Level Waste*, OSS 200.

### 4.0 SELECTION OF LLMWs TO BE SHIPPED TO OFF-SITE FACILITIES

Waste streams to be reviewed for off-site treatment and/or disposal are selected based on the permits, radioactive materials licenses, and WAC at operating facilities. There are two available commercial facilities, DSSI and Envirocare, which are currently accepting LLMW of the types LANL has generated. DOE's SRS, and ORNL facilities may have similar or additional capabilities in the near future.

Waste streams identified in the past as suitable for Envirocare are those stored in Dome 49 of TA-54, Area G, and waste generated from environmental restoration activities. Liquid LLMW candidates for DSSI were identified in the document *Feasibility of Treatment of Los Alamos National Laboratory Low-Level Mixed Waste at Diversified Scientific Services, Inc.*, OSS 100 (DOE 1994b), and are stored at TA-54, Area L. During the past year, LANL has been developing its program for shipping waste off-site for treatment or disposal. The program relies on an established team of technical personnel who collectively and separately select likely waste streams, develop the

various regulatory documents, sample wastes and verify analytical results, determine if the waste stream meets the off-site facility's WAC, and prepare the waste for shipment. The process of selecting a waste stream for shipment off-site for treatment or disposal has been demonstrated to take from 9 to 12 months to complete. The process developed and used by LANL during the last year is illustrated in Figure 1.

#### **4.1 Solid LLMW**

LANL began work on the lead waste stream identified in the *FY95 Annual Action Plan for Off-Site Shipment of Low-Level Mixed Waste*. This waste stream of approximately 265 55-gallon containers is a complex stream because of the variety of shapes and forms of lead waste and will take several years to work off. It includes items such as lead contaminated soils, lead chips and turnings, lead scrap, pigs and lead shot which are not suitable for decontamination and reuse in accordance with milestone LD 200. Not all of this waste stream such as irradiated shot is believed to be suitable for treatment or disposal off site. Information on the various lead waste forms is being examined and directed toward appropriate treatment technologies. Technologies being considered for this waste stream include CO<sub>2</sub> blasting, grit blasting, sponge blasting, chemical or solvent decontamination, chemical chelation, smelting and (micro and macro) encapsulation.

The mercury contaminated soils from environmental restoration activities (approximately 17 B25 boxes and 19 55-gallon containers), are being managed as LLMW and represent the other solid waste stream LANL is pursuing for off-site treatment and disposal. The waste stream contains trace quantities of solvents and very low concentrations of radioactivity which meet the Envirocare WAC. Analytical data is being validated and verified to ensure the waste stream meets Envirocare's WAC for hazardous constituents.

#### **4.2 Liquid LLMW**

Liquid LLMWs are being sent to DSSI for treatment and disposal. LANL began developing its exemption package to ship the scintillation fluid waste stream (approximately 15 55-gallon containers) off site last year and is continuing the exemption process in this fiscal year. During the next reporting period, LANL will be concentrating on completing its exemption process for shipping the scintillation fluids off site and completing shipment, and will begin preparing to identify background data for development of the exemption package for the isopropyl alcohol waste stream (approximately 100 55-gallon containers). LANL has already begun to identify background data for development of the exemption package for shipping bulk radioactive non-regulated oils (approximately 110 55-gallon containers) off site for disposal. Shipment of this non-RCRA waste stream will free up limited storage space within the mixed waste storage area at TA-54, Area L.

### **5.0 SUMMARY OF LLMW TO BE SHIPPED**

In summary, to ship LLMW to off-site commercial facilities, LANL must:

- identify waste stream and container
- develop an approvable exemption package
- ensure its waste stream will meet the facilities' WAC

For LANL to ship LLMW to off-site DOE facilities, the following actions must be completed:

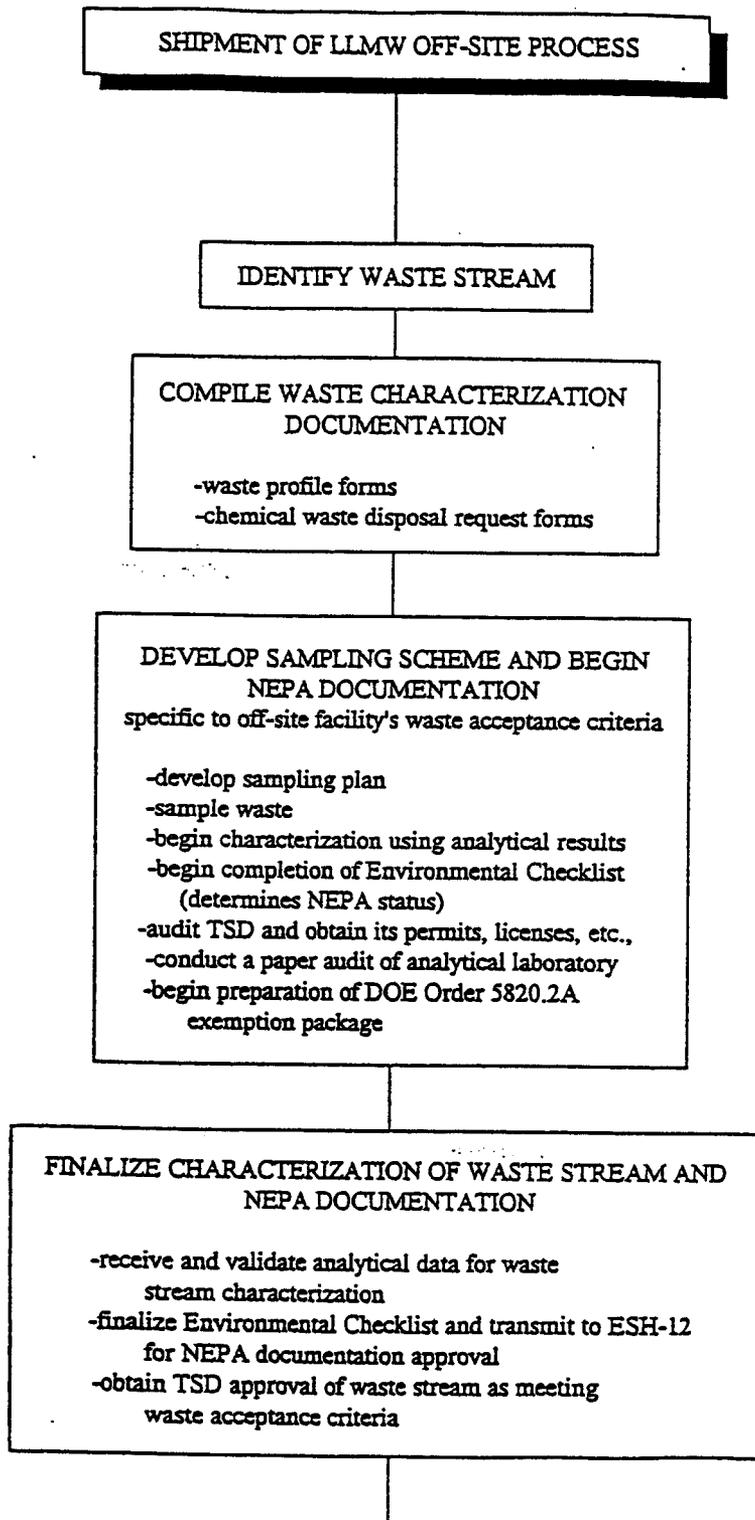
- NMED must establish equity agreements with the states to which LLMW will be shipped if treatment and disposal is in another state
- The DOE facilities must modify their RCRA operating permits to accept out-of-state (New Mexico LANL waste) LLMWs for treatment/disposal
- Any additional DOE required documentation such as NEPA documentation, safety analysis reports, etc., must be developed by the facility and approved by DOE

- LANL wastes must be scheduled for treatment/disposal at these facilities
- Treatment residue issues must be resolved (i.e., ORNL residues may either be stabilized and returned to LANL or sent to Envirocare of Utah; SRS residues will be buried on site)

During the next reporting period, August 1995 through July 1996, LANL will continue its program to ship LLMWs off site for treatment or disposal. LANL will continue its efforts to ship the Environmental Restoration contaminated soils (managed as F001, D009) to Envirocare for disposal, and its scintillation fluids (D001) to DSSI for treatment and disposal. Additionally, LANL has begun to compile the data to develop its exemption packages to ship off site for treatment/disposal its radioactive bulk non-regulated oils and isopropyl alcohol (D001) waste streams. If, during the development of an exemption package for shipping a particular waste off site, LANL determines that the waste is not suitable for off-site shipment, LANL will report this determination, as well as its continuing efforts to identify additional off-site facilities and additional waste streams for shipment, in the *FY96 Annual Report*.

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FIGURE 1

SHIPMENT OF LLMW OFF-SITE PROCESS

(CONTINUED)

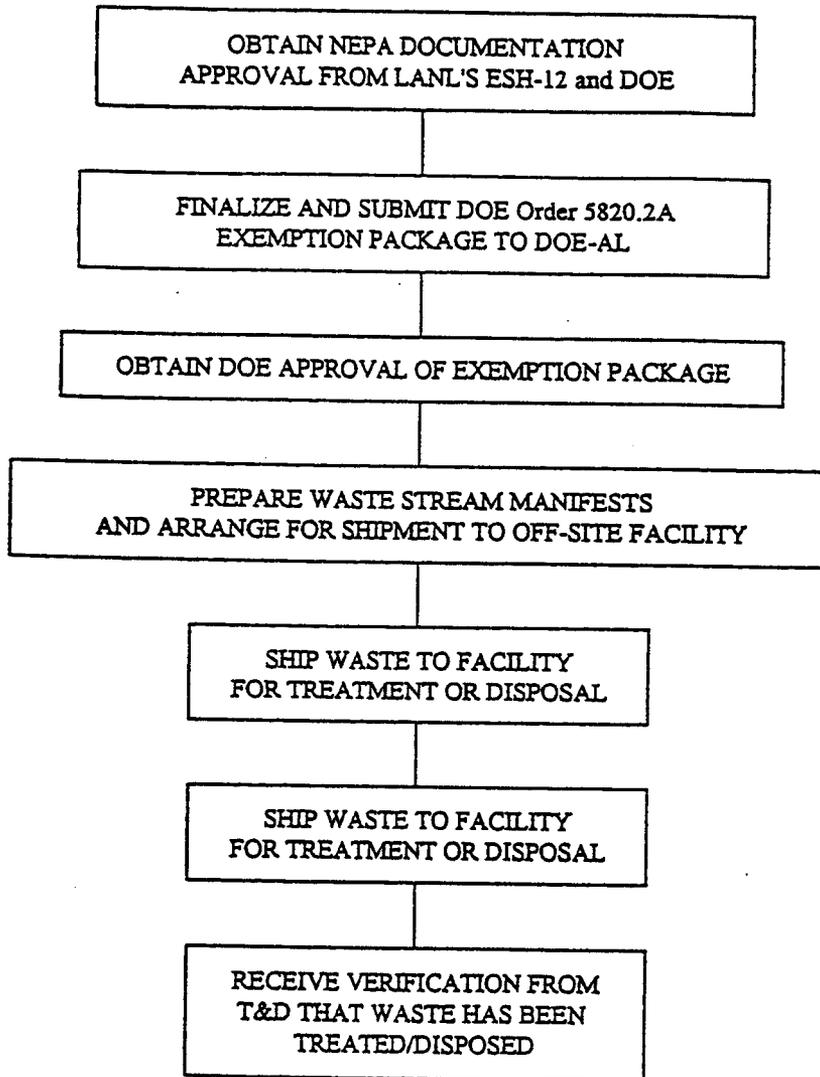


FIGURE 1  
(continued)

**WM 200**  
**FY96 WASTE MINIMIZATION ANNUAL WORK PLAN**

**FINAL**

July 30, 1995

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

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## PREFACE

This *FY96 Annual Waste Minimization Work Plan* (WM 200) is being submitted to the U.S. Environmental Protection Agency (EPA) by the U.S. Department of Energy (DOE) and Los Alamos National Laboratory (LANL) in fulfillment of DOE's commitment to EPA under the Federal Facility Compliance Agreement (FFCA) developed pursuant to the Land Disposal Restrictions (LDR) requirements of the Resource Conservation and Recovery Act (RCRA), as promulgated in 40 CFR Part 268. This *FY96 Waste Minimization Annual Work Plan* is provided as a deliverable in compliance with Milestone WM 200 in Appendix B of the FFCA.

The purpose of this annual plan is to identify pollution prevention and waste minimization priorities for fiscal year 96 and the specific activities planned to identify and assess LANL's low-level mixed waste (LLMW) streams. This plan will identify specific pollution prevention opportunity assessments (formerly called process waste assessments) and site specific plans that are in progress or planned; and the status of corrective actions and/or research and development initiatives.

This *FY96 Annual Waste Minimization Work Plan* discusses the following elements:

- Waste Minimization and Pollution Prevention Activities
- Ongoing Miscellaneous Activities

The following table presents the LDR FFCA milestones that relate to WM 200 and the nature of that interrelationship.

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

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## LIST OF ACRONYMS AND ABBREVIATIONS

ACIS	Automated Chemical Inventory Systems
ALARA	As Low As Reasonably Achievable
ATLAS	Advanced Testing Line for Actinide Separations
BAT	Best Available Technology
BDAT	Best Demonstrated Available Technology
BEJ	Best Engineering Judgment
BIF	Boiler and Industrial Furnace
BUS	Business Operations
CAI	Controlled-Air Incinerator
CAMs	Continuous Air Monitor
CFC	Chlorofluorocarbon Solvents
CFR	Code of Federal Regulations
CLS	Analytical Chemistry Group
CMR	Chemistry and Metallurgy Research
CST	Chemical Science and Technology
CWM	Chemical Waste Management, Inc.
CWDR	Chemical Waste Disposal Request
CY	Calendar Year
D&D	Decontamination and Decommission
DOE	U.S. Department of Energy
DOE/AL	DOE Albuquerque Operations Office
DOT	U.S. Department of Transportation
DSSI	Diversified Scientific Services, Inc.
DX	Dynamic Experimentation
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ERC	Earth Resources Corporation
ES&H	Environment, Safety, And Health
FERC	Federal Energy Regulatory Commission
FFCA	Federal Facility Compliance Agreement
FHA	Fire Hazard Analysis
FY	Fiscal Year
GCP	Gas Cylinder Project
GSA	General Services Administration
HEPA	High Efficiency Particulate Air
HSWA	Hazardous and Solid Waste Amendments
HWFP	Hazardous Waste Facility Permit
HWTF	Hazardous Waste Treatment Facility
ICP	Inductively Coupled Plasma
IPA	Isopropyl Alcohol
IPO	Industrial Partnership Office
JCI	Johnson Controls Incorporated
KOP	Knowledge of Process
LAMPF	Los Alamos Meson Physics Facility
LANL	Los Alamos National Laboratory
LAO	LANL Assessment Office
LDR	Land Disposal Restrictions
LLMW	Low-Level Mixed Waste
LLW	Low-Level (Radioactive) Waste

**LIST OF ACRONYMS AND ABBREVIATIONS**  
(Continued)

LP	Laboratory Procedure
MSC	Material Substitution Committee
MSDS	Material Safety Data Sheets
MST	Materials Science and Technology
MWRSF	Mixed Waste Receiving and Storage Facility
NEPA	National Environmental Policy Act
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NMED	New Mexico Environmental Department
NMT	Nuclear Materials Technology
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
P <sup>2</sup> /WMin	Pollution Prevention and Waste Minimization
P <sup>3</sup> O	Pollution Prevention Program Office
PCB	Polychlorinated Biphenyls
PHA	Preliminary Hazard Analysis
PPAC	Pollution Prevention Awareness Campaign
PPOA	Pollution Prevention Opportunity Assessment
PRD	Program Required Document
PSTP	Proposed Site Treatment Plan
PTS	Project Tracking System
PWA	Process Waste Assessment
QA	Quality Assurance
QAP	Quality Assurance Plan
RCRA	Resource Conservation and Recovery Act
R&D	Research and Development
R&M	Redistribution and Marketing Center
RES	Rollins Environmental Services
RMMA	Radioactive Material Management Area
ROD	Record of Decision
RSWD	Radioactive Solid Waste Disposal Record
SOP	Safe Operating Procedure
SSP	Site Specific Plan
SWDA	Solid Waste Disposal Act
SWEIS	Site Wide Environmental Impact Statement
TA	Technical Area
TCLP	Toxicity Characteristic Leaching Procedure
Title I	Preliminary Design Summary Report
Title II	Definitive Design
Title III	Final Design
TRU	Transuranic
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage, and Disposal Facility
UBC	Uniform Building Code
UL	Underwriters Laboratories
ULISSES	Uranium Line for Special Separation Sciences
VE	Value Engineering
WAC	Waste Acceptance Criteria
WBS	Work Breakdown Structure

**LIST OF ACRONYMS AND ABBREVIATIONS**  
**(Continued)**

WIPP	Waste Isolation Pilot Plant
WMC	Waste Management Coordinator
WPF	Waste Profile Form

**WM 200**  
**FY96 WASTE MINIMIZATION ANNUAL WORK PLAN**

## **1.0 INTRODUCTION**

The *FY96 Waste Minimization Annual Work Plan (WM 200)* describes how the Los Alamos National Laboratory (LANL) *Waste Minimization Plan (FFCA report WM 100)* will be implemented in fiscal year (FY) 96. The plan outlines LANL's pollution prevention and waste minimization (P<sup>2</sup>/WMin) priorities for FY96 and the specific activities planned to identify and assess low-level mixed waste (LLMW). Additionally, to provide consistency with the requirements of FFCA Appendix B and *Waste Minimization Plan WM 100*, it outlines P<sup>2</sup>/WMin activities addressing low-level (radioactive) waste (LLW), and transuranic (TRU) waste. The annual work plan also identifies pollution prevention opportunity assessments (PPOAs) (formerly called process waste assessments) and site specific plans (SSPs) that are expected to be completed during the FY and the corrective actions and/or research and development activities that are expected to be initiated to address the P<sup>2</sup>/WMin opportunities identified.

### **1.1 Emphasis of LANL P<sup>2</sup>/WMin Program**

P<sup>2</sup>/WMin program development, guidance, and technical and administrative support at LANL is provided by the Pollution Prevention Program Office (P<sup>3</sup>O) (formerly known as the Waste Minimization Program Office, WMPO) within the Environmental Management Directorate. An operational overview of the details of P<sup>2</sup>/WMin activities at LANL was originally provided in the *Waste Minimization Plan (WM 100)*. Since that time, the P<sup>2</sup>/WMin activities at LANL have been redirected to reflect the overall shift in LANL waste reduction priorities and to account for issues that have been addressed.

Approximately 210 waste streams regulated under the Resource Conservation and Recovery Act (RCRA) were previously targeted as priority waste streams for LANL's P<sup>3</sup>O. Of the 210 waste streams, 39 were LLMW and were addressed in FFCA Appendix B and in *Waste Minimization Plan (WM 100)*. The remaining 171 P<sup>3</sup>O waste streams were LLW, TRU waste, or RCRA and non-RCRA regulated waste. In FY95, the P<sup>2</sup>/WMin efforts focused on the 39 mixed waste streams and an additional 15 large-quantity non-RCRA regulated waste generating functions. At mid-year, P<sup>2</sup>/WMin efforts were redirected to LLW and TRU waste generating operations after it was determined that all 39 priority mixed waste streams had been addressed, either through a completed or ongoing assessment or because the waste generator was no longer in operation. Further activities on the 15 non-RCRA-regulated chemical waste generating operations were deferred at that time. Since the last reporting period, a P<sup>3</sup>O chargeback system has been established to fund technical support related to P<sup>2</sup>/WMin assessments and corrective actions.

### **1.2 Goals**

The LANL P<sup>3</sup>O will focus its FY96 efforts on those program elements that further the LANL-wide waste reduction goals, as identified by the DOE Albuquerque Operations Office (DOE/AL), and that provide the greatest return-on-investment (ROI) toward reaching the goal of 50% waste reduction by the year 1999. This goal has been established for all DOE/AL sites and is based on a three year average of calendar year (CY) 89-91 LANL waste generation as a baseline, and measuring progress utilizing a three year rolling average. Waste reductions in all waste types will be used when verifying achievement of this goal.

The University of California Performance Measures contained in DOE's LANL operating contract also currently require a 5% annual reduction for RCRA, LLW, and mixed waste types on a CY basis. Provisions are included to exclude non-mission wastes and those wastes resulting from significant programmatic increases. One such increase which is becoming apparent during CY95, as compared to CY94, is mixed waste generation at TA-55 in the Nuclear Material Technology (NMT) Division. While LANL will receive an exemption from the University of California Performance Measures due to the increase in programmatic waste generation at TA-55, P<sup>3</sup>O will work with the personnel at TA-55 to identify the sources of the mixed waste increase and develop solutions. It is important to emphasize that while P<sup>3</sup>O may establish goals, without the commitment of waste generators in the form of personnel, funding, and policy, the established goals will not be met. Consequently, the P<sup>2</sup>/WMin work

accomplished in FY96, as proposed by this work plan, will be heavily dependent on the availability of funding and continued management support. Many of the potential FY96 P<sup>2</sup>/WMin projects must compete for funding on a DOE complex-wide basis.

Section 2.0 of this work plan, "Waste Minimization and Pollution Prevention Activities," discusses the FY96 program elements that will be directed toward the remaining LLMW streams and the non-RCRA LLW and the TRU waste operations. Section 3.0, "Ongoing Miscellaneous Activities," discusses other FY96 P<sup>2</sup>/WMin program activities that may indirectly impact LLMW, LLW and TRU waste generation.

## 2.0 WASTE MINIMIZATION AND POLLUTION PREVENTION ACTIVITIES

LLMW for routine mission-related generation at LANL has been reduced to less than 10% of the annual generation rate reported in 1989. In FY96, the LANL P<sup>3</sup>O will continue conducting PPOAs of LLMW, LLW, and TRU waste generating operations begun during FY95. The P<sup>3</sup>O will continue to use internal reviews and monthly reports to track progress and ensure that milestones are achieved.

LANL uses PPOAs as a foundation for identifying P<sup>2</sup>/WMin priorities and opportunities for corrective action. PPOAs are operational assessments that characterize the nature and amount of waste generated from a process, identify the opportunities that exist for P<sup>2</sup>/WMin, and evaluate those opportunities for feasible implementation. The final product of the PPOA is a SSP which identifies specific implementation needs for corrective action. SSPs detail potential improvements to the waste generation activities, and opportunities and strategies for site specific P<sup>2</sup>/WMin. For a detailed explanation of the PPOA methodologies, see WM 100, Section 2.0.

A PPOA for the Sigma facility (TA-3) will be completed in FY96 to assess waste streams and P<sup>2</sup>/WMin opportunities for the facility as a whole. Earlier P<sup>2</sup>/WMin assessments had been completed on individual operations within the Sigma facility, such as metal finishing. Concurrent to the PPOA efforts, the P<sup>3</sup>O will provide technical support to the facility's effort in actively planning for and designing new production operations, so that P<sup>2</sup>/WMin options are incorporated into the early stages of project planning and design.

The completion of an SSP and implementation of corrective actions at the Sigma facility are not currently scheduled for FY96 because of limited resources. However, if feasible P<sup>2</sup>/WMin corrective actions are identified, P<sup>3</sup>O will assist the Sigma facility generators in locating potential funding sources, DOE Defense Program funding or ROI funding.

A SSP will be completed and P<sup>2</sup>/WMin opportunities implemented for one analytical laboratory/area within the Chemical Science and Technology (CST) Division. Full scale implementation will be dependent on funding approval and funding availability through the P<sup>3</sup>O chargeback system. Other SSPs for mixed waste generating areas will continue in FY96.

In the area of non-RCRA LLW generation, 12 PPOAs and several SSPs started in FY95 will be ongoing in FY96. These LLW generating areas include: accelerator activities at the Los Alamos Meson Physics Facility (LAMPF, TA-53); the Dynamic Experimentation (DX) Division facilities; Environmental Restoration (ER) activities (conducted by the LANL ER Program within the Environmental Management Directorate); the Chemical and Metallurgy Research (CMR) facility at TA-3; and facilities at TA-55, TA-48, and TA-50. Upon completion of the PPOAs and SSPs, these areas will be evaluated for consideration of P<sup>3</sup>O chargeback system funded implementation efforts.

Implementation of three pilot/demonstration projects will be completed in FY96, under funding provided by the P<sup>3</sup>O chargeback system. These include:

- Recycling of caustic waste water using in-line high density magnetic separation of actinide solids;
- Demonstration of very low-level radioactivity detection monitors to improve characterization and segregation of suspect LLMW and LLW; and

- Fabrication and demonstration of a 2-ft<sup>3</sup> compactor, with remote loading capabilities.

Program management, coordination, and support provided by P<sup>3</sup>O for these efforts will be funded through the DOE Waste Management FY96 Baseline. The waste generator's efforts must be funded through individual budget requests to DOE Defense Programs through the DOE Work Authorization Directive System for P<sup>2</sup>/WMin.

The PPOA, SSP, and pilot/demonstration technical efforts will continue to be supported and funded through the LANL P<sup>3</sup>O chargeback system. In addition, the P<sup>3</sup>O chargeback system will partially fund the implementation of P<sup>2</sup>/WMin activities within an operating division, subject to the availability of P<sup>3</sup>O chargeback system funds.

### 3.0 ONGOING MISCELLANEOUS ACTIVITIES

LANL performs a significant portion of the mission-critical work carried out by the DOE weapons complex of facilities. Facility transition and reconfiguration within the complex are resulting in the movement of production and stockpiling maintenance activities to LANL, with consequent increases in the amount of mission-related waste generation. LANL is currently the major generator of all the facilities operating under the DOE/AL producing RCRA and non-RCRA regulated hazardous and chemical wastes, as well as being a generator of large quantities of particularly problematic LLW and TRU wastes. These waste types are the more expensive wastes to manage, making the implementation of an aggressive and proactive P<sup>2</sup>/WMin program of paramount importance.

The following sections discuss ongoing or planned miscellaneous P<sup>2</sup>/WMin efforts that are exclusive of the LLMW, LLW, and TRU waste activities (PPOAs and SSPs) outlined in Section 2.0. These P<sup>2</sup>/WMin efforts may indirectly impact LLMW and LLW, and TRU waste generating activities, as well as other waste generating functions and activities within LANL. These miscellaneous activities include ongoing technical and administrative activities, and special projects that have been funded by the DOE to address environmental, safety and health performance measures and/or P<sup>2</sup>/WMin program development and implementation. The FY96 level of effort on each project is subject to funding availability and continued management support.

#### 3.1 Ongoing Technical Activities

The ongoing technical activities that will continue, pending funding availability, in FY96 include the following.

1. Continued implementation of the LANL Chemical Exchange Program for the internal redistribution or subsequent external redistribution of excess and unused chemicals to preclude these chemicals from becoming hazardous waste requiring treatment, storage, and disposal. The P<sup>3</sup>O will continue to support the chemical exchange program with the objective of transferring and integrating the program's operations to the waste management group or other appropriate division during FY96. Planned efforts include: establishing a dedicated chemical exchange coordinator; setting up a chemical exchange warehouse to facilitate exchange activities through a central location; developing and testing procedures for external off-site recycling; developing an awareness and education plan; and developing a tracking system.
2. Finalization of the Comprehensive Recycling Plan developed in FY95; gain approval of its implementation guide, the Recycling Technical Bulletin, also developed in FY95; and implement a pilot test to recycle hazardous and radioactive materials. P<sup>3</sup>O will continue to support the incorporation of successful P<sup>2</sup>/WMin recycling pilot projects into LANL waste management operations, where appropriate.
3. The P<sup>3</sup>O will continue its participation in the DOE funding opportunity to implement projects that reduce or eliminate wastes based upon the highest ROI. LANL, success in obtaining ROI funding will greatly affect the number and types of projects undertaken in FY96.
4. The P<sup>3</sup>O will complete by September of 1995, an assessment of alternative disposal options for materials that are free from radioactive contamination. The assessment report will identify the options available to LANL for disposal of verified clean materials that have been generated in a radioactive materials management area

(RMMA). The report will be distributed to LANL management and DOE Los Alamos Area Office for future planning of disposal options.

5. PPOAs and SSPs for an estimated 15 large quantity non-RCRA regulated chemical functions, which were put on hold during FY95, may be reactivated in FY96. The level of effort on this activity will depend on the completion of PPOA/SSP work for LLW and TRU generation and the availability of funds through the P<sup>3</sup>O chargeback system or other funding avenues.

### 3.2 Ongoing Administrative Activities

The ongoing administrative activities that will continue in FY96 are described below.

1. The P<sup>3</sup>O will continue management of core P<sup>2</sup>/WMin programmatic activities, including: coordination of and integration with P<sup>2</sup>/WMin special and ROI projects; project control and project tracking system reporting; budget analysis; strategic planning; project development and funding acquisition; and administrative support.
2. The P<sup>3</sup>O will continue data tracking and reporting through data acquisition and analysis to support the development of new strategies, tracking progress, prioritizing project activities, document successes and lessons learned, and provide for required reporting of the *Annual Report on Waste Generation and Waste Minimization Progress* (required by DOE Order 5400.1), FFCA reporting, RCRA biennial reporting, and the management of the University of California Contract Performance Measures related to P<sup>2</sup>/WMin.
3. The P<sup>3</sup>O conducted strategic planning in FY95 which established priority waste types, identified priority facilities, and defined a six-step action plan. This work will continue in FY96 and P<sup>3</sup>O will finalize the waste minimization program plan that specifies objectives, goals, implementation strategies, and planned activities. P<sup>3</sup>O will also work directly with the LANL Waste Management (WM) Program Office to develop an evolutionary WM "Future State" action plan to define future WM requirements that will meet WM operational needs under declining budgets and a changing LANL mission. The action plan is meant to address the needs for support of new programs, reduce associated costs, and increase productivity in WM services and regulatory compliance.
4. The P<sup>3</sup>O will continue oversight and coordination of the P<sup>3</sup>O chargeback system that funds technical support of PPOAs, SSPs, and implementation of waste reduction opportunities. This activity is highly dependent on annual LANL reauthorization of the P<sup>3</sup>O chargeback system and continued management support.
5. The material substitution program was re-scoped during FY95 to include primarily administrative and informational activities. (The technical activities related to identifying suitable substitutes for hazardous, toxic, and heavily regulated materials were transferred to the affirmative procurement special program and the Virtual Cleaning Center at LANL). During FY96, the Materials Substitution Committee will continue to meet on a routine basis and function as a clearing house for information exchange on internal and external materials substitution opportunities and successes. The program will continue to integrate with existing LANL programs, including procurement, recycling, and chemical exchange, and will coordinate with other DOE facilities for information sharing, where appropriate.
6. The P<sup>3</sup>O will continue to develop and implement P<sup>2</sup>/WMin awareness campaigns including exhibits, workshops, presentations, displays, newsletters, *LANL News Bulletin* articles, public school outreach, interface with stakeholders, and the LANL P<sup>2</sup>/WMin Internet homepage. P<sup>3</sup>O will prepare and distribute one-page *Fact Sheets* on P<sup>3</sup>O programs that will be used as supplemental material for waste minimization training courses, including the waste management coordinator (WMC) training program and the existing waste minimization training video, and provide modifications, additions, or updates as needed. P<sup>3</sup>O also will work directly with Environmental, Safety and Health (ES&H) training staff to create a P<sup>2</sup>/WMin self study course. The P<sup>3</sup>O will continue its annual Employee Incentives Award Program that recognizes individual effort for identifying and implementing P<sup>2</sup>/WMin activities.

7. The P<sup>3</sup>O will continue to review safe operating procedures (SOPs) for P<sup>2</sup>/WMin practices and provide written feedback on P<sup>2</sup>/WMin practices that should be considered in the SOP. The P<sup>3</sup>O will continue to distribute updated guidance information for incorporating P<sup>2</sup>/WMin best practices into SOPs, where appropriate.
8. The P<sup>3</sup>O will continue to provide program interface and technical support to waste generating programs and the waste management customer services function. P<sup>3</sup>O will provide question/answer services to WMCs and waste generators concerning P<sup>2</sup>/WMin, chemical exchange, and recycling by working in the waste management customer service office and participating in WMC and waste generator meetings and briefings. P<sup>3</sup>O will use this program interface with waste management as an opportunity to identify potential initiatives to reduce waste generation from waste management program operations. The success of this effort is being measured through the performance appraisal requirements for LANL P<sup>3</sup>O staff.

### 3.3 Ongoing Special Projects

The LANL P<sup>3</sup>O has initiated a number of P<sup>2</sup>/WMin special projects based upon the recently completed (FY95) strategic planning effort which identified program development priorities by waste type and facility that offer the greatest impact. These special projects use funding from the DOE Head Quarters Office of Environmental Management, Waste Minimization Division (EM-334). Program work aimed at process changes and/or modification to reduce or eliminate waste is expected to produce the greatest ROI and best management practices that are the simplest to implement.

P<sup>2</sup>/WMin special projects that will continue in FY96 are briefly described below. Continued effort for these projects is highly dependent on continuation of funding from the DOE.

1. P<sup>2</sup>/WMin Options Assessment and Implementation for CMR Upgrades. The project involves the assessment and pilot implementation of near-term P<sup>2</sup>/WMin options to reduce the amount of LLW from the facility upgrade activities at the CMR Building (TA-3). The project has identified P<sup>2</sup>/WMin options including elimination, reduction, recycling and reuse of selected LLW wastes. A comprehensive assessment of these near-term options begun in FY95 is nearing completion and work has begun to implement pilot activities of the more viable options. Implementation of pilot activities will continue in FY96 together with post-implementation assessments to identify and quantify realized benefits, including demonstrated waste disposal avoidance.
2. Facility Wide Materials Segregation (RMMA Project). This activity is a continuation of the LANL initiative to further develop and maintain RMMAs to administratively reduce the volume of suspect LLW generated and disposed. The project tasks will implement improved work practices and segregation practices similar to the "Green is Clean" program employed by the commercial nuclear power industry. Implementation activities include training, procedures development, and the quality assurance/quality control documentation of detection equipment use supporting the segregation effort. This activity is a cooperative effort with the RMMA program manager, ES&H health physics, training, and environmental protection at LANL.

This project provides a limited amount of support for the continued development of the LANL Waste Acceptance for Nonradioactive Disposal (WAND) assay instrumentation that may be used to demonstrate and verify clean waste segregation of materials from a RMMA (the TA-55 Plutonium Facility).

3. Solid Waste Reduction at the Radioactive Liquid Waste Treatment Facility (TA-50). Project activities include evaluation, assessment, and pilot scale testing of alternative technologies for LANL radioactive liquid waste treatment facility (TA-50) to reduce solid waste generation and improve the quality of effluent water. Bench-scale testing and pilot-scale implementation of technology approaches will continue in FY96, including the testing of commercially-available mobile treatment equipment. Data expected from this project will provide information useful to the integration of P<sup>2</sup>/WMin approaches into new facilities designs, and influence best management practices for existing radioactive liquid waste treatment facilities. Concurrently, the evaluation of alternatives will include liquid LLW processing at other DOE weapons complex facilities with the goal of implementing successful pilot projects complex-wide.

4. Pollution Prevention Procurement Program. This program will establish and implement an environmentally conscious procurement program that facilitates: the elimination or substitution of materials that result in the generation of mixed wastes, or pose complex or cost ineffective regulatory compliance concerns in disposal; maximum reuse and recycling of materials to drive source reduction; optimum treatment for disposal through materials selection criteria (compactability, incineration, reforming, decomposition, etc.); low environmental impact in treatment and disposal; and low cost in disposal as newly generated waste. The operational applicability and feasibility of each alternative identified will be evaluated and the results incorporated into the development of LANL-wide procurement policies and procedures used in the acquisition of materials used at LANL. P<sup>3</sup>O's intent is to devise policies to cause procurement to prefer some materials as opposed to others. Work to continue in FY96 includes and testing of replacement materials.
5. P<sup>2</sup>/WMin in Environmental Restoration Project. LANL is the lead site for a DOE complex-wide project team that is testing the effectiveness of P<sup>2</sup>/WMin applied to ER activities. P<sup>3</sup>O will continue this effort in FY96 providing P<sup>2</sup>/WMin expertise to the ER and decommissioning and decontamination programs. Activities include working with ER field project leaders and waste coordinators to utilize available information on P<sup>2</sup>/WMin opportunities; assisting decommissioning projects with the implementation of recycling and decontamination opportunities; and incorporating P<sup>2</sup>/WMin into project plans for facility upgrades or decommissioning .
6. The Chemical Exchange Program is a formal program for the internal exchange and external recycling of chemicals at LANL. Surplus chemicals are offered to LANL personnel instead of being sent off site for recycling or disposal. All the transfer arrangements and costs for these chemicals are handled by the chemical exchange program in order to encourage exchanges. The external program is being expanded to include DOE facilities and other government entities, such as state agencies and schools. A cooperative effort is also being implemented to integrate the programs at Los Alamos and Sandia National Laboratories.

The chemical exchange program has increased the recycling of chemicals internally and externally at LANL. The volume of used chemicals, that have required disposal because of the lack of recycling opportunities has decreased. The proactive marketing and networking practices of the program have increased the exchange of the multitude of chemicals ordered and reduces the environmental impact of the manufacture of these chemicals. The risk of exposure during hazardous operations, such as transportation of chemicals to and from LANL, will also be reduced. The project is linked to the automated chemical inventory system and the list of surplus chemicals is automatically downloaded to the Internet. The Internet is also used to advertise the program, maintain the list of chemicals available for exchange, and send electronic mail to exchange chemicals. These activities minimize the amount of paperwork required for the recycling of chemicals.

CHEAPER is a user friendly recycling program, which requires little effort and involves no cost for internal users at LANL. This program is unique because of the awareness, educational, and marketing campaigns that are part of the project and the integration with other programs at LANL. "Wishlists" are maintained so that there is a ready market for chemicals as soon as they become available for exchange. Another novel element of the program is the use of the Internet for publicity, awareness, education and marketing of the chemical exchange program. This project is part of the pollution prevention efforts at LANL and involves other programs such as Purchasing, Industrial Hygiene Transportation, Materials Substitution and Waste Management. The existence of an integrated program has increased the efficiency and effectiveness of chemical recycling at LANL.