0040816

Federal Facility Compliance Act

Proposed Site Treatment Plan for Lawrence Livermore National Laboratory

Prepared for

The State of California
California Environmental Protection Agency
Department of Toxic Substances Control
Hazardous Waste Management Program
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APR 1995
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March 1995

DOE/OAK DOC. NO. 94-W 465/5400.2.a.3.1

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EXECUTIVE SUMMARY

Purpose of the Site Treatment Plan

The Proposed Site Treatment Plan (PSTP) for the Lawrence Livermore National Laboratory (LLNL) was written in response to the Federal Facility Compliance Act (FFCAct). The FFCAct requires that site treatment plans (STPs or plans) be developed for facilities at which the U.S. Department of Energy (DOE) generates or stores mixed waste. Mixed waste is defined by the FFCAct as any waste containing both a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) and source, special nuclear, or by-product material subject to the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.).

On April 6, 1993, DOE published *The Schedule for Submitting Plans for the Treatment of Mixed Waste Generated or Stored at Each Site* in the *Federal Register* (58 *FR* 17875) describing its proposed process for developing the site treatment plans. The plans would be developed in three phases: conceptual, draft, and proposed. The conceptual plan presented known treatment needs, capabilities, and preliminary options for treating the mixed waste. The purpose of the draft plan was to identify site-specific preferred options for treating the mixed waste, or for developing technologies where technologies do not exist or need modification. The proposed plan reflects DOE's preferred options, developed with State input and based on existing available information. The options reflect a "bottom-up" approach and have been evaluated for their potential effects on other DOE sites and the overall DOE program. Changes in the preferred options and associated schedules were also made between the draft and proposed site treatment plans as a result of evaluations from the DOE-wide perspective. These may change further as a result of discussions with affected states and public comments before the approval of the PSTP and issuance by the California Department of Toxic Substances Control (DTSC) of an Order (FFCAct Order) requiring

DOE to implement the STP developed for each site.

The PSTP consists of the Compliance Plan Volume and the Background Volume with Appendices. The Compliance Plan Volume contains the enforceable milestones associated with the preferred treatment options. A more detailed discussion of the preferred treatment options, which is provided for informational purposes only, is presented in the Background Volume and Appendices.

DOE faces increasingly tight budgets throughout the DOE complex and anticipates that funding will continue to be constrained. The schedules in this and other Plans reflect those constraints. DOE has asked regulatory agencies to work with DOE and other interested parties at the site and National level to assist DOE in prioritizing its activities. Through this process, DOE expects that some schedules will be revised before the Site Treatment Plans are approved and FFCAct Orders issued.

Summary of PSTP Proposed Options for LLNL

Current inventories of mixed waste at LLNL account for a total of approximately 650 m^3, including 196.5 m^3 of potential transuranic mixed waste. In addition, one waste stream at LLNL requires further characterization. Mixed wastes will be treated either onsite (371 m^3) or shipped offsite to the Idaho National Engineering Laboratory (75.5 m^3), the Hanford site in Washington (7 m^3), or the Waste Isolation Pilot Plant in New Mexico for waste determined to be transuranic. Schedules for waste treatment and shipment vary by waste stream.

Mixed wastes at LLNL will continue to be generated in the future due to laboratory operations. Future mixed wastes generated that do not meet RCRA Land Disposal Restriction requirements will be characterized and addressed in updates to this plan as required.

Federal Facility Compliance Act
Proposed Site Treatment Plan
For
Lawrence Livermore National Laboratory
Livermore, California

Background Volume

Prepared for

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List of Abbreviations and Acronyms

AEC	Atomic Energy Commission
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CH	Contact Handled
CSTP	Conceptual Site Treatment Plan
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DOE/OAK	U.S. Department of Energy/Oakland Operations Office
DSTP or Draft Plan	Draft Site Treatment Plan
DSTP Framework	Draft Site Treatment Plan Development Framework
DTSC	State of California Department of Toxic Substances Control
DWTF	Decontamination and Waste Treatment Facility
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EM	Environmental Management
EMAB	Environmental Management Advisory Board
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPD	Environmental Protection Department
ER	Environmental Restoration
ERD	Environmental Restoration Division
ES&H	Environmental Safety and Health
FFA	Federal Facilities Agreement
FFCAct or the Act	Federal Facility Compliance Act
FY	Fiscal Year
HE	High Explosives
HEPA	High Efficiency Particulate Air (Filter)
HLW	High-level Waste
HWM	Hazardous Waste Management
HWM-RCO	Hazardous Waste Management Division Requisition Control Office
INEL	Idaho National Engineering Laboratory
IWPF	Idaho Waste Processing Facility
KD-1	Key Decision 1
LDR	Land Disposal Restriction
LLL	Lawrence Livermore Laboratory
LLNL or the Laboratory	Lawrence Livermore National Laboratory
MEO	Mediated Electrochemical Oxidation
MLLW	Mixed Low-level Waste
MSO	Molten Salt Oxidation
MTRU	Mixed Transuranic Waste
MWIR	Mixed Waste Inventory Report
MWMF	Mixed Waste Management Facility
NAS	Naval Air Station
nCi	NanoCurie
NEPA	National Environmental Policy Act
NGA	National Governors Association
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
OAT	Options Analysis Team

List of Abbreviations and Acronyms (continued)

ORNL	Oak Ridge National Laboratory
PEIS	Programmatic Environmental Impact Statement
POTW	Publicly Owned Treatment Works
PPG	Pollution Prevention Group
PSTP	Proposed Site Treatment Plan
QA/QC	Quality Assurance and Quality Control
RCRA	Resource Conservation and Recovery Act
RH	Remote Handled
ROD	Record of Decision
RTR	Real-Time Radiography
RWQCB	Regional Water Quality Control Board
SPM	Systems Prioritization Method
SRS	Savannah River Site
STP	Site Treatment Plan
SWRI	Site-Wide Remedial Investigation
TRU	Transuranic Waste
UCRL	University of California Radiation Laboratory
VOC	Volatile Organic Compound
WAC	Waste Acceptance Criteria
WAP	Waste Analysis Plan
WEDF	Waste Engineering Development Facility
WERF	Waste Experimental Reduction Facility
WIPP	Waste Isolation Pilot Project
WIPP WAC	Waste Isolation Pilot Project Waste Acceptance Criteria
WMSC	Waste Minimization Steering Committee
WRAP II-A	Waste Recovery and Processing Facility II-A

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

The Proposed Site Treatment Plan (PSTP) for the Lawrence Livermore National Laboratory (LLNL) was written in response to the Federal Facility Compliance Act (FFCAct). The FFCAct requires that site treatment plans (STPs or plans) be developed for facilities at which the U.S. Department of Energy (DOE) generates or stores mixed waste. Mixed waste is defined by the FFCAct as any waste containing both a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) and source, special nuclear, or by-product material subject to the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.). On April 6, 1993, DOE published *The Schedule for Submitting Plans for the Treatment of Mixed Waste Generated or Stored at Each Site* in the *Federal Register* (58 *FR* 17875) describing its proposed process for developing the site treatment plans. The plans would be developed in three phases: conceptual, draft, and proposed. The conceptual plan presented known treatment needs, capabilities, and preliminary options for treating the mixed waste. The purpose of the draft plan was to identify site-specific preferred options for treating the mixed waste, or for developing technologies where technologies do not exist or need modification. The proposed plan reflects DOE's preferred options, developed with state input and based on existing available information. The options reflect a "bottom-up" approach and have been evaluated for their potential affects on other DOE sites and the overall DOE program. Changes in the preferred options and associated schedules were also made between the draft and proposed site treatment plans as a result of evaluations from the DOE-wide perspective. Public comment and discussions with affected states may result in further changes prior to approval of the PSTP and issuance by the regulating agency of an Order (FFCAct Order) requiring DOE to implement the STP developed for each site. For DOE Oakland Operations Office (DOE/OAK) sites in California, the plans must be submitted to the California Department of Toxic Substances (DTSC) for approval, approval with modification, or disapproval.

The PSTP identifies specific facilities for treating mixed waste and proposes schedules as required by the FFCAct. Schedules for activities associated with the preferred treatment options are also provided as appropriate. A standardized evaluation procedure was used to identify the specific treatment facilities for treating the mixed wastes. If existing onsite treatment, onsite small-scale treatment (less-than-90-days generator treatment or a treatability study), or an existing commercial treatment agreement was available, then that option was considered as the preferred treatment option. If these options were not available, then planned onsite, existing offsite, or planned offsite facilities that could potentially treat the waste were identified and evaluated. The evaluations were based on the following criteria: (1) treatment effectiveness, (2) environmental health and safety, (3) implementability, (4) regulatory concerns, (5) stakeholder concerns, and (6) life-cycle costs. The preferred treatment option selected for each characterized waste stream as a result of these evaluations, as modified by the DOE site-wide mixed waste treatment configuration, is presented in the PSTP.

The Proposed Plan also contains schedules for the implementation of the preferred treatment options. DOE faces increasingly tight budgets throughout the DOE complex and anticipates that funding will continue to be constrained. The schedules in this and other Plans reflect those constraints. DOE is providing schedules to support further discussions with the expectation that schedules in the approved Plans will differ for some sites from the schedules in the Proposed Plans.

The schedules contained in this and the Proposed Plans for other sites are based on funds currently budgeted for and projected to be available for waste management activities. As a result, schedules in the Proposed Plans for some facilities, particularly the largest and most costly facilities, may be protracted. Schedules for small sites that are relying on the treatment capacity at larger sites are also affected. DOE anticipates that, at some sites, funds will be shifted from other environmental management activities to support more sensible and integrated schedules for mixed waste treatment.

DOE discussed with States and EPA the difficulty DOE faces in providing timely schedules for some new treatment facilities given current budgetary constraints, and the need to consider whether funds from other activities should be shifted to support more timely schedules. The States and EPA recommended that the Proposed Plans be submitted with schedules consistent with current budget and priorities, even though they recognized schedules may be extended. As part of its efforts to develop its budget request for FY 1997, DOE has asked regulatory agencies to work with DOE and other interested parties at the site and National level to assist DOE in prioritizing its activities, including mixed waste treatment, and in assessing activities under way and that need to be accomplished at the site. Through this budget development process and through discussions on the Proposed Plans, DOE and the regulatory agencies expect that some schedules will be revised before the Site Treatment Plans are approved and the FFCAct Orders are issued.

Even after the Plans are approved, DOE anticipates that modifications and adjustments to the Plan will be necessary because of the technical and funding uncertainties that naturally exist with long-term activities like those covered by the Plans. For example, emerging or new technologies not yet considered may be identified in the future that provide opportunities to manage waste more safely, effectively, and at lower cost than the current technologies identified in the Proposed Plan. DOE will continue to evaluate and develop technologies that offer potential advantages in the areas of public acceptance, risk abatement, and performance and life cycle cost. Should more promising technologies be identified, DOE may request a modification of its treatment plan in accordance with provisions of the final Site Treatment Plan and/or the FFCAct Order.

The PSTP reflects the results of discussions among the State of California and other states, the U.S. Environmental Protection Agency (EPA), and others based on the *Conceptual Site Treatment Plan* (CSTP) submitted to the State of California in October 1993, and the *Draft Site Treatment Plan* (DSTP) submitted in August of 1994. The plans for DOE/OAK mixed wastes located at LLNL are available for review at the Department of Energy Oakland Operations Office Public Reading Room at 1301 Clay Street, Oakland, California.

The PSTP consists of the Compliance Plan Volume and the Background Volume with Appendices. The Compliance Plan Volume contains the enforceable milestones associated with the preferred treatment options. A more detailed discussion of the preferred treatment options, which is provided for informational purposes only, is presented in the Background Volume and Appendices.

1.2 SITE HISTORY AND MISSION

1.2.1 Overview

LLNL is owned by the DOE and is jointly operated by the University of California and the DOE. The Laboratory was established in 1952 to conduct nuclear weapons research. Since 1952, other major programs including magnetic fusion energy, laser fusion and laser isotope separation, biomedical and environmental sciences, and applied energy technology have been added. LLNL is a research laboratory with all the infrastructure necessary to support its operations and more than 10,000 personnel. Employees conduct research in a variety of settings; the programmatic research includes the areas of chemistry and material science, computer science and technology, biological sciences, engineering, and physics. Operations at the Livermore site occupy 548,000 gross m^2 of facilities in approximately 600 buildings. Site 300 occupies 32,000 m^2 of facilities within 63 buildings and 6 temporary structures.

1.2.1.1 Site Description and Background

LLNL is composed of a main site and Site 300, with satellite operations taking place at 2020 Research Drive, Almond Avenue, and the Livermore Airport. The main site is located approximately 40 miles east of San Francisco, California, at the southeast end of the Livermore Valley in southern Alameda County, adjacent to the city of Livermore. Nearly 6 million people live within 50 miles of the main site; of these, approximately 57,600 people live within the city of Livermore. Site 300 is located in the sparsely populated hills of the Diablo Range, 15 miles southeast of the main site.

Prior to 1942, the main site property was part of the Wagoner Ranch and used for grain production and cattle grazing. In 1942, the U.S. Department of the Navy bought the property to be used for a Naval Air Station (NAS) and an adjoining ancillary gunnery range. Initially the facility was used as a flight-training base. By mid-1945, large volumes of assembly and repair work, principally overflow from Alameda NAS, were performed on the property. This activity continued until October 1946 when the NAS was deactivated.

From the 1946 deactivation until April 1950, the land and runways were retained for the U.S. Naval Reserve Retraining command. In 1950, the Navy allowed occupation of the site by the Atomic Energy Commission (AEC). The property was formally transferred to the AEC in January 1951.

In September 1952, the site was established as the Livermore Branch of the University of California Radiation Laboratory. Subsequent names of the site include the Ernest O. Lawrence Radiation Laboratory (in 1958) and the Lawrence Livermore Laboratory (in 1971). In December 1979, the Congress renamed the site the LLNL.

In 1953, the University of California Radiation Laboratory (UCRL) proposed a location along Corral Hollow between Livermore and Tracy as a high explosive (HE) test site. UCRL acquired the approximate 3-mi^2 parcel of land, named it Site 300, and commenced HE testing at the site in 1955. The site subsequently became part of the Livermore Branch of UCRL. Prior to its acquisition by UCRL, land use in the area of Site 300 was limited to sheep and cattle grazing. In 1957, additional land was acquired and the site was enlarged to 10.4 mi^2. In 1971, the UCRL Livermore Branch became the Lawrence Livermore Laboratory (LLL), and Site 300 became part of LLL.

1.2.1.2 Hazardous Waste Management Activities

LLNL presently operates five Hazardous Waste Management Facilities at the Livermore main site. These are the Area 514 Facility, Area 612 Facility, Building 233 Facility,

Building 693 Facility, and Building 419 Facility. The Area 514 and 612 Facilities include treatment and storage units for hazardous and mixed wastes; the Building 233 Facility is a container storage unit for hazardous and mixed wastes; the Building 693 Facility is a container storage unit for hazardous wastes, but will eventually be used for the storage of both hazardous and mixed wastes; and the Building 419 Facility includes inactive treatment units which are awaiting regulatory closure.

LLNL's main site is currently operating its hazardous waste management activities under the interim status standards of the *California Code of Regulations* (CCR), Title 22, Part 66265. LLNL has submitted a RCRA Part B permit application to the State of California for continued operation and expects to be issued a final permit in FY-1996. Under interim status, the main site receives hazardous and/or mixed wastes from Site 300 and the offsite satellite operations at 2020 Research Drive, Almond Avenue, and the Livermore Airport. No other offsite locations are currently allowed to send hazardous or mixed wastes to the LLNL main site.

LLNL also operates two hazardous waste management units at Site 300. These units are only used for the treatment and long-term storage (i.e., greater than 90-day storage) of hazardous wastes. LLNL does not anticipate the future generation of mixed waste at Site 300. If mixed waste is generated at Site 300, the mixed waste would be limited to storage periods of 90 days or less. The mixed waste would then be either taken to the main site for treatment and/or long term storage or sent to commercial facilities for treatment and/or disposal.

LLNL operations at the 2020 Research Drive, Almond Avenue, and the Livermore Airport locations occasionally generate small quantities of hazardous wastes. No mixed wastes are generated at these locations. There are no interim status or permitted hazardous waste management units for treatment or storage at these locations. Hazardous wastes that are generated at these locations are transported to the main site for treatment and/or storage or are sent to commercial facilities for treatment and/or disposal.

Hazardous waste management operations at LLNL are subject to federal, State of California, regional, and local environmental laws and regulations. Hazardous and mixed waste operations at LLNL sites include the safe and proper handling, treatment, packaging, storage, and disposition of all hazardous and mixed wastes generated by LLNL. Some mixed waste can be chemically or physically treated at the Livermore main site. Existing treatment for mixed wastes includes: neutralization, flocculation, chemical reduction and oxidation, precipitation, separation, filtration, solidification, size reduction, shredding, adsorption, and blending. Mixed wastes are currently treated in the Building 513 Solidification Unit, the Area 514 Waste Water Filtration Unit, and the Area 514 Waste Water Treatment Tank Farm Unit.

LLNL has requested regulatory agency approval to add centrifugation and evaporation treatment units as well as to increase current treatment operations for mixed wastes. Also, mixed wastes are stored in appropriate units at the Livermore main site for extended periods until they can be shipped to an approved offsite treatment and/or disposal facility.

The Hazardous Waste Management (HWM) Division of LLNL's Environmental Protection Department (EPD) manages the hazardous, radioactive, and mixed wastes generated at LLNL. The HWM Division processes these wastes for temporary storage, treatment, or transportation for recycling or offsite disposal. The HWM Division also processes, stores, packages, solidifies, treats, or prepares waste for shipment and disposal, recycling, or discharge to the sanitary sewer. Additionally, the HWM Division is involved in locating and evaluating facilities that may accept mixed waste for storage, treatment, or disposal, and subsequently in ensuring that shipments from LLNL meet the waste acceptance criteria of any selected site.

1.2.1.3 Environmental Restoration Activities

The Environmental Restoration Division (ERD) of EPD is responsible for identifying and remediating historic releases to the environment and remediating contamination resulting

from past hazardous materials handling and disposal practices, including leaks and spills, that have occurred at the Livermore main site and Site 300. These past practices and spills have resulted in releases of contaminants at concentrations requiring remedial measures. In addressing the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) compliance issues, ERD staff plans, directs, and conducts assessments to determine both the impact of such releases on the environment and the measures needed to reduce contamination levels to protect human health and the environment.

The ERD staff investigates field sites to confirm the presence and extent of contamination and its impact on human health and the environment. ERD also evaluates various remediation technologies, including state-of-the-art technologies, and recommends and implements actions for environmental restoration. Finally, ERD is responsible for managing remediation activities, such as soil removal and groundwater and surface water treatment, and for assisting in closure of inactive facilities in a manner designed to prevent or minimize the extent of environmental contamination.

1.2.2 Mission

The mission of LLNL is to be a national resource of scientific, technical, and engineering capability with special focus on national security, the environment, energy, biomedicine, and industrial partnerships. LLNL undertakes those multidisciplinary, fundamental, and applied research and development activities that are necessary to maintain a leading position in the diverse scientific and technical fields required for this mission. In pursuit of this mission, LLNL interacts closely with scientific and technical personnel throughout the federal government, other national laboratories, universities and industry.

Over the years, LLNL's mission has evolved to include a wide variety of activities, including inertial confinement fusion, laser isotope separation, magnetic fusion energy, biomedical and environmental research, energy and resources, environmental restoration and waste management, and scientific and institutional support. A specific activity in support of LLNL's

mission involving environmental research and waste management is the Mixed Waste Management Facility (MWMF) project. This project's mission is to design, construct, and start-up a facility by integrating the systems necessary to provide, through development and demonstration, the technical basis for the treatment of LLNL, DOE complex, and commercial low-level mixed organic wastes without the use of incineration. The facility will be used to obtain data to determine whether MWMF treatment technologies are equivalent to incineration. Equivalency to incineration will be based on the MWMF's ability to meet or surpass the treatment standards for the RCRA LDR wastes that have incineration as their technology-based standard.

1.3 FRAMEWORK FOR DEVELOPING DOE'S SITE TREATMENT PLANS

RCRA Land Disposal Restrictions (LDR) require the treatment of hazardous waste [including the hazardous component(s) of mixed waste] to certain standards before the waste can be land-disposed, and prohibit storage of hazardous wastes that do not meet LDR standards, except for the purposes of accumulating sufficient quantities to facilitate proper recovery, treatment, or disposal of the waste. DOE is currently storing mixed waste inconsistent with the LDR provisions because the treatment capacity for such wastes, either at DOE sites or in the commercial sector, is not adequate or is unavailable at this time.

The FFCAct, signed on October 6, 1992, waives sovereign immunity for fines and penalties for RCRA violations at Federal facilities. However, the FFCAct postpones the waiver for three years for LDR storage prohibition violations for DOE mixed wastes and requires DOE to prepare plans for developing the required treatment capacity for its mixed waste at each site at which it stores or generates mixed waste. Each plan must be approved by the State or EPA, after consultation with other affected states and consideration of public comment, and an order shall then be issued by the regulatory agency requiring compliance with the plan. The FFCAct further provides that DOE will not be subject to fines and penalties for LDR storage prohibition violations for mixed waste as long as it is in compliance with an approved plan and order.

The FFCAct requires the plans to contain schedules for developing capacity for mixed waste for which identified treatment technologies exist; and for mixed waste without an identified existing treatment technology, schedules for identifying and developing technologies. The FFCAct also requires the plan to provide certain information where radionuclide separation is proposed. The FFCAct states that the plans may provide for centralized, regional or onsite treatment of mixed waste, or any combination thereof, and requires the States to consider the need for regional treatment facilities in reviewing the plans.

The *Schedule for Submitting Plans for the Treatment of Mixed Waste Generated or Stored at Each Site* was published as a notice on April 6, 1993, in the *Federal Register* (58 *FR* 17875). In the notice, DOE committed to providing the site treatment plans in three phases: a conceptual plan to be submitted in October 1993, a draft plan to be submitted no later than August 1994, and a final proposed plan to be submitted no later than February 1995. The date for submittal of the proposed plan has been amended to April 1995. This process provides opportunity for early involvement by the states and other stakeholders to discuss technical and equity issues associated with the plans.

The CSTP, submitted in October 1993, focused on identifying treatment needs, capabilities, and options for treating the site's mixed waste. The DSTP, submitted in August 1994, focused on identifying preferred options for treating the site's mixed wastes, as well as proposed schedules for constructing treatment capacity. The options presented in the DSTP represent the site's best judgment of the available information, the states' input, and provided a starting point for discussions leading to the development of the PSTP. The proposed plan is being submitted to the regulatory agency for review and approval, approval with modification, or disapproval, as required by the FFCAct. Each version of the plan reflects discussions among states, as well as site-specific input from the individual regulatory agency and other interested parties on the previous submittal. It is DOE's intent that this iterative process, with ample opportunity for input and discussion, will facilitate approval of the STP and issuance of the compliance order required by the FFCAct. DOE's goal is to have all plans and FFCAct Orders in place by October 1995.

1.4 PSTP ORGANIZATION

The PSTP for DOE/OAK mixed wastes located at LLNL follows the same format as the proposed plans of other DOE sites to facilitate cross-site comparisons. The proposed plan is organized in two separate, but integrated volumes. This *Background Volume* is one of two volumes that constitute the PSTP. It provides a detailed discussion of the preferred treatment option or options, identifies the waste streams the option addresses, and gives explanatory information for the *Compliance Plan Volume*. The Compliance Plan Volume is a short, focused document containing the preferred options and schedules for implementing the options and is intended to contain all the information required by the FFCAct. The Compliance Plan Volume also contains a mechanism to implement the plan and establish schedules that will be enforced by the FFCACT Order. It references, but does not duplicate, details on the options in the Background Volume.

Sections 1.0 and 2.0 in the Background and Compliance Plan Volumes contain introductory material relevant to the purpose of each volume. The Background Volume contains general information on the proposed plan and the site in Section 1.0 and provides top-level assumptions and a description of the process used to determine the preferred options in Section 2.0.

Sections 1.0 and 2.0 of the Compliance Plan Volume propose certain administrative provisions appropriate for implementing the plan when finalized. These include provisions such as the approach to setting milestones, updates to the plan, additions or removals of waste streams covered by the plan, and funding considerations. These sections are intended to initiate discussion; it is expected that the specific language will be developed in conjunction with the regulatory agency. New language to address other administrative provisions may eventually be added to these compliance plan volume sections or incorporated into a separate FFCAct Order.

Sections 3.0 through 5.0 of the Background and Compliance Volumes discuss the preferred option or options for mixed low-level waste (MLLW), mixed transuranic waste (MTRU), and

high-level waste (HLW). Each volume discusses the same waste streams and options in parallel sections. The Background Volume discusses the waste streams, technology needs, and uncertainties and other details on the preferred options. In the Compliance Plan Volume, the sections include proposed schedules as required under the FFCAct.

The Background Volume includes three additional sections that are not included in the Compliance Plan Volume because they are not required by the Act and are not compliance-related. *Section 6.0* discusses mixed wastes expected to be generated in the future to assist in anticipating treatment needs. These waste streams will be incorporated into the Compliance Plan Volume, and treatment approaches and schedules developed, when the wastes are generated. *Section 7.0* discusses storage capacity needs and how compliant storage will be provided for DOE/OAK mixed wastes located at LLNL pending treatment. Section 7.0 also includes a discussion of storage for waste treatment residues prior to disposal.

Section 8.0 describes a process being followed by DOE and the states for evaluating options for disposal of mixed waste treatment residues. Although the FFCAct does not require disposal to be covered in the plans, DOE is including disposal information to be responsive to the states' request that disposal be addressed and to support state discussions. Section 8.0 identifies that LLNL Site 300 is continuing to be evaluated as a potential mixed waste disposal site. Resources and guidance documents used to prepare this document are summarized in *Section 9.0.*

The PSTP also includes proposed offsite shipping agreements between DOE/OAK and offsite treatment facilities in Appendix A of the Background Volume and a glossary of terms in Appendix B of the Background Volume.

1.5 RELATED DOCUMENTS

Other DOE efforts that could be closely linked to STP development may include treatment options analysis, cost estimating for treatment options, the Mixed Waste Inventory Report

(MWIR), LLNL's RCRA Part B Application (3/94), activities conducted pursuant to the National Environmental Policy Act (NEPA), the California Environmental Quality Act (CEQA), and Federal Facility Agreements for the LLNL main site and Site 300.

1.5.1 Draft Site Treatment Plan Appendices

The appendices to the DSTP present summaries and evaluations of treatment options initially identified for DOE/OAK mixed wastes identified at that time. In some cases, the likely preferred option identified in the DSTP for a waste has been changed due to technical considerations (e.g., trace contaminants found to be incompatible with the treatment process), or policy decisions (e.g., proposed facilities eliminated or inconsistent with the overall DOE preferred mixed waste treatment configuration).

1.5.2 The Mixed Waste Inventory Report

The *Mixed Waste Inventory Report*, which is required by the FFCAct, provides inventories of (a) mixed waste currently stored or generated or expected to be generated during the next five years from DOE activities, and (b) treatment capacities and technologies. The *Interim Mixed Waste Inventory Report* provided information on each waste stream for each site that generates or stores DOE mixed waste. Updated waste stream, treatment facility, and technology data was made available to the states and EPA in May 1994. The MWIR represents the best record of DOE's mixed waste inventory at the beginning of 1994. Because data are constantly being refined, waste stream information in DOE/OAK's proposed plan for LLNL may differ somewhat from the most recent inventory report. Any changes in waste stream information are documented in the Background Volume.

An updated MWIR is currently being prepared and is being closely coordinated with preparation of the proposed plans to ensure consistency in waste stream information between the two documents. The updated MWIR data is expected to be released by DOE in July 1995.

1.5.3 The Programmatic Environmental Impact Statement for Waste Management (NEPA)

DOE is preparing a Programmatic Environmental Impact Statement (PEIS) which will be used to formulate and implement a waste management program in a safe and environmentally sound manner and in compliance with applicable laws, regulations and standards. The PEIS is intended to present to the public, states, EPA, and DOE an understanding of impacts to human health and the environment together with the costs associated with a wide range of alternative strategies for managing the DOE's environmental program. The PEIS is examining the following waste types and activities: high-level, transuranic, mixed low-level waste, low-level, and hazardous. The analysis for the WM PEIS will evaluate decentralized, regional, and centralized approaches for storage of high-level waste; treatment and storage of transuranic waste; treatment and disposal of low-level and low level mixed waste; and treatment of hazardous waste.

Development of the Waste Management (WM) PEIS is being coordinated with the preparation of the Site Treatment Plans under the Federal Facility Compliance Act. Information being generated to support the WM PEIS (e.g., hypothetical configurations, preliminary risk analyses, and cost studies) is shared with states to support STP discussions. The Draft WM PEIS will not identify a preferred alternative (i.e., configuration) for mixed waste facilities since this will be evolving in consultation with the states and EPA through the STP process. However, the WM PEIS analyses of potential environmental risks and costs associated with a range of possible waste management configurations will provide valuable insight as the public, states, and DOE discuss using existing facilities and constructing new mixed waste facilities to treat mixed waste.

The Draft WM PEIS is scheduled to be published in May 1995. The Final PEIS will be issued after a public comment period, at or near the time of issuance of the Consent Orders by the appropriate regulatory agency. To remain flexible and accommodate potential changes, the WM PEIS Record of Decision for mixed waste will be issued after the

appropriate regulatory agency has fulfilled their legislative requirement of issuing the Consent Orders.

1.5.4 Documents Required by The California Environmental Quality Act for STP Approval

CEQA California Public Resources Code Section 21000 et seq, as amended, is the principal statute mandating environmental impact review of governmental actions in the state of California. Guidelines for implementing the CEQA program are contained in 14 CCR 1500 et seq. CEQA was developed by the California legislature with the intent to maintain a quality environment; take all actions necessary to protect and rehabilitate the environmental quality of the state; and require governmental agencies at all levels to develop standards and procedures necessary to protect environmental quality. The CEQA process provides opportunities for input and comment by other governmental agencies and the public.

The California DTSC has determined that approval of the PSTPs for DOE-managed waste located at California sites is subject to CEQA. An Initial Study will be prepared by DTSC for each of the sites to determine if implementation of the PSTPs may have a "significant effect on the environment." If an Initial Study indicates that no significant effects will occur, DTSC will issue a "Negative Declaration." If any aspect of an Initial Study reveals that a project may cause a significant effect on the environment, an Environmental Impact Report (EIR) must be prepared before the plan for that site is implemented.

1.5.5 RCRA Part B Permit Application

As required by the RCRA and California's Hazardous Waste Control Law, LLNL submitted a permit application to continue operating hazardous and mixed waste treatment and storage facilities at the LLNL main site. There are two parts to the RCRA permit application. Part A is a short, standard form in which the applicant provides general information about the facility and the capacities and types of its hazardous waste operations. Following approval of the Part A application, facilities are required to submit a Part B application to receive a

regular RCRA operating permit, which is valid for up to five years. A Part B permit application is much more comprehensive than Part A and provides extensive and highly technical information covering the design, operation, and maintenance of each hazardous or mixed waste treatment and storage facility onsite.

LLNL submitted a revised Part B RCRA permit application to the State of California on February 28, 1994. This application pertains only to the LLNL main site. The February Part B submittal is a continuation of a permitting process that began in the mid-1980s, when LLNL initially submitted an application for a RCRA permit. LLNL's hazardous waste facilities are currently operating under "interim status" in accordance with requirements set forth by the EPA and DTSC. LLNL expects DTSC to issue a draft permit in FY96.

1.5.6 Environmental Impact Statement/Environmental Impact Report

To meet the requirements of NEPA and CEQA, DOE and the University of California (UC) prepared a joint Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) in August 1992 to analyze the potential environmental impact of continued operation, including near-term (within 5 to 10 years) proposed projects, of LLNL and Sandia National Laboratories, Livermore (SNL/CA). The EIS/EIR is provided in a document entitled *Environmental Impact Statement and Environmental Impact Report for Continued Operation of Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore.* The EIS/EIR assesses the environmental impacts of the laboratories' operations on air and water quality, sensitive natural resources and habitats, occupational and public health and safety, cultural resources, and floodplains and wetlands. The EIS/EIR also discusses noise, socioeconomic, hazardous waste management, site contamination, and other environmental issues. The EIS/EIR also examined the alternative of discontinuing the University of California's management of LLNL after September 1992. A Notice of Determination certifying the EIR was issued on November 25, 1992 by the UC Board of Regents, concluding the CEQA process. The NEPA Record of decision (ROD) was signed by the Secretary

of Energy on January 21, 1993. DOE published the appropriate Mitigation Action Plan (MAP) in October 1993 to complete the EIS process.

1.5.7 Federal Facility Agreement

Hazardous constituents have been found in the groundwater in the LLNL vicinity, but groundwater contamination has not been attributed to the activities at LLNL's hazardous waste management facilities. LLNL was placed on EPA's National Priorities List (NPL) in 1987 due to the extent of the hazardous constituents in groundwater. EPA, in conjunction with the DTSC and the California Regional Water Quality Control Board (RWQCB), oversees LLNL's investigations and cleanup activities associated with the groundwater in accordance with Section 120 of CERCLA, as amended.

The EPA, DOE, DTSC, and the RWQCB entered into a Federal Facility Agreement (FFA) under CERCLA in November 1988. The FFA establishes a framework to comply with the statutory and regulatory requirements for the performance of a remedial investigation and feasibility study in accordance with CERCLA. Furthermore, the agreement provides direction for: (1) implementing the selected interim and final remedial action(s) in accordance with CERCLA; (3) providing for continued operation and maintenance of the selected remedial action(s); and (4) assuring compliance with Federal and state hazardous waste laws and regulations for matters covered by the Agreement. The FFA names DOE as the responsible agency to take all necessary actions in order to fully effectuate the terms of this Agreement, including undertaking response actions at the LLNL in accordance with federal and state applicable or relevant and applicable laws, standards, limitations, criteria, and requirements to the extent consistent with CERCLA. Section VII of the FFA discusses statutory compliance and RCRA-CERCLA integration and states that it is the intent of the parties in the agreement to integrate DOE's CERCLA response obligations and RCRA corrective action obligations which relate to the release of hazardous substances, hazardous wastes, pollutants, or contaminants.

Any remedial action or corrective action selected, implemented, and completed under the FFA would be deemed by the parties to be protective of human health and the environment such that remediation of releases covered by the FFA would obviate the need for further corrective action under RCRA with respect to those releases. The FFA is therefore a comprehensive agreement, and the activities covered by and performed in accordance with the FFA satisfy the corrective requirements of State of California and/or RCRA Section 3004(u) and (v).

On August 5, 1992, a ROD was signed by the EPA Region IX Administrator. The ROD presents the selected remedial actions for the LLNL Livermore site, which were chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The RWQCB and the DTSC concur with the selected remedies. The selected remedies address the principal concerns at the LLNL site by removing contaminants in groundwater and soil and treating them at the surface to levels protective of human health and the environment. The ROD applies to all known contaminants in groundwater and unsaturated sediment originating from activities at the LLNL site. If further investigations identify additional public health or environmental risks, the ROD may be augmented through CERCLA/SARA and the NCP to address any additional action. For further discussion, see Section 6.0.

1.6 SUMMARY AND STATUS OF DOE/OAK MIXED WASTES AT LLNL

Current inventories of mixed wastes at LLNL account for a total of approximately 650 m^3, including 196.5 m^3 of potential mixed transuranic wastes. In addition, one waste stream at LLNL requires further characterization. Mixed wastes will be treated either onsite or shipped offsite to the Idaho National Engineering Laboratory, the Hanford site, or the Waste Isolation Pilot Plant. Schedules for waste treatment and shipment vary by waste stream.

Table 1-1

SUMMARY OF DOE/OAK MIXED WASTE STREAMS AT LLNL

Waste Stream No.	Waste Stream Description	Background Volume Section	Status
LL-W001	Lab Packs without Metals	3.2.1	Onsite Treatment; MWMF Technology*
LL-W002	Inorganic Sludges/Particulates	3.1.1*	Onsite Existing Treatment
LL-W003	Inorganic Debris	3.1.3	INEL WERF/IWPF
LL-W004	Aqueous Liquid	3.1.1	Onsite Existing Treatment
LL-W005	Inorganic Sludges/Particulates	3.1.2	Onsite Existing Treatment
LL-W006	Inorganic Debris	3.1.4	INEL IWPF
LL-W007	Elemental Lead	3.1.5	Hanford WRAP II-A
LL-W008	Organic Liquids	3.2.1	Onsite Treatment; MWMF Technology
LL-W009	Organic Liquids	3.2.1	Onsite Treatment; MWMF Technology
LL-W010	Soils	3.1.2	Onsite Existing Treatment
LL-W011	Reactive Metals	3.2.2	Onsite Small Scale Treatment
LL-W014	Organic Liquids	3.2.1	Onsite Treatment; MWMF Technology
LL-W015	Inorganic Debris	3.1.5	Hanford WRAP II-A
LL-W016	Organic Liquids	3.2.1	Onsite Treatment; MWMF Technology
LL-W017	Heterogeneous Debris	3.1.3	INEL WERF/IWPF
LL-W018	MTRU Debris	4.0	WIPP
LL-W021	Lab Packs with Metals	3.1.3	INEL WERF/IWPF
LL-W022	Uranium Chips with Coolant (Other Reactives)	3.3.1	Further Characterization required
LL-W023	Soil with Debris	3.1.2	Onsite Existing Treatment
LL-W024	Liquid Mercury	3.1.6	INEL WEDF Amalgamation
LL-W025	Cemented Solids	3.1.2	Onsite Existing Treatment
LL-W026	Organic Sludges/Particulates	3.2.1	Onsite Treatment; MWMF Technology
LL-W027	Other Reactives	3.3.2	Further Technology Assessment Required

* = Technologies to be demonstrated in MWMF, successful technologies to be transitioned to treatment operations.

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2.0 METHODOLOGY

2.1 ASSUMPTIONS

All sites used the following assumptions to provide for a degree of consistency in the preparation of the PSTPs. The assumptions were developed as a part of the DSTP Framework and reflect review and comment from the states and EPA.

1. HLW will continue to be managed according to current plans at each site (i.e., Hanford, West Valley, Savannah River Site (SRS), INEL). Primarily due to potential safety concerns, HLW will not be transported offsite except as a treated, stable waste that is ready for disposal. The PSTPs will not change management strategies for HLW.

2. Regarding defense related MTRU, the PSTPs reflect DOE's current strategy that the WIPP will open and receive a No-Migration Variance. The PSTPs identify characterization, processing, and treatment of MTRU waste to meet the WIPP Waste Acceptance Criteria (WIPP WAC). Consistent with this policy, treatment of MTRU to meet LDR standards will not be included in the PSTPs at this time.

   However, the PSTPs recognize that DOE's policy regarding WIPP is under review and may change in the future. As such, the STPs provide for the flexibility to modify activities and milestones regarding MTRU waste to reflect potential future changes in DOE policy.

   Under current DOE policy, non-defense related TRU waste will not be disposed of at WIPP. As such, the PSTPs reflect LDR treatment of non-defense MTRU.

3. DOE recognizes some states' preference for treatment of all wastes onsite. Where appropriate, existing onsite capacity will be utilized before new facilities are con-

structed. When onsite treatment or use of commercial or mobile facilities is not practicable, the use of existing offsite capacity, as well as the construction of new facilities, will be considered.

4. Sites in the same state will investigate the practicality of consolidated treatment facilities.

5. Mixed waste resulting from Environmental Restoration (ER) and Decontamination and Decommissioning (D&D) activities will be factored into planning activities and equity discussions, particularly where utilization of facilities identified in the PSTPs is being considered for managing ER and D&D waste.

6. On a volume basis, the large majority of DOE's mixed waste will be treated onsite. Because of transportation concerns and costs, this generally includes process waste water and some explosives and remote-handled wastes. In addition, other large volume waste streams will generally be treated on site. At a minimum, the Hanford site, Oak Ridge National Laboratory (ORNL), INEL, and the SRS will have onsite facilities to treat the majority of their wastes.

7. The DOE Environmental Management PEIS is being prepared in parallel with the development of the STPs. The PSTP process will provide input to the PEIS. Each site will prepare any necessary specific NEPA documentation before proceeding with a specific project or facility approved by the state or EPA and incorporate it into the STP and FFCAct Order.

   The State of California is required to comply with all CEQA requirements prior to approval of the plans. As part of the STP process, each California site will prepare any necessary specific CEQA documentation before proceeding with a specific project or facility approved by the state or EPA.

8. In support of DOE's cradle-to-grave waste management philosophy, disposal site location and criteria will be factored into state equity discussions, waste treatment facility designs, and the characteristics of the final waste forms.

9. In order to provide target dates for schedules regarding offsite shipment of wastes, various assumptions are identified in Tables 3-4a through 3-4e. Some assumptions specify time periods for actions by the offsite facilities that will receive the wastes; if these time periods are exceeded, the target date(s) may be impacted. Assumptions for offsite shipment schedules include estimated time frames for receiving the treatment facility WAC, approval of certification plans and waste profiles, and identification of an approved shipping date.

2.2 PREFERRED OPTION SELECTION PROCESS

The preferred option selection process was conducted in two phases. Phase 1 consisted of the respective DOE sites developing preferred options for their mixed waste streams. This process and the sites' preferred treatment options were detailed in Appendix A of the DSTP. Phase 2 consisted of an Options Analysis Team (OAT) evaluating the respective DOE sites' preferred options and optimizing the overall treatment configuration. The resulting overall DOE preferred mixed waste treatment configuration is included as a reference in Section 9 of this Background Volume.

2.2.1 Preferred Option Selection Process - Phase 1

DOE prepared several guidance documents to assist the sites in working through treatment identification and selection of preferred options. The overall process is contained in the DSTP Framework, which establishes common terminology, objectives and values, planning assumptions, and a recommended methodology for narrowing the alternatives presented in the CSTP. The *Treatment Selection Guides*, Revision 0, dated March 14, 1994, provides information on selecting among treatment options by comparing the options on fundamental

criteria such as regulatory compliance, environmental health and safety, treatment effectiveness, implementability, stakeholder concerns, and life-cycle costs. The *Draft Site Treatment Plan Cost Information Guidance*, dated April 21, 1994, provides a level of consistency in the cost information by providing common cost assumptions. In some cases, site-specific cost information was also used to develop cost estimates for the preferred treatment options. Drafts of these and other technical assistance documents were provided to the states and their comments were incorporated into the final revision. These documents are available in the DOE/OAK Public Reading Room at 1301 Clay Street, Oakland, California.

DOE/OAK developed an option selection process consistent with the DOE's Draft Framework. The process favors the use of existing onsite or readily implementable treatment capabilities. Therefore, onsite treatment of wastes at existing facilities (such as treatment of aqueous liquids and homogeneous solids at LLNL) is considered a preferred treatment option. Additionally, onsite "less than 90-day treatment" (as allowed under the state-tiered permitting program) and treatability studies as allowed under 22 CCR 66261.4(e), were preferred treatment options when determined to be appropriate for a specific waste stream. If appropriate, existing commercial contracts for treatment of mixed waste were identified as preferred treatment options.

If none of the preferred treatment options described above is identified for a given waste stream, then planned onsite and planned and existing offsite treatment facilities were evaluated. DOE's evaluation of planned onsite facilities consisted of mobile, fixed-base, or bench-scale treatment units. Mobile treatment units are made up of small-scale units (which could include a series of units or "treatment train") that can be transported from site to site to allow waste treatment at the site where the waste is generated. Fixed-base treatment facilities are typically large-scale units permanently located at a site and are typically expensive to construct and operate. Additional information regarding fixed-base units is available in Section 3.3 of Appendix A to the DSTP. Bench-scale units are small-scale units that may require regulatory approval but are typically designed to treat very small quantities of waste. Additional discussion of bench-scale units is available in Section 3.0 of the

Appendix A to the DSTP. Planned and existing offsite facilities evaluated by DOE/OAK consisted of a hypothetical centralized treatment facility located in California and proposed to be operated at LLNL and other existing or planned treatment facilities at other DOE sites in the DOE complex. The proposed centralized treatment option at LLNL would utilize several existing and planned treatment units. This centralized option was considered for treatment of waste generated from five DOE/OAK sites located in California. The evaluation of the mobile, fixed-base, bench-scale and centralized treatment options was conducted using the following major criteria categories:

- Treatment Effectiveness
- Environmental Health and Safety
- Implementability
- Regulatory Concerns
- Stakeholder Concerns
- Life-Cycle Costs.

The results of these evaluations were used as an analytical tool to determine a preferred treatment option. The process is considered to be a subjective evaluation process that relied on both a weighted scoring system and the best professional judgements of the evaluators. Additional data regarding how preferred treatment options were identified are outlined in Section 2.0 of Appendix A to the DSTP.

In summary, the options selection process examined preferred treatment options, including existing onsite treatment (including mobile treatment), existing commercial agreements, potential modifications to existing facilities, treatability studies, or treatment of wastes in tanks and containers within 90 days of generation (generator treatment option). If none of these options was available, planned onsite or existing or planned offsite facilities were evaluated to determine a preferred treatment option. The preferred treatment options identified as a result of these evaluations are summarized in Appendix A to the DSTP.

2.2.2 Preferred Option Selection Process - Phase 2

Because the DSTPs were prepared by the sites using a "bottom-up" approach, the resulting treatment configuration, when viewed from a national level, contained many redundancies and inefficiencies. In developing the PSTPs, an assessment was performed to determine what accommodations were necessary to blend the "bottom-up" DSTPs into a more sensible national configuration of treatment systems. To facilitate this assessment, DOE established the OAT comprised of site representatives and members of the Headquarters' FFCAct Task Force. The OAT coordinated their efforts with the states, through the National Governors' Association, to ensure the national mixed waste configuration reflected both the States' and DOE's concerns. As part of this evaluation, the impacts of implementing the emerging DSTP configuration, as well as alternative configurations, were evaluated.

The focus of the OAT's efforts has been on MLLW. While HLW and MTRU are also covered by the FFCAct, the strategies for managing these wastes have already been established. However, DOE recognizes that modifications of these strategies may be needed as the programs evolve and new information becomes available.

In combination, the DSTPs form a mixed waste treatment configuration which was the baseline for the OAT analyses. Changes to the DSTP configuration proposed by the OAT are based on the following analyses:

1. Review of the DSTP baseline configuration to identify redundant and technically inefficient proposed treatment options.

2. Identification of alternative treatment configurations that emphasize key state and DOE concerns.

3. Evaluation of the DSTP baseline and alternate configurations against key evaluation areas to determine what combination of treatment options results in a

configuration that best meets DOE's, the states', EPA's and other stakeholders' concerns.

The results of the initial OAT analysis were shared with each of the sites and the state regulators, as well as DOE management. The OAT worked for several more months responding to state requests for additional analysis, incorporating ongoing site analysis, and responding to comments. The resulting configuration, as presented in the PSTPs, is DOE's best attempt to balance competing DOE and stakeholder interests.

The overall DOE preferred mixed waste treatment configuration resulted in two changes to the preferred treatment options identified in the LLNL DSTP. First, the elimination of the Hanford Thermal Treatment Facility from the overall treatment configuration impacted the treatment of organic debris currently stored at LLNL. As a result of this change, this waste stream will be treated at either the INEL Waste Experimental Reduction Facility (WERF) or Idaho Waste Processing Facility (IWPF). The INEL WERF will be used to treat waste streams with less than or equal to 10 nanoCuries/gram (nCi/g) of alpha emitting radionuclides. Those waste streams that have greater than 10 nCi/g of alpha emitting radionuclides will be treated at the INEL IWPF which will be designed to treat alpha contaminated mixed waste. The second change is based on the OAT's decision to eliminate small-scale treatments when they are not cost effective. It was proposed in the LLNL DSTP to treat a mercury-bearing waste stream with a treatability study. It has since been determined that the treatment of this waste stream would be more cost effective if conducted at the INEL Idaho Waste Processing Facility (IWPF) Amalgamation Unit. These changes are reflected in Section 3.0 of the LLNL PSTP.

2.3 COORDINATION WITH REGULATORY AGENCIES AND OTHER STAKEHOLDERS

The FFCAct offers an opportunity for DOE, the state, and EPA regulators who will be approving the Plans to work cooperatively toward defining mixed waste treatment plans. As

requested by the states, DOE signed a cooperative agreement in August 1993 with the NGA to facilitate the DOE-to-State interactions. The NGA has sponsored national meetings on a routine basis with DOE, the states, EPA, and the Indian Nations throughout the development of the STPs.

The FFCAct requires the states and EPA to provide for public involvement after the PSTPs are submitted. DOE has provided additional opportunities for public input into the development of the Conceptual and Draft Plans through existing public involvement mechanisms at the site.

DOE/OAK has initiated and encouraged public participation activities during the development of the STPs for the Oakland Operations Office sites. DOE/OAK regularly conducts FFCAct Coordination meetings with the DTSC, the State of California Department of Health Services, and EPA Region IX. In coordination with DTSC, two FFCAct fact sheets have also been developed. Volume Numbers 1 and 2 in a series of three fact sheets were published in January and September of 1994. These were sent to approximately 1,000 members of the public. The fact sheets explain commonly asked questions regarding the FFCAct and the STP development and approval process, addresses how the general public can become more involved in the process, and includes names of contacts and repository locations where the STP and related documents can be reviewed. Additionally, throughout the STP process, mixed waste issues have been included on the agenda at several meetings conducted by DOE/OAK. These meetings were attended by the public and a wide variety of regulatory agencies.

At the national level, DOE has presented information on the development of the STPs to the Environmental Management Advisory Board, and held an Open House in Washington, D.C. when the Draft Plans were released. DOE also met informally with representatives of Indian Tribes and separately with representatives of other groups that may have interest in Site Treatment Plan development. The purpose of the meetings was to determine if there are national issues that may not be identified through site-specific activities. Additional

opportunities to obtain input at the National level may be offered in coordination with the States and EPA. The Center for Environmental Management provides information on FFCAct activities at the National level (1-800-736-3282; or 202-863-5084 in Washington, D.C.).

2.4 CHARACTERIZATION OF MIXED WASTES

2.4.1 DOE Treatability Groups

Treatability groups are used to characterize DOE waste stream information in a consistent and technically valid manner based on waste characteristics. Treatability groupings for waste streams in this PSTP are based on three parameters: (1) radiological, (2) waste stream matrix, and (3) regulated contaminants. Each of the three parameters are divided into subcategories based on the type of treatment required to meet RCRA LDR requirements. DOE mixed waste streams are classified using the treatability group classification system outlined in *Waste Treatability Group Guidance*. The three parameters that define a treatability group are defined as follows:

The *Radiological* parameter identifies up to four key elements including (1) radiological waste classification (i.e., low-level, TRU, high-level, or mill tailings); (2) handling restrictions, noted as contact-handled (CH) or remote-handled (RH); (3) TRU alpha levels, indicating the presence and activity level (if known) of alpha-emitting TRU radionuclides; and (4) non-TRU alpha levels, indicating the presence and activity level (if known) of other alpha-emitting radionuclides.

The waste *Matrix* identifies the overall bulk physical and chemical form of the waste. The matrix code is selected from a list containing approximately 100 codes, and consists of a title and a single character to describe the waste stream physical form (e.g., "S" for solids, "L" for liquids), plus a four-digit code describing the chemical form of the waste stream (if known).

The *Regulated Contaminant* parameter identifies up to three key elements to indicate the regulatory classification and types of regulated contaminants in the waste, including (1) the regulatory program that covers the waste (e.g., "RC" for RCRA-regulated); (2) the presence of any RCRA-regulated hazardous organics (code "O") and/or metals (code "M") for which LDR treatment standards have not been met or established; and (3) whether the waste exhibits a RCRA hazardous characteristic (code "C") for ignitable, corrosive, or reactive wastes.

Under this waste classification system, waste streams that fit the criteria for a specific treatability grouping will have the same or similar matrices, and the same or similar radiological and chemical contaminants. This allows site-wide comparisons and groupings of DOE waste streams in order to assess treatment technology, capacity, and technology development needs. Treatability groups have been identified, if known, for DOE mixed waste located at LLNL in Table 3-2 for MLLW. The definitions for the codes used for the LLNL treatability groups are provided in Table 2-1.

2.4.2 Characterization

A general overview on waste characterization and a discussion of procedures used by LLNL to characterize waste is provided in the *Preparation Guide for Generators of Hazardous Chemicals and Radioactive Waste at LLNL*. Either process knowledge or data from sampling and analysis can be used to characterize waste streams. The degree of characterization may be dependent upon the waste form and nature of the waste generating process.

The generator is responsible for providing all information, including any necessary or required chemical analysis, to characterize MLLW adequately and to ensure proper handling and disposal. The hazardous components of all MLLW must be identified by the generator before the waste is accepted by the HWM Division. The identification of hazardous and radioactive constituents in a MLLW, including laboratory analyses, is certified by the generator of the waste. Analytical methods and protocols may include, but are not

Table 2-1

DOE TREATABILITY GROUP CODES FOR DOE/OAK MIXED WASTES AT LLNL

Code	Definition
Radiological Parameters	
LL	Low-Level
CH	Contact-Handled
T11	$10 \leq$ TRU α $<$ 100 nCi/g
T12	$0 <$ TRU α $<$ 10 nCi/g
T19	TRU α Range Unknown
T20	No TRU α
T90	TRU α Presence Unknown
N11	Non-TRU α $\geq$ 10 nCi/g
N12	$0 <$ NonTRU α $<$ 10 nCi/g
N19	NonTRU α Range Unknown
N90	NonTRU α Presence Unknown
Matrix	
L2110	Aqueous/Organic Liquids
L2120	Aqueous/HOC Organic Liquids
L2220	Non-HOC Pure Organic Liquids
L2210	Halogenated Pure Organic Liquids
L2290	Unknown/Other Pure Organic Liquids
S3116	Metal Chips/Turnings
S3121	Wastewater Treatment Sludges
S3129	Unknown/Other Inorganic Sludges
S3150	Solidified Homogeneous Solids
S3229	Unknown/Other Organic Sludges
S4100	Soils
S4300	Rock/Gravel
S5111	Metal Debris without Pb or Cd
S5123	Ceramic/Brick Debris
S5410	Composite Filters
S5420	Predominantly Inorganic Debris
S5490	Unknown/Other Heterogeneous Debris
X6400	Scintillation Cocktails
X6900	Unknown/Other Lab Packs
X7000	Special Waste
X7100	Elemental Mercury
X7510	Bulk Reactive Metals
Regulated Contaminant	
RC	RCRA-Regulated
C11	Ignitable
C12	Corrosive
C15	Ignitable/Reactive
C90	Not Ignitable, Corrosive, or Reactive
O11	Organics Present
O90	No Organics Present
M11	Metals without Mercury
M12	Metals with Mercury
M90	No Metals

necessarily limited to, those approved by the EPA or certified by the State of California. A copy of all laboratory reports accompanies each requisition for waste acceptance.

Information on MLLW characterization at LLNL can be obtained from the Hazardous Waste Management Division Requisition Control Office (HWM-RCO), the biennial report required by the California DTSC, and Operating Records maintained on site. In addition, the LLNL RCRA Part B permit application includes the Waste Analysis Plan (WAP), and the LLNL's *Environmental Protection Handbook* provides information on the procedures for characterizing waste streams.

In general, the analytical methods are found in SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* published and periodically amended by EPA. The methods for evaluating the leachability of a waste are outlined in the *Toxicity Characteristic Leaching Procedure* in Part 262, Appendix II in 40 CFR and the *California Assessment Manual Wet Extraction Test* in 22 CCR.

Analytical methods, sampling procedures, and criteria for characterizing wastes are provided in 40 CFR, 22 CCR, the WAP, and the *Preparation Guide for the Generators of Hazardous Chemicals and Radioactive Waste at LLNL*. MLLW characterization data obtained by sampling and analysis are associated with a 90% confidence level for homogeneous waste streams when methods described in SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, have been used. For radioassays, the confidence level is 95%. Analytical results are often verified by duplicates and blanks. The confidence level may be impacted by certain technical constraints related to obtaining representative samples, such as heterogeneous process solids and debris wastes.

Process knowledge, sampling and analysis, or a combination of the two may be used to determine the appropriate RCRA hazardous waste codes (e.g., characteristic or listed RCRA hazardous wastes). A waste is routinely sampled and analyzed if information (process

knowledge) about the waste is not adequate for storage or treatment purposes and a representative sample can be obtained.

MLLW for which generator knowledge is not available is identified as unknown. The first step in identifying unknown MLLW is a radiological screening. The generator must submit a representative 100-g sample for a gross alpha, beta, and tritium count analysis. When the presence of radioactive material is indicated, an additional 100-g sample is required for isotopic analysis.

The EPA, State of California, and permitted waste disposal contractors may also routinely require specific laboratory analyses to verify that the composition of specific types of wastes complies with regulatory threshold limits. The use of EPA-approved analytical methods and laboratories certified by the State of California performing the analyses are required for these analyses.

Quality assurance and quality control (QA/QC) are delineated in the Waste Characterization section of LLNL's RCRA Part B permit application. This Waste Characterization section contains the Waste Analysis Plan which describes information on the QA/QC requirements for analytical laboratories used by LLNL and the amount of verification analyses that must be performed. The QA/QC procedures are part of LLNL's standard protocols for waste analyses. The HWM Division of the Environmental Protection Department at LLNL has performed a waste verification of 10% of its wastes. The verification procedures and required analytical methods are discussed in the Waste Characterization section of LLNL's RCRA Part B Permit application.

There may be uncertainties with radioassay data on debris waste associated with sampling and analytical methods. Estimates of radionuclide content are determined based on a summation of radioactivity placed into the debris container. Other estimates of radionuclide content are based on surface contamination readings by monitoring a portion of a surface and multiplying the reading per unit surface area by the total estimated waste surface. Other

methods employ the use of whole drum counting. An entire drum can be counted with radioassay equipment provided isotopic composition is known and the levels of activity are sufficiently high to provide a significant count efficiency. Uniform samples are radioassayed by scintillation, gamma-spectroscopy, and gross alpha and gross beta counting.

Uncertainties with radioassay vary with waste form, level of contamination, knowledge of the types of isotopes present, and analytical instrumentation used. The best numerical efficiency in the radioassay methods is based on procedures for counting representative samples of homogeneous wastes. The level of confidence is 95%.

There is a high confidence level that the waste characterization data are sufficient to identify the required treatment technology.

2.5 WASTE MINIMIZATION

2.5.1 Overview

In accordance with DOE policy and good management practices, a hierarchical approach to pollution prevention (i.e., waste minimization) has been adopted at LLNL. Pollution prevention efforts focus on source reduction activities. Where source reduction cannot be effectively implemented, recycling (i.e., reuse or reclamation) is evaluated and performed, when possible. Emphasis is placed on onsite versus offsite recycling methods. Whenever feasible, "closed loop" recycling is implemented. Process waste which cannot be recycled is treated to reduce its volume, toxicity, or mobility before storage or disposal.

2.5.2 Program Description

The pollution prevention program at LLNL is an organized, comprehensive, and continual effort to reduce waste generation systematically. The program works to eliminate or

minimize pollutants released during the LLNL operation. The purpose is to protect public health and the environment as well as to:

- Reduce waste management and compliance costs
- Reduce resource usage
- Improve product yields
- Reduce or eliminate inventories and releases of hazardous chemicals reportable under the Emergency Planning and Community Right-to--Know Act (EPCRA)
- Reduce the Laboratory's exposure to civil and criminal liability under existing environmental laws
- Initiate use of recycled materials, in compliance with Executive Order 12780, Federal Agency Recycling and the Council on Federal Recycling and Procurement Policy
- Keep the Laboratory in compliance with all federal and state statutes and DOE orders and directives.

2.5.3 Waste Minimization Organization

Responsibilities for environmental safety and health (ES&H) and the programmatic activities of the Laboratory start with the Director and are delegated to Associate Directors and Program Leaders. Pollution prevention is included in these responsibilities.

The Pollution Prevention Group (PPG) is part of the Operations and Regulatory Affairs Division of the EPD within the LLNL Plant Operations Directorate. The PPG is charged with providing pollution prevention coordination and guidance, as well as cost and waste generation accounting. In addition, the PPG monitors the progress of LLNL pollution prevention efforts and offers technology information transfer and engineering support. The PPG is also responsible for establishing a pollution prevention awareness program and providing guidance to ensure that LLNL is in compliance with federal and State of California regulations associated with pollution prevention. The PPG interacts Laboratory wide through

the Waste Minimization Steering Committee (WMSC), the ES&H Working Group, and individual program waste minimization committees and coordinators. The PPG also interacts directly with generators to help carry out assessments, assist in technical and economic feasibility studies, and facilitate technology transfer.

The LLNL pollution prevention organizational structure is designed to maximize the dissemination and collection of pollution prevention information and to provide waste generating organizations with the necessary data to develop, design, construct, and implement pollution prevention projects.

The WMSC, which is chaired by the Head of the EPD, is composed of representatives from each of the directorates and programs. The WMSC serves as a forum for communicating pollution prevention information and data and for discussing regulatory requirements. It also helps to develop and recommend waste minimization policies at LLNL. The Pollution Prevention Group Leader serves as the Secretary of the WMSC and leads most of its meetings.

Other functions of the WMSC include, but are not limited to, identifying tasks that implement pollution prevention, reviewing DOE and LLNL policies and federal and State of California regulations, and exchanging data on Laboratory-wide and program-specific waste minimization projects.

3.0 MIXED LOW-LEVEL WASTE STREAMS

The waste streams identified in this section are MLLW located at LLNL, which contain both RCRA-hazardous waste and radioactive constituents. MLLW is defined as mixed waste that does not satisfy the definition of HLW as defined in Section 5, nor is it a transuranic waste (contains TRU constituents over 100 nCi/g). Alpha-contaminated MLLW (α-MLLW), which is waste with TRU contamination > 10 nCi/g but $\leq$ 100 nCi/g, has historically been managed at DOE along with TRU waste, but is addressed in this document as MLLW.

Some MLLW streams generated at LLNL are treated onsite to meet the RCRA LDR standards found in 22 CCR 66268 (40 CFR 268). For specific waste streams, such as aqueous liquids that are not land-disposed, treated effluent may be discharged to the sanitary sewer if the effluent concentrations do not exceed the discharge limits established by the local publicly owned treatment works (POTW). Filter cake generated from the treatment of aqueous wastes will be stabilized and placed in storage at onsite regulated waste management storage areas prior to disposal in accordance with Section 8 of the Background Volume. Other waste streams such as MLLW debris and organic liquids are currently stored at RCRA interim status storage facilities at LLNL pending future treatment at either onsite planned facilities or existing or planned offsite treatment facilities.

A majority of LLNL's MLLW is sufficiently characterized to proceed with the identification of appropriate treatment technologies and the selection of preferred options. The characterization process for the LLNL's MLLW is described in Section 2.4.2 of this volume. The level of confidence associated with characterization is also discussed in Section 2.4.2. LLNL is in the process of re-evaluating its waste stream containing uranium metal chips and machine coolants (identified as waste stream number LL-W022) to confirm the quantities currently in storage at the site. For further discussion on LL-W022, see Section 3.3.

The treatment options identified for LLNL's MLLW will meet the RCRA Land Disposal Restrictions requirements as defined in 22 CCR 66268 (40 CFR 268) and will be conducted in accordance with all RCRA requirements. This includes, but is not limited to, adhering to waste analysis plans written in accordance with RCRA and maintaining/developing the applicable recordkeeping, notification, and/or certification requirements mandated by RCRA.

For the purpose of determining the appropriate treatment technologies and identifying treatment options, mixed waste streams are categorized into treatability groups based on their radiological, matrix and regulated contaminant parameters (see Section 2.4.1 of Background Volume). The treatability group matrix descriptions for LLNL waste streams include:

- Aqueous Liquids
- Inorganic Homogeneous Solids
- Organic Liquids
- Organic and Inorganic Debris
- Inorganic Debris
- High Efficiency Particulate Air (HEPA) Filters
- Elemental Lead
- Reactive Metals
- Elemental Mercury
- Other Reactives

Information on LLNL's characterized mixed waste streams, sorted by treatability group, is provided in Table 3-1 and 3-2. The waste volumes noted in cubic meters in Table 3-1 and Table 3-2 reflect the updated volumes from those identified in Phase 2 of the MWIR database dated May 1994. The level of confidence in volume estimates is high because each waste item must be quantified before it is stored at LLNL's hazardous waste management facilities.

Table 3-1

DESCRIPTIONS OF WASTE STREAMS

Waste Stream No.	Treatability Group	RCRA Codes	Radio-Nuclide	Waste Form	Volume (m^3)	5-Year Projected Volume (m^3)
LL-W001	LL-CH-T20-N20/X6400/RC-011-M90-C11	F001, F002, F003, F005, D001	Beta/ Gamma emitters are present	Lab Packs without Metals	5.5	5
LL-W002	LL-CH-T19-N19/S3121/RC-011-M12-C90	D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D021, D022, D023, D024, D025, D026, D027, D028, D029, D030, D032, D033, D034, D035, D036, D038, D039, D040, F001, F002, F005, F007, F009	Alpha, Beta, and Gamma emitters are present	Inorganic Sludges / particulates	105.9[a]	110
LL-W003	LL-CH-T12-N11/S5420/RC-011-M12-C90	D001, D003, D004, D005, D006, D007, D008, D009, D010, D011, F001, F002	Alpha, Beta, and Gamma emitters are present	Inorganic Debris	8.7	7
LL-W004	LL-CH-T20-N11/L2120/RC-011-M11-C12	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D021, D022, D023, D024, D025, D026, D027, D028, D029, D030, D032, D033, D034, D035, D036, D038, D039, D040, F001, F002, F005, F007, F009	Alpha, Beta, and Gamma emitters are present	Aqueous Liquid	68.1[a]	1350
LL-W005	LL-CH-T20-N11/S3129/RC-011-M11-C90	D005, D006, D007, D008, D009, F002	Alpha, Beta, and Gamma emitters are present	Inorganic Sludges/ particulates	2.8[a]	5
LL-W006	LL-CH-T11-N19/S5111/RC-090-M12-C90	D003, D004, D006, D008, D009, D011, F002	Alpha, Beta/ Gamma emitters	Inorganic Debris	15.2	5
LL-W007	LL-CH-T20-N11/S5123/RC-090-M11-C90	D008	Alpha, Beta/ Gamma emitters	Elemental Lead	3.9	5
LL-W008	LL-CH-T20-N11/L2210/RC-011-M11-C11	D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D021, D022, D023, D024, D025, D026, D027, D028, D029, D030, D032, D033, D034, D035, D036, D038, D039, D040, F001, F002, F005, D001	Alpha, Beta/ Gamma emitters are present	Organic Liquids	7.1	10
LL-W009	LL-CH-T20-N11/L2290/RC-011-M11-C90	D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D021, D022, D023, D024, D025, D026, D027, D028, D029, D030, D032, D033, D034, D035, D036, D038, D039, D040, F001, F002, F005	Alpha, Beta/ Gamma emitters are present	Organic Liquids	3.6	8.5

Table 3-1 (Continued)

DESCRIPTIONS OF WASTE STREAMS

Waste Stream No.	Treatability Group	RCRA Codes	Radio-Nuclide	Waste Form	Volume (m^3)	5-Year Projected Volume (m^3)
LL-W010	LL-CH-T20-N12/S4100/RC-011-M11-C90	D005, D006, D007, D008, D009, F002, F005	Alpha, Beta, and Gamma emitters are present	Soils	10.1[a]	10
LL-W011	LL-CH-T20-N12/X7510/RC-090-M90-C15	D001, D003	Tritium at as high as 1 mCi /g	Reactive Metals	1.0	1.0
LL-W014	LL-CH-T20-N12/L2220/RC-011-M11-C11	D001, D006, D007, D008, D009, F001, F002,	Alpha, Beta/ Gamma emitters are present	Organic Liquids	13.7	20
LL-W015	LL-CH-T20-N19/S5410/RC-090-M12-C90	D004, D005, D006, D007, D008, D009, D011, F001, F002, D015, D018, D028, D039, D040, F001, F002, F005	Alpha, Beta/ Gamma emitters are present	Inorganic Debris	3.0	15
LL-W016	LL-CH-T20-N12/L2110/RC-011-M11-C90	D001, D002, D005, D007, D008, D009, D010, D019, D039, D040, F001, F002, F003, F005	Alpha, Beta/ Gamma emitters are present	Organic Liquids	0.3	1.0
LL-W017	LL-CH-T12-N11/S5490/RC-090-M12-C90	D004, D005, D006, D007, D008, D009, D010, D011, D020, D022, D031, F001, F002, F005, F020, F027	Alpha, Beta/ Gamma emitters are present	Hetero-geneous Debris	50.7	50
LL-W021	LL-CH-T20-N12/X6900/RC-090-M11-C12	D001, D009	Alpha, Beta/ Gamma emitters are present	Lab Packs with Metals	0.8	1.5
LL-W023	LL-CH-T20-N12/S4300/RC-090-M11-C90	D006, D008, D009, F001	Alpha, Beta/ Gamma emitters are present	Soil with Debris	6.6[a]	30
LL-W024	LL-CH-T20-N20/X7100/RC-090-M12-C90	D009	Tritium at less than 100 mCi per gram	Liquid Mercury	0.09	0.05
LL-W025	LL-CH-T20-N11/S3150/RC-011-M11-C90	D007, D009, D039, F001, F002, F005	Alpha, Beta/ Gamma emitters are present	Cemented Solids	141.3[a]	125
LL-W026	LL-CH-T20-N11/S3229/RC-011-M11-C90	D001, D007, D008, D009, D011, F001, F002, F005	Alpha, Beta/ Gamma emitters are present	Organic Sludges/ particulates	1.2[a]	5
LL-W027	LL-CH-T20-N12/ X7000/RC-090-M11-C15		Alpha, Beta/ Gamma emitters are present	Other Reactives	4.4	1.0

a = This waste is currently being treated on-site; and therefore, the inventory is continuously being altered.

Table 3-2

TREATMENT SUMMARY FOR CHARACTERIZED LLNL WASTE STREAMS

Waste Stream No.	Description	RCRA Waste Codes†	Universal Treatment Standards	Proposed Treatment and Location	Inventory Volume (m^3)	5-Year Projection (m^3)
LL-W002, LL-W004	Aqueous Liquids and Flter Cake	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D021, D022, D023, D024, D025, D026, D027, D028, D029, D030, D032, D033, D034, D035, D036, D038, D039, D040, F001, F002, F005, F007, F009	Technology Based Code: Deactivation followed by treating underlying constituents to the UTS concentration based standards cited in 40 CFR 268.48 or discharge to POTW. Concentration Based Standard: Treat to meet standard for each RCRA waste code cited.	Neutralization, Precipitation, Filtration, Stabilization. Existing On-Site Facilities: Area 514 Waste Water Treatment Tank Farm, Area 514 Waste Water Filtration Unit, Building 513 Solidification Unit	174	1460
LL-W005, LL-W010, LL-W023, LL-W025	Homo-geneous Solids	D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D021, D022, D023, D024, D025, D026, D027, D028, D029, D030, D032, D033, D034, D035, D036, D038, D039, D040, F001, F002, F005, F007, F009	Concentration Based Standard: Treat to meet standard for each RCRA waste code cited.	Stabilization Existing On-Site Facilities: Building 513 Solidification Unit	160.8	170
LL-W001, LL-W008, LL-W009, LL-W014, LL-W016, LL-W026	Organic Liquids with Water	D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D021, D022, D023, D024, D025, D026, D027, D028, D029, D030, D032, D033, D034, D035, D036, D038, D039, D040, F001, F002, F005	Concentration Based Standard: Treat to meet standard for each RCRA waste code cited.	Medicated Electro-chemical Oxidation (MEO) and/or Molten Salt Oxidation (MSO) To be demonstrated in Mixed Waste Management Facility (MWMF), and transitioned to treatment	31.4	49.5
LL-W003 LL-W017 LL-W021	Organic/ Inorganic Debris	D001, D003, D004, D005, D006, D007, D008, D009, D010, D011, D020, D022, D031, F001, F002, F005, F020, F027	Technology Based Code: Deactivation followed by treating underlying constituents to the UTS concentration based standards cited in 40 CFR 268.48 or discharge to POTW.	INEL WERF Treatment Facility - Incineration and Stabilization = 85.5% of Total Inventory INEL IWPF Thermal Treatment Facility = 17.5% of Total Inventory	60.2	58.5

Table 3-2

TREATMENT SUMMARY FOR CHARACTERIZED LLNL WASTE STREAMS

Waste Stream No.	Description	RCRA Waste Codes†	Universal Treatment Standards	Proposed Treatment and Location	Inventory Volume (m^3)	5-Year Projection (m^3)
LL-W006	Inorganic Debris	D001, D003, D004, D005, D006, D007, D008, D009, D010, D011, D020, D022, D031, F001, F002, F005, F020, F027	Technology Based Code: Deactivation followed by treating underlying constituents to the UTS concentration based standards cited in 40 CFR 268.48 or discharge to POTW.	INEL IWPF Thermal Treatment Facility	15.2	5
LL-W015	HEPA Filters	D004, D005, D006, D007, D008, D011, F001, F002, D015, D018, D028, D039, D040, F001, F002, F005	Concentration Based Standard: Treat to meet standard for each RCRA waste code cited.	Hanford Site WRAP II Stabilization	3	15
LL-W007	Elemental Lead	D008	Subcategory: Radioactive Lead. Technology Based Code: Macro Encapsulation	Hanford Site WRAP II Macro-encapsulation	3.9	5
LL-W011	Reactive Metals	D001, D003	. Technology Based Code: Deactivation followed by treating underlying constituents to the UTS concentration based standards cited in 40 CFR 268.48 or discharge to POTW.	Small-scale On-site Treatment	1.0	1.0
LL-W024	Elemental Mercury	D009	Subcategory: Radioactive Elemental Mercury. Technology Based Code: Amalgamation	INEL Site-IWPF Amalgamation	0.09	0.05

Notes:

† - For wastes which are hazardous due to metal concentrations, the LDR treatment standards are concentration standards for individual constituents.

- For F-listed RCRA waste codes (F001-F005), the LDR standards are concentration standards for individual organic constituents. Other F-listed waste codes may be listed due to metal constituents which require a stabilization technology to meet the LDR treatment standard.
- Elemental emental lead have technologies specified as the LDR treatment standard (e.g., amalgamation and macroencapsulation.)
- RCRA wastes which exhibit the characteristics of ignitability, reactivity and corrosivity have deactivation as the LDR treatment standard.
- Debris wastes may be treated either to meet the treatment standards for individual RCRA waste codes or using the technologies specified in the debris rule.

Table 3-3

LLNL MLLW STREAMS REQUIRING CHARACTERIZATION OR TECHNOLOGY ASSESSMENT

Waste Stream No.	Waste Stream Description	Current Volume (m^3)	Projected Future Volume (m^3)
LL-W022	Depleted Uranium Chips with Coolant (Requires Additional Characterization	TBD	TBD
LL-W027	Other Reactives (Requires Technology Assessment)	4.4	1.0

The preferred treatment options shown in Table 3-2 were identified utilizing the option selection process described in Section 2.2 of the PSTP and Appendix A in the DSTP. These treatment options are further described in Section 3.1 and 3.2 of this PSTP. The mixed waste that is currently uncharacterized is identified in Table 3.3.

The schedules for treating, shipping, characterizing, or conducting technology assessment for the mixed waste described in Tables 3-1 and 3-3 are provided in Table 3-4a, Table 3-4b, Table 3-4c, Table 3-4d, and Table 3-4e. Table 3-4a describes the activities necessary to conduct treatment onsite with existing technology. Table 3-4b describes the activities necessary to ship waste offsite. Table 3-4c describes the activities necessary to treat waste onsite with technology that requires development. Table 3-4d describes the activities necessary to treat waste onsite through small-scale treatment. Table 3-4e identifies the schedule for managing uncharacterized waste streams or waste streams requiring technology assessment. A discussion of some of the issues that effect the schedules are provided in Section 3.1.

3.1 MIXED LOW-LEVEL WASTE STREAMS FOR WHICH TECHNOLOGY EXISTS

As stated in Section 3.0, waste at LLNL can be broken into ten treatability group matrix categories. This section describes the wastes included in these treatability groups for which an existing technology is the preferred treatment option.

3.1.1 Aqueous Liquids and Filter Cake (LL-W002, LL-W004)

The waste streams that make up this treatability group are described in Tables 3-1 and 3-2.

Table 3-4(a)

SCHEDULE FOR MLLW STREAMS TO BE TREATED ONSITE BY EXISTING TREATMENT

Activity	LL-W004	LL-W002	LL-W005	LL-W010	LL-W023	LL-W025
Submission of RCRA Permit Application to the State of CA	Completed	Completed	Completed	Completed	Completed	Completed
Procure Construction Contracts	Completed	Completed	Completed	Completed	Completed	Completed
Initiate Construction	Completed	Completed	Completed	Completed	Completed	Completed
Conduct System Testing	Completed	Completed	Completed	Completed	Completed	Completed
Commencing Options	Completed	Completed	Completed	Completed	Completed	Completed
Treat 90% of waste by volume generated prior to 10/1/95	----	9/30/97	9/30/97	9/30/97	9/30/97	9/30/97
Treat 100% of waste generated prior to 10/1/95	9/30/96	9/30/98	9/30/98	9/30/98	9/30/98	9/30/98
Treat waste generated after 10/1/95	Treated in accordance with RCRA requirements*	Treated in accordance with RCRA requirements*	Treated in accordance with RCRA requirements*	Treated in accordance with RCRA requirements*	Treated in accordance with RCRA requirements*	Treated in accordance with RCRA requirements*

Notes:

* A RCRA permit application was submitted to the California EPA Department of Toxic Substances Control on March 1, 1994. The permit application included the treatment units to be used to comply with this schedule. Prior to treatment, waste will be stored in a RCRA storage facility subject to Title 22 of the California Code of Regulations, Section 66265 or 66264.

Table 3-4(b)

SCHEDULE FOR WASTE STREAMS TO BE TREATED OFFSITE BY EXISTING TECHNOLOGIES AT EXISTING OR PLANNED TREATMENT UNITS

Activity	Waste Streams Nos.						
	LL-W003	LL-W006	LL-W017	LL-W021	LL-W015	LL-W007	LL-W024
Offsite Treatment Location	INEL	INEL	INEL	INEL	Hanford	Hanford	INEL
Request WAC from selected offsite treatment facility.[a]	11/15/95	11/15/95	11/15/95	11/15/95	11/15/95	11/15/95	11/15/95
Submit a written certification plan[b] to the offsite facility.	9/15/96	9/15/96	9/15/96	9/15/96	9/15/96	9/15/96	9/15/96
Conduct sampling and analysis of waste (if required[c]) and submit profiles of the waste to the offsite facility following sampling and analysis.	3/15/98	3/15/98	3/15/98	3/15/98	3/15/98	3/15/98	3/15/98
Request an acceptable shipping schedule.	10/15/98	10/15/98	10/15/98	10/15/98	10/15/98	10/15/98	10/15/98
Complete shipment of the wastes.	d	d	d	d	d	d	d

Notes:

a Waste Acceptance Criteria (WAC)
b A certification plan is required by DOE Order 5820.2A and includes packaging requirements, waste form acceptance criteria, and constituent acceptance criteria. The plan is developed from the information established in the offsite facility's WAC.
c The offsite facility may or may not require sampling and analysis prior to waste acceptance; sampling and analysis would be conducted in accordance with the procedures established in the approved certification plan.
d The completion of the waste shipment will be accomplished six months following the designated shipment date provided by the treatment facility.

Assumptions:

The offsite facilities will require 3 months to provide the WAC following the request.
The offsite facilities will approve the certification plan within 6 months of submittal.
The offsite facilities will approve the waste profile within 6 months of submittal.

Table 3-4(c)

SCHEDULE FOR LIQUID ORGANIC WASTE STREAMS TO BE TREATED ONSITE USING TECHNOLOGIES DEMONSTRATED IN THE MIXED WASTE MANAGEMENT FACILITY

Activity	Waste Streams Nos. LL-W001, LL-W008, LL-W009, LL-W014, LL-W016,LL-W026
DOE approves MWMF Baseline Plan and issues Project Plan, establishing scope and funding commitments. Technology selection has already been completed.[1]	3/95
Submit regulatory documentation.	4/95
Begin construction of building.	9/96*
Begin MSO tests . All permits are in place to begin testing.	7/00*
Begin MEO tests . All permits are in place to begin testing.	7/01*
Demonstration testing complete and data obtained to submit LLNL Part B permit modification for MSO.	4/02*
Submit modifications to LLNL Part B Permit to the State, to permit waste treatment using MSO.	7/02*
Demonstration testing complete and data obtained to submit LLNL Part B permit modification for MEO.	7/03*
Submit modifications to LLNL Part B Permit to the State, to permit waste treatment using MEO.	10/03*
Submit Schedule to the State of California for the treatment of the waste backlog.	1/04*

Notes:

(1) *Technology Selection and Implementation Plan Part I: Primary Processes*, UCRL-ID-116210 Pt 1, January, 1994.

* These are proposed dates, based on DOE and other regulatory approvals.

Table 3-4(d)

SCHEDULE FOR WASTE STREAMS TO BE TREATED ONSITE BY SMALL-SCALE TREATMENT

Activity	Waste Stream No.
	LL-W011
Submit a request for treatment to the State of California.[a]	Completed
Initiate Treatment.[b]	6/30/96
Complete treatment of 90% of the waste.	12/30/96
Complete treatment of 100% of the waste.	6/30/98

Notes and Assumptions:

a RCRA Part B permit application was submitted to the California EPA, Department of Toxic Substances Control on March 1, 1994. The permit application includes a discussion on conducting small-scale treatment at LLNL.

b Completion of this activity by 6/30/98 is contingent upon receipt of the RCRA permit from the State of California by 6/30/96.

TABLE 3-4(e)

SCHEDULE: MLLW STREAMS REQUIRING CHARACTERIZATION OR TECHNOLOGY ASSESSMENT

Activity	Waste Stream No.	
	LL-W022	LL-W027
Complete necessary characterization to allow the identification of treatment option.	6/1/96	9/30/96
Select a treatment option and submit a treatment schedule with the STP Annual Update	3/31/97	3/31/97

3.1.1.1 Description of Technology and Capacity Needs

The technologies identified to treat the aqueous liquids are neutralization/pH adjustment, oxidation/reduction, precipitation, chelation/flocculation, and filtration. The treatments will be conducted in existing onsite treatment units at LLNL. Treatment is performed on a batch basis. Chemicals and wastes are added to the treatment units to achieve the desired treatment objectives.

Filter cake from the treatment of aqueous liquids are stabilized (i.e., solidified) thereby minimizing the leaching of hazardous and radioactive constituents from the waste matrix into the environment. Stabilization is performed on a batch basis in an onsite existing treatment unit. Solidifying agents that are used are cementaceous materials such as portland cement, gypsum cement, pozzalonic fly ash, aluminum and magnesium silicate clays, and resinous materials such as polystyrene, epoxides, and resorcinol formaldehyde. For many cementaceous and resinous materials, activators such as silicates or polymerizers can be used to form a more stable waste matrix. Solidification can also include the mixing of resin components. Resin components are mixed or otherwise combined in accordance with the manufacturer's instructions.

The combined inventory of aqueous liquids and filter cake is 174 m^3, although the inventory varies dramatically as a result of generation and onsite treatment.

3.1.1.2 Preferred Option

The preferred option for aqueous liquids and filter cake is onsite treatment. LLNL has treatment facilities (Area 514 Waste Water Treatment Tank Farm, Area 514 Waste Water Filtration Unit, and Building 513 Solidification Unit) that are presently operational and have sufficient capacity for these LLNL mixed wastes. These treatment facilities are currently subject to the interim status standards of the 22 CCR 66265. LLNL has submitted a RCRA Part B permit application to the State of California for continued operation of these interim

status treatment units and expects to receive a final RCRA permit in FY96. MLLW is currently being treated in these units.

3.1.2 Homogeneous Solids (LL-W005, LL-W010, LL-W023, LL-W025)

The waste streams that make up this treatability group are described in Tables 3-1 and 3-2.

3.1.2.1 Description of Technology and Capacity Needs

Homogeneous solids are stabilized (i.e., solidified) thereby minimizing the leaching of hazardous and radioactive constituents from the waste matrix into the environment. Stabilization is performed on a batch basis in an onsite existing treatment unit. Solidifying agents that are used are cementaceous materials such as portland cement, gypsum cement, pozzalonic fly ash, aluminum and magnesium silicate clays, and resinous materials such as polystyrene, epoxides, and resorcinol formaldehyde. For many cementaceous and resinous materials, activators such as silicates or polymerizers can be used to form a more stable waste matrix. Solidification can also include the mixing of resin components. Resin components are mixed or otherwise combined in accordance with the manufacturer's instructions. The inventory of homogeneous solids is 160.8 m^3.

3.1.2.2 Preferred Option

The preferred option for homogeneous solids is onsite treatment using LLNL's treatment facilities, specifically Building 513 Solidification Unit. LLNL's treatment facilities are currently subject to the interim status standards of the 22 CCR 66265. LLNL has submitted a RCRA Part B permit application to the State of California for continued operation of these interim status treatment units and expects to receive a final RCRA permit in FY96. MLLW is currently being treated in these units.

3.1.3 Organic and Inorganic Debris (LL-W003, LL-W017, LL-W021)

The waste streams that make up these treatability groups are described in Tables 3-1 and 3-2.

3.1.3.1 Description of Technology and Capacity Needs

The EPA debris rule currently allows generators to use various organic destruction and extraction technologies, and immobilization (stabilization and macroencapsulation) technologies for metals. The current inventory of organic and inorganic debris is 60.2 m^3.

3.1.3.2 Preferred Option

The preferred option for organic and inorganic debris is incineration at the INEL WERF Incinerator. The ash resulting from the WERF incineration process will be stabilized at the WERF stabilization unit. This waste stream could potentially be treated by technologies developed by LLNL's MWMF (described in Section 3.2).

The INEL's WERF Incinerator is an existing treatment facility. The WERF Incinerator processes combustible mixed low-level waste liquids, sludges, and solids. The incinerator is capable of destroying a wide range of hazardous organic constituents with temperatures of up to 2,000 degrees Fahrenheit. Ash remaining from the incineration process is containerized, stabilized with portland cement, and transferred to an approved storage area. Offgases are filtered through the use of HEPA filters to remove particulate matter. WERF Incinerator operations are expected to resume during FY-1995. A schedule for treating the mixed waste backlog at the INEL will be developed based on the results of the operation shortly thereafter. The waste acceptance criteria for the WERF Incinerator includes restrictions on treating mixed wastes with alpha content less than 10 nCi/g (between 0.1 and 10 nCi/g on case-by-case basis). Therefore, if further radiological characterization of DOE/OAK wastes indicates that some wastes exceed this alpha contamination limit, these wastes will likely be treated at

& the INEL Idaho Waste Processing Facility (IWPF), which is planned for the treatment of alpha-contaminated waste.

The INEL IWPF is a planned facility. Its primary mission will be to treat mixed waste with greater than 10 nCi/g alpha content. The facility will require technology development prior to construction focusing on adapting existing hazardous waste treatment technologies to a high-alpha/remote-handled environment. The current schedule for the IWPF calls for completion of technology development and operational plans by the end of FY-1997. Thus a schedule for developing the treatment capacity will be completed and submitted by DOE ID to the State of Idaho by the end of FY-1997.

3.1.4 Inorganic Debris (LL-W006)

The waste streams that make up this treatability group are described in Tables 3-1 and 3-2.

3.1.4.1 Description of Technology and Capacity Needs

The technologies required to treat the inorganic debris follow the EPA debris rule allowing generators to use organic destruction, other than incineration, and extraction and immobilization technologies. The current inventory of inorganic debris is 15.2 m^3.

3.1.4.2 Preferred Option

The INEL IWPF is a planned facility. Its primary mission will be to treat mixed waste with greater than 10 nCi/g alpha content. The facility will require technology development prior to construction focusing on adapting existing hazardous waste treatment technologies to a high-alpha/remote-handled environment. The current schedule for the IWPF calls for completion of technology development and operational plans by the end of FY-1997. Thus a schedule for developing the treatment capacity will be completed and submitted by DOE ID to the State of Idaho by the end of FY-1997.

3.1.5 HEPA Filters and Lead Bricks (LL-W015, LL-W007)

The waste streams that make up this treatability group are described in Tables 3-1 and 3-2.

3.1.5.1 Description of Technology and Capacity Needs

The technology required to treat the HEPA filters is stabilization, while the technology required to treat the lead bricks is macroencapsulation. As a pretreatment step, the HEPA filters will undergo size reduction before stabilization. The current inventories of the HEPA filters and lead bricks are 3 m^3 and 3.9 m^3, respectively.

3.1.5.2 Preferred Option

The preferred option for the HEPA filters is stabilization at the Hanford WRAP II-A facility, while the preferred option for the lead bricks is macroencapsulation at the Hanford WRAP II-A facility. The WRAP II-A is a planned treatment facility for solids, sludges, particulates, and debris waste. The process involves waste sorting and size reduction steps prior to stabilization. The stabilization processes proposed for this facility may include either a grout solidification (utilizing portland cement, slag, and fly ash) process or an alternative polyethylene polymer solidification process to reduce the leachability of the hazardous constituents. Once stabilized, the treated residuals may be managed strictly as low-level waste.

The Hanford Site is proposing to seek treatment services from the private sector for waste streams, including wastes from other DOE sites, that were to be treated in a new facility, WRAP II-A. Accordingly, DOE-Richland has requested that the Milestone M-19-00, "Complete WRAP II Module Construction and Initiate Operations," in the Hanford Tri-Party Agreement be amended. The proposed amendment would not change the milestone date for initiating operations on September 30, 1999. If the amendment is approved, the specific nature and location of the facility will be determined through the contracting process. The

status of the privatization effort, progress in securing treatment services by DOE-Hanford and any change to the facility title will be reported in subsequent Annual Update Reports to the Plan.

Storage of waste at the Hanford site while treatment capacity is being developed will be in compliance with the RCRA LDR storage prohibition in accordance with Hanford's Tri-Party Agreement signed by DOE, the EPA and the State of Washington. Therefore, any LLNL wastes shipped to Hanford for future treatment will be in compliance with the LDR storage prohibition when they are accepted for storage at Hanford. The pretreatment storage plans are described in Section 7 of this Background Volume.

3.1.6 Elemental Mercury (LL-W024)

The waste stream that makes up this treatability group is described in Tables 3-1 and 3-2.

3.1.6.1 Description of Technology and Capacity Needs

The technology required to treat the elemental mercury waste stream is amalgamation. The current inventory of elemental mercury is 0.09 m^3.

3.1.6.2 Preferred Option

The preferred option for elemental mercury is amalgamation at the INEL IWPF Amalgamation Unit. The INEL IWPF is described in Section 3.1.3.2

3.2 MIXED LOW-LEVEL WASTE STREAMS FOR WHICH TECHNOLOGY EXISTS BUT NEEDS ADAPTATION, OR FOR WHICH NO TECHNOLOGY EXISTS

3.2.1 Organic Liquids (LL-W001, LL-W008, LL-W009, LL-W014, LL-W016, LL-W026)

The waste streams that make up this treatability group are described in Tables 3-1 and 3-2.

3.2.1.1 Description of Technology and Capacity Needs

LLNL does not have current existing treatment units to treat its organic liquid mixed waste. However, LLNL is planning to develop technology which can be utilized to treat these waste streams. This will be done through a technology demonstration project, called the MWMF. Successfully demonstrated technologies will be permitted for treatment of applicable waste streams. A brief description of the MWMF project follows.

DOE's Office of Waste Management, EM-30 supports the MWMF. This project's mission is to design, construct, and start-up a facility by integrating the systems necessary to provide, through development and demonstration, the technical basis for the treatment of LLNL, DOE complex, and commercial low-level mixed organic wastes without the use of incineration. The facility will be used to obtain data to determine whether MWMF treatment technologies are equivalent to incineration. Equivalency to incineration will be based on the MWMF's ability to meet or surpass the treatment standards for the RCRA LDR wastes that have incineration as their technology-based standard.

The scope of the project is to conduct equipment engineering development and design, fabricate, install, and initiate operation of integrated mixed waste treatment systems. Facility construction will be accomplished through an existing line item for the Decontamination and Waste Treatment Facility (DWTF). The long term plan is to operate a test bed for new and future mixed waste technologies that could replace incineration.

The MWMF will initially house the following systems:

- Feed preparation and transport systems
- Initial primary treatment systems (e.g., molten salt oxidation)
- Secondary treatment systems (e.g., salt recycle)
- Offgas, water treatment, and solid final form systems

The goal of the MWMF is to operate a national user facility and involve other DOE sites and industrial partners during the design, development, and demonstration. The MWMF demonstration facility will provide engineering and design information for full-scale, RCRA permitted, treatment within the MWMF and at other DOE sites. Although the demonstrations may use small quantities of LLNL mixed waste streams from the HWM inventory as appropriate, the MWMF's primary function is not treatment of LLNL's mixed waste inventory.

3.2.1.2 Preferred Option

The treatment technology(ies) successfully demonstrated in the MWMF is (are) the preferred treatment option(s) for some liquid organic mixed waste streams at LLNL. At such time as the MWMF process(es) is (are) successfully demonstrated, LLNL will proceed with fulfilling additional regulatory requirements to convert the successfully demonstrated technologies into treatment processes to treat the remaining inventory and to provide for continuing capability to process organic liquids at LLNL. The permitting and operation of this treatment facility will be required to comply with the National Environmental Policy Act, California Environmental Quality Act, Clean Air Act, and RCRA. These regulatory statutes include provisions for public participation.

DOE believes that successful demonstration of treatment processes under the project would significantly reduce the risk of deploying new technologies for treating LLNL, DOE complex, and commercial low-level mixed organic wastes without the use of incineration.

The MWMF will be used to obtain data to determine whether the MWMF selected treatment technologies are equivalent to incineration.

On June 15, 1994, the Assistant Secretary for Environmental Management, EM-1, authorized the start of Title I and II design (Key Decisions 1 and 2) for the MWMF. The preliminary design of the MWMF began immediately thereafter, and a definitive design is scheduled to begin in FY95. The schedule for demonstrating the MWMF technology is identified in Table 3-3b.

Two major treatment technologies are to be initially demonstrated and evaluated in MWMF. Mediated electrochemical oxidation (MEO) is an electrochemical process for treating wastes; the process is similar to the reaction of charging a car battery. Electrical current flows through the cells, causing chemical reactions in the electrolyte. The chemical reactions eventually destroy organics and dissolve the radionuclides introduced into the solution. The second technology, molten salt oxidation (MSO), is an alternative to incineration. MSO is a thermal process that converts organics into CO_2 and water. Radionuclides and other organics remain in the salt.

Treatment of the organic liquids waste stream in MWMF selected technologies may result in volume reduction, and the resulting residue may be classified as low-level waste but not mixed waste. The classification of residue as low-level waste would allow DOE to ship the waste to a site designated for nonhazardous low-level disposal.

If the MWMF technology fails to demonstrate and provide effective treatment for the organic liquids or if budget constraints do not allow for the development of the MWMF, an alternate treatment option is shipment for offsite treatment at the INEL WERF or IWPF. These facilities are described in Section 3.1.3.2.

3.2.2 Reactive Metals (LL-W011)

The waste stream that makes up this treatability group is described in Tables 3-1 and 3-2.

3.2.2.1 Description of Technology and Capacity Needs

The technology required to treat the reactive metals waste stream is deactivation through oxidation. The treatment of the reactive metals will be conducted in an existing one liter reactor using water or water-like reactants as an oxidizer. The reactor is a closed system and designed to contain the violent nature of these reactions. LLNL's current RCRA Part B permit application, currently under review by the DTSC, provides the capability to conduct small-scale treatment in a treatability laboratory. The current inventory of reactive metals is 1.0 m^3.

3.2.2.2 Preferred Option

The reactive metals waste stream has been identified for small-scale onsite treatment as shown in Table 3-2. This waste stream is included in this section primarily due to its unique characteristics that require an evaluation of the appropriate approaches to the treatment of the waste. Additionally, limited treatment options are available in the DOE complex for this waste stream.

3.3 MIXED LOW-LEVEL WASTE STREAMS FOR WHICH TECHNOLOGY ASSESSMENT HAS NOT BEEN DONE

3.3.1 Uranium Chips with Coolant (LL-W022)

LLNL is in the process of re-evaluating a waste stream containing metal chips and machine coolants to confirm the quantities currently in storage at the site. After the quantities have been identified, a plan to treat the waste stream will be included in the STP annual update as identified in Table 3-4e.

3.3.2 Other Reactives (LL-W027)

Additional technology assessment is necessary prior to developing a treatment plan for this waste stream. Following completion of the technology assessment, the plan to treat the waste stream will be included in the STP annual update as identified in Table 3-4e.

4.0 TRANSURANIC MIXED WASTE STREAMS

The waste streams identified in this section are MTRU wastes located at LLNL, which contain both RCRA-hazardous waste and transuranic constituents. MTRU waste is waste that is contaminated with (1) alpha-emitting transuranic radionuclides with half lives of more than 20 years and concentrations greater than 100 nCi/g at the time of assay and (2) RCRA-regulated waste.

4.1 MTRU WASTE STREAMS EXPECTED TO GO TO WIPP

The current DOE strategy for management of MTRU waste is to segregate MTRU wastes from MLLW; to maintain the MTRU wastes in safe interim storage; to characterize, certify, process if necessary, and package the wastes to meet the waste acceptance criteria (WAC) of the Waste Isolation Pilot Plant (WIPP); and to permanently dispose of applicable MTRU waste in WIPP. Compliance with the requirements of the FFCAct for MTRU waste will be achieved using the RCRA no-migration variance petition approach provided in the CFR Title 40, Section 268.6. Under this strategy, no treatment other than that necessary to meet WIPP WAC is anticipated; however, the performance assessment, and the EPA no-migration variance determination will ascertain what treatments, if any, will be required to ensure disposal compliance.

DOE is actively gathering inventory and characterization data for input into the performance assessment and preparing several regulatory submittals to EPA to demonstrate compliance with no-migration variance petition requirements. The current plan is to submit a draft compliance certification package to EPA in March 1995; a no-migration variance petition to EPA by May 1995; a revised RCRA Part B permit application to the New Mexico Environment Department by June 1995; a final compliance certification package (including final performance assessment results) to EPA by December 1996; and to finalize the disposal WIPP WAC by June 1997. DOE plans to declare operational readiness for WIPP

by December 1997. Disposal of CH TRU waste will begin in June 1998, followed by RH TRU waste in June 1999. These dates are contingent upon permit approval, certification of disposal compliance, and determination of no-migration from the appropriate regulators and are subject to the availability of funds.

In the interim, site-specific information is included in the section, "site MTRU waste management approach," to outline activities being performed at LLNL to maintain safe, compliant storage, waste characterization activities, and other activities planned to support the ultimate goal of shipment to and disposal at WIPP under a no-migration variance petition.

4.1.1 Waste Stream Description

MTRU waste has been and continues to be generated at LLNL in the Plutonium Facility and in the Heavy Element Facility. MTRU waste is segregated into special mixed waste drums or boxes. Information on the MTRU waste is summarized in Table 4-1. There is only one LLNL MTRU waste stream, currently identified Mixed (Inorganic/Organic) Debris from Glove Boxes. Glove box waste is characterized by the waste generator and his/her knowledge of what radionuclides and any hazardous components were handled in the glove box. Radionuclide amounts are characterized in the Plutonium Facility by radioassay of ^{239}Pu and by generator knowledge of relative or actual amounts of other radionuclides. Radionuclide amounts are characterized in the Heavy Element Facility by radioassay of all radionuclides.

There is a high level of confidence (95%) for radioassay numbers due to use of LLNL's analytical equipment and testing procedures. There is also a high level of confidence in the hazardous component characterization for waste characterization since 1990 due to increased training of generators. However, the level of confidence is lower for waste generated before 1990. The Waste Certification Program at LLNL is re-evaluating and augmenting waste characterization of the entire stored inventory, with special attention being given to the waste generated before 1990.

Table 4-1

SUMMARY OF LLNL'S MIXED TRU STREAMS

Waste Stream No.	Description	RCRA Waste Codes	Universal Treatment Standards	Management Approach	Inventory Volume (m^3)
LL-W018	MTRU Debris	Pending Characterization	Pending Characterization	Further characterization required; No LDR treatment. required; Disposal at WIPP.	196.5

4.1.1.1 Management Approach

LLNL is in the process of re-evaluating the TRU and MTRU waste streams to confirm the quantities of MTRU currently in storage at the site. The evaluation consists of a thorough review of the existing records on the waste, as well as interviews with waste generators. The evaluation may include head space gas analyses and real-time radiography (RTR). Results of the evaluation may cause a portion of the waste previously reported as MTRU to be reclassified as TRU waste only (i.e., no hazardous component). LLNL's entire inventory of TRU waste is defense-related.

Following the evaluation or characterization of the TRU waste located at LLNL, the MTRU waste will be stored onsite. LLNL anticipates that some of the MTRU waste inventory will require additional characterization to assess the concentration of hazardous components; in addition, some of the MTRU waste is stored in containers too large for transport over public roadways. LLNL does not currently maintain permitted facilities designed for the opening and repackaging of MTRU waste containers. Consequently, LLNL must develop a receipt of appropriate regulatory permits, and construction of a facility which adequately protects human health and the environment during the opening, sampling, and repackaging of containers of MTRU waste, particularly MTRU waste currently stored in containers too large to transport over public roadways. The schedule will also include the timeframe to characterize and repackage the MTRU upon construction of the facility.

At the determination that WIPP will be used for the disposal of MTRU waste, a second schedule will be developed that could include the preparation of a waste certification plan for MTRU, characterization of MTRU to meet the final WIPP WAC, repackaging of the MTRU waste, and actual shipping of the MTRU waste to WIPP. Where appropriate, this second schedule will incorporate the completion of the activities associated with the characterization and packaging schedule. As indicated previously, the determination that WIPP will be used for the disposal of MTRU waste is expected to be finalized in December 1997.

The schedule for submission of the characterization and packaging schedule and the submission of a schedule for shipping MTRU waste to WIPP is included in Table 4-2.

4.2 MTRU WASTE NOT DESTINED FOR WIPP

LLNL has no MTRU waste in this category.

Table 4-2

SCHEDULE FOR WASTE STREAMS TO BE DISPOSED AT WIPP

Activity	Waste Stream No. LL-W018
Offsite Disposal Location	WIPP
Provide schedule for completing characterization of MTRU	9/30/96
Provide schedule for offsite shipment of waste to WIPP. This may include schedule dates for requesting the WIPP WAC, submitting a written certification plan, conducting additional sampling and analysis of waste if needed to meet WAC, requesting an acceptable shipping schedule from WIPP, and a date to complete shipment of waste offsite.	12/30/98

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5.0 MIXED HIGH-LEVEL WASTE STREAMS

HLW is defined as highly radioactive waste material that results from the reprocessing of spent nuclear fuel including liquid wastes produced directly in reprocessing and any solid waste derived from the liquid that contains a combination of transuranic waste and fission products in concentrations requiring permanent isolation. There are no HLW currently stored or planned for generation at the LLNL facility.

6.0 FUTURE GENERATION OF MIXED WASTE STREAMS

The mixed waste identified in this section are wastes predicted to be generated in the future, primarily from environmental restoration, decontamination and decommissioning, and future operation activities at LLNL. To the extent possible, the volumes of such wastes have been estimated. The waste streams will be incorporated into the STP following generation only if they do not meet LDR requirements, regardless of the time of generation or if storage/treatment of the mixed waste is not addressed under an existing agreement or permit with the State of California (i.e., a CERCLA-based environmental restoration agreement).

6.1 ENVIRONMENTAL RESTORATION WASTE

ER waste consists of soil excavated from onsite drilling, trenching and clean-up activities and liquids (primarily groundwater) from developing, testing, purging and pumping wells.

The ER activities at LLNL are selected, implemented, and completed under a Federal Facility Agreement (FFA) established under Section 120 of the CERCLA, as amended. The FFA was entered into by the EPA, DOE, DTSC, and the RWQCB. The FFA names the DOE as the responsible agency to take all necessary actions in order to fully implement the terms of the agreement, including undertaking response actions at the LLNL in accordance with federal and state applicable or relevant and appropriate laws, standards, limitations, criteria, and requirements to the extent consistent with CERCLA. The FFA applies to all known releases of hazardous substances to environmental media originating from activities at the LLNL site. ER wastes covered under the FFA will not be incorporated into the STP.

Mixed waste streams identified after the submittal of the PSTP which are not in compliance with the LDR storage prohibition due to lack of adequate treatment capacity and which are not within the scope of the FFA will be incorporated into the STP in accordance with the

procedure outlined in Section 2 of the Compliance Plan Volume, and a plan and schedule for identifying treatment options will be prepared and submitted to the State of California.

6.1.1 Sources and Quantities

Soils from ER activities may contain low level radioactivity (primarily tritium and some depleted uranium at Site 300) mixed with low concentrations of volatile organic compounds (VOCs) and possibly some metals (i.e., cadmium, lead, chromium, copper, nickel, zinc, beryllium, and mercury) in the soil matrix. The solid would primarily be generated during drilling operations and minor excavations. ER drilling activities at the LLNL main site are likely to occur through 1998. Drilling activities are carefully planned to minimize mixed waste generation. The generation rate of wastes from the main site drilling is estimated to be 20 to 50 drums per year or approximately 17 to 42 m^3 through 1998.

A small number of wells are anticipated to be drilled at Site 300, following the completion of the Site-Wide Remedial Investigation (SWRI). The generation of mixed waste from these drilling activities is not anticipated.

Liquids (groundwater) from developing, testing, and purging wells that contain tritium and VOCs as the primary contaminants could potentially be generated. The total estimated volume of potential liquid mixed waste is less than 5000 gal/yr. This would correspond to 76 m^3 through 1998.

There exists a potential for the generation of mixed waste through the LLNL ER treatment facilities. However, the probability of mixed waste generation is extremely low and would be confined to granulated activated carbon canisters or resin beds. Consequently, estimated volumes for this waste can not be made at this time.

The characterization of ER waste is similar to the characterization of other MLLW at LLNL as described in Section 2.4.2 of this volume. The level of confidence associated with characterization is also discussed in Section 2.4.2.

These assumptions delineate the uncertainties in the generation of mixed wastes. As in most remediation work, it is difficult to provide more than qualitative estimation of waste generation.

6.2 DECONTAMINATION AND DECOMMISSIONING WASTES

6.2.1 Sources, Quantities, and Type of Wastes Expected To Be Generated in the Future

D&D activities at LLNL may begin as early as late FY95 with significant amounts of mixed waste potentially generated over the ensuing years; however, LLNL has not developed an estimate of the amount of D&D mixed waste which could be generated because the extent of the D&D activities at LLNL is not currently known.

Building 222, 251, and 412 are currently under consideration for transfer to the DOE Surplus Facilities Database and environmental restoration in FY96 with actual D&D activities to occur in FY97. However, only Building 251 and 412 were specifically used for activities involving substantial quantities of radioactive materials and are expected to yield significant amounts of mixed waste. LLNL has not completed evaluations on the potential volume of mixed waste generated from the D&D of these buildings.

The only building partially characterized for mixed waste generation is Building 419. Removal of equipment from this building is scheduled for FY94-FY95 and the commencement of RCRA closure activities is in FY95-FY96. Four waste streams may be generated as a result of the RCRA closure: (1) construction debris consisting of ducting, stacks, floor tile, wall board, etc.; (2) lab equipment including hoods, sinks, electric furnaces, a vapor degreaser, ultrasonic cleaners, a parts washer, etc.; (3) spent decontamination liquids; and

(4) miscellaneous debris consisting of bottles, rags, paper, wipes, personnel protection equipment, etc. An estimated 26,515 lb of construction debris, 15,100 lb of lab equipment, 725 gallons of decontamination liquids, and 90 ft^3 of miscellaneous debris may be generated. Currently, the characterization data indicates that there is no contaminated environmental media associated with the RCRA closure of Building 419 which will be required to be handled as mixed waste.

The characterization of D&D and waste resulting from RCRA closures waste is similar to the characterization of other MLLW as described in Section 2.4.2 of this volume. The level of confidence associated with characterization is also discussed in Section 2.4.2.

Mixed waste streams identified after the submittal of the PSTP which are not in compliance with the LDR storage prohibition due to lack of adequate treatment capacity will be incorporated into the STP in accordance with the procedure outlined in Section 2 of the Compliance Plan Volume and a plan and schedule for identifying treatment options will be prepared and submitted to the State of California.

6.3 OTHER WASTES

6.3.1 Sources, Quantities, and Type of Wastes Expected To Be Generated in the Future

LLNL is currently generating MTRU and MLLW as a result of laboratory operations. LLNL expects to continue to generate these wastes through 1998 and beyond. The wastes discussed in this section are further described in Section 3 and 4 of this volume.

Approximately 1,764 m^3 of MLLW and an additional 3 m^3 of MTRU waste is projected to be generated from site operations through the end of 2000. If these waste streams are not in compliance with the RCRA LDR storage prohibition due to lack of adequate treatment capacity, they will be incorporated into the STP in accordance with the procedure outlined in

Section 2 of the Compliance Plan Volume and a plan and schedule for treating the mixed waste will be prepared and submitted to the State of California.

The matrices of the MLLW to be generated in the future include aqueous liquid, homogeneous solids, organic and inorganic debris, organic liquids, reactive metals, elemental lead, HEPA filters, and elemental mercury. The aqueous liquid and homogeneous solids waste streams are projected to each generate 92% of the MLLW. Organic liquids will account for almost 3% of the future volume and the organic/inorganic debris is projected to account for approximately 4% of the MLLW. The other waste streams mentioned previously (reactive metals, elemental lead, HEPA filters, and elemental mercury) account for the remaining 1%.

MTRU wastes to be generated in the future include inorganic debris, solidified aqueous liquids, and solidified organic liquids. Inorganic debris (scrap metal, lead bricks, metal shavings from research and maintenance, etc.) accounts for 52% of the volume, solidified aqueous liquid (residue from metal etching activities using sulfuric acid), and solidified organic liquids (spent solvents used to clean tanks and equipment during program changes) account for the remaining 48%.

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7.0 STORAGE REPORT

DOE is committed to storing waste in compliance with RCRA storage requirements in 22 CCR 66264 or 66265 pending the development of treatment capacity and implementation of the STPs.

7.1 STORAGE FOR CURRENT INVENTORY AND FUTURE WASTE

LLNL stores mixed waste in hazardous waste management units subject to the interim status standards of the 22 CCR 66265. LLNL has submitted a RCRA Part B permit application to the State of California for continued operation of these interim status storage units and expects to be issued a final permit in FY-1996. The hazardous waste storage units at Site 300 are permitted to store only hazardous waste.

LLNL presently has adequate storage capacity for its mixed and low-level waste, and shipments of low-level waste offsite to the Nevada Test Site (NTS) for disposal have been initiated. Additional low-level waste shipments to NTS are planned. LLNL will continue to have adequate storage capacity for mixed waste provided that NTS shipments continue and Hanford and INEL shipments begin in accordance with this plan.

LLNL's interim storage units used to store mixed wastes currently are approximately 73% full (by volume). These units are also used to store radioactive-only wastes. In a worst case scenario, if radioactive-only waste shipments to NTS were discontinued and shipments of mixed waste to Hanford and INEL (as described in Section 3 of the PSTP Background Volume) did not occur, LLNL would be in compliance with RCRA storage requirements for about 1 year. This 1-year assumption is based on estimates of future generation rates without waste management operational changes. However, LLNL can make several operational changes that can maintain storage compliance beyond 1 year. LLNL radioactive-only wastes can be relocated since RCRA-compliant storage is not an issue with these wastes.

More rigorous avenues of size reduction can be pursued in compliance with our RCRA permit application. If necessary, LLNL would pursue permit or interim status modifications to perform size reduction and decontamination.

MTRU waste is stored by the HWM Division at the Building 612 storage facility, the Building 514 facility, and at the Building 233 facility.

7.2 STORAGE FOR WASTES PRIOR TO TREATMENT

As noted in Section 3.1 of the PSTP Background Volume, waste identified for treatment at the Hanford WRAP II facility and the INEL IWPF may be shipped to the offsite facilities prior to the treatment facilities becoming operational. In these cases, the waste will be stored at the offsite facility prior to treatment. DOE/OAK believes that the small volume of waste to be shipped will have a negligible impact on the offsite receiving facility's compliant storage capacity. Schedules for shipping mixed waste offsite and the offsite storage locations to be used prior to treatment will be identified in the proposed agreements between DOE/OAK and the offsite treatment facility included in Appendix A.

MTRU wastes destined for the WIPP facility in New Mexico will be stored onsite at LLNL, pending approval from the EPA and the State of New Mexico for WIPP to commence operations.

7.3 STORAGE FOR WASTE TREATMENT RESIDUALS PRIOR TO DISPOSAL

Disposal issues are discussed in Section 8 of this volume. DOE/OAK's approach for treatment residuals from wastes shipped offsite for treatment consists of the following two options, in order of preference:

1. Treatment residuals will be stored in an approved storage location at the treatment site, pending final decisions regarding disposal. The identification that the treatment residuals will be stored at the treatment site is noted in the tables contained in Appendix A to this volume.

2. If the above option is not feasible, treatment residuals will be shipped back to a DOE/OAK site located in California, pending final decisions regarding disposal.

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8.0 PROCESS FOR EVALUATING DISPOSAL ISSUES IN SUPPORT OF THE SITE TREATMENT PLAN DISCUSSIONS

This section discusses the overall DOE process for evaluating issues related to the disposal of residuals from the treatment of MLLW subject to the FFCAct. LLNL Site 300 is among the sites being analyzed further for potential development as a disposal site for residuals from the treatment of MLLW subject to the FFCAct. This section outlines the disposal planning process developed by DOE, in consultation with the states, for evaluating potential options for the disposal of residuals from the treatment of MLLW. Importantly, because DOE is not currently developing MLLW disposal sites (with the exception of the Hanford Site) preferred alternatives or final destinations for disposal of treatment residuals are not known at this time. The results of this process are intended to be considered during subsequent planning activities and discussions between DOE and regulatory agencies.

8.1 BACKGROUND

The FFCAct requires DOE to develop a plan for the treatment of mixed wastes. The Act does not impose any similar requirement for the disposal of mixed wastes after they have been treated; however, DOE recognizes the need to address this final phase of mixed waste management. The following process reflects DOE's current strategy for evaluating the options for disposal; the evaluation will increase understanding of the strengths and weaknesses of a site's potential for disposal but is not a site selection process. Ultimately the identification of sites that may receive mixed waste for disposal will follow state and federal regulations for siting and permitting, and will include appropriate public involvement.

HLW and MTRU are among the mixed waste subject to the FFCAct. Options for disposal of these mixed wastes are not identified by this process because there are established processes for studying, designing, constructing, and operating disposal facilities for these wastes.

The DOE has historically planned to develop MLLW disposal facilities at the six DOE sites currently disposing of low-level waste. These sites are Hanford, Savannah River, Oak Ridge Reservation, Idaho National Engineering Laboratory, Nevada Test Site, and Los Alamos National Laboratory. Currently, the Hanford Site has the only active permitted facility operated by DOE for the disposal of residuals from the treatment of MLLW. This plan has been re-directed in conjunction with the planning efforts of the FFCAct to include the results of the disposal planning process (Figure 8.1), and the Environmental Management Programmatic Environmental Impact Statement (EM PEIS). The sites subject to evaluation under this process are the 49 sites reported to Congress by DOE in the MWIR, April 1993, that are currently storing or expected to generate mixed waste.

8.2 DISPOSAL PLANNING PROCESS

Although the FFCAct does not specifically address disposal of treated mixed wastes, both DOE and the states have recognized that disposal issues are an integral part of treatment discussions. A process was established to evaluate and discuss the issues related to the potential disposal of the residuals from the treatment of DOE MLLW at the sites subject to the FFCAct, shown in Figure 8.1. The focus of this process has been to identify, from among the 49 sites that currently store or are expected to generate mixed waste, sites that are suitable for further evaluation of their potential as disposal sites. Sites determined to have marginal or no potential for disposal will be removed or deferred from further evaluation under this process. The remaining sites will be evaluated more extensively. Ultimately, a number of sites are expected to be identified that are technically acceptable for disposal of treated residuals.

8.2.1 Activities to Date

Site Grouping

The initial step in this process was to examine each of the 49 sites to determine which sites, while individually listed in the MWIR, were in such geographic proximity that further

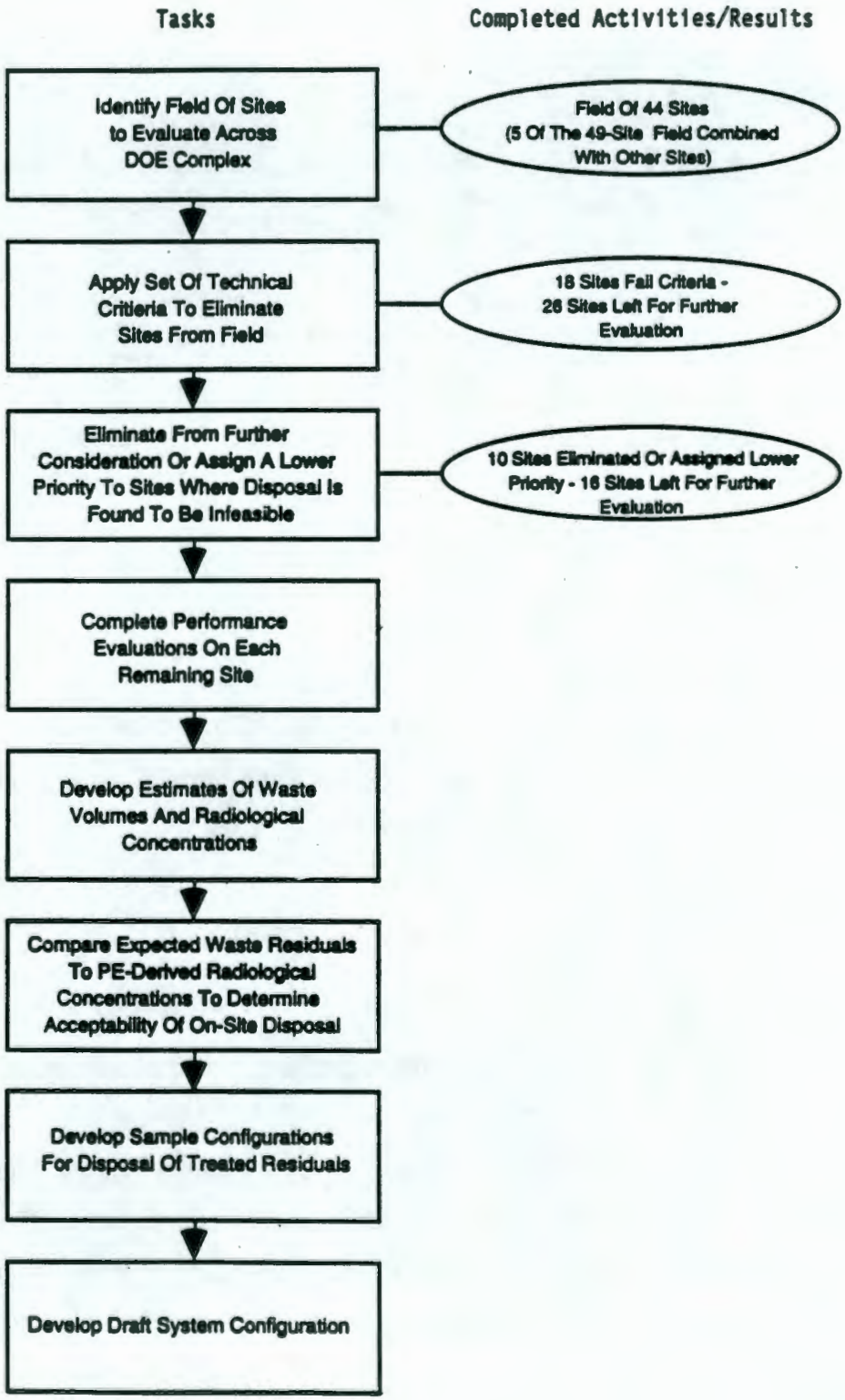

FIGURE 8-1 Disposal Planning Process

analysis could address them as a single site. This grouping reduced the number of sites to 44, as follows:

- Idaho National Engineering Laboratory and Argonne National Laboratory (West) are located on a single federally-owned reservation near Idaho Falls, Idaho;
- The Sandia National Laboratories, California, and Lawrence Livermore National Laboratory are located on adjoining, federally-owned properties near Livermore, California;
- The Inhalation Toxicology Research Institute and Sandia National Laboratories, New Mexico, are located on the same federally-owned reservation, and;
- The Oak Ridge National Laboratory, Oak Ridge K-25 Site, and Oak Ridge Y-12 are all located within the federally-owned Oak Ridge Reservation, near Oak Ridge, Tennessee.

Initial Site Screening

At a joint meeting on March 3-4, 1994, DOE and the states agreed on three exclusionary criteria for further screening the 44 remaining sites. These criteria were developed by reviewing federal and state requirements regarding the siting of waste treatment, storage, and disposal facilities. In order to be evaluated further, a site:

- must not be located within a 100-year floodplain;
- must not be located within 61 meters (200 feet) of an active fault, and;
- must have sufficient area to accommodate a 100-meter buffer zone.

The first criterion (100-year flood plain) is derived from both National Regulatory Commission (NRC) and Resource Conservation and Recovery Act (RCRA) requirements. The second criterion (active fault) was selected from requirements found in RCRA which restrict the location of waste treatment, storage, and disposal facilities. The third criterion (sufficient area for 100-meter buffer) is derived from guidance from the Environmental Protection Agency (EPA), NRC, and DOE for the proper operation of waste facilities.

Evaluation of the 44 sites resulted in identification of 26 sites meeting the above criteria. At a joint meeting on March 30-31, 1994, DOE and the states agreed to remove from further evaluation those sites not meeting the screening criteria. Also at that meeting, DOE agreed to collect additional, more detailed information on the remaining 26 sites to identify additional strengths and weaknesses of the sites. It was agreed that DOE or any affected state may propose further elimination of sites from consideration following the site-specific evaluation.

Evaluation of the Remaining 26 Sites

DOE and the states met on July 26-27, 1994, to discuss the site-specific data on the remaining 26 sites, and to consider proposals for eliminating additional sites from further evaluation. The focus of these discussions was to identify sites suitable for further evaluation under this process.

The criteria that DOE and the states used to eliminate sites from further evaluation at this stage were derived from three main groupings of considerations: Technical Considerations, Potential Receptor Considerations, and Practical Considerations. Each of the remaining 26 sites were evaluated against criteria in these groupings that included; soil stability and topography, precipitation and evapotranspiration, population, proximity to sensitive environment, land acquisition, government presence at the site, and regulatory constraints.

Sites with marginal or no potential for disposal, based on these criteria, were recommended for removal or postponement from further evaluation. As a result of the meeting, DOE and the states agreed to eliminate five sites from further evaluation due to their limited potential for disposal. These are:

Site	State
Energy Technology Engineering Center	California
General Atomics	California
General Electric Vallecitos Nuclear Center	California
Pinellas Plant	Florida
Site A/Plot M	Illinois

Additionally, DOE and the states agreed to merge the evaluation of Knolls Atomic Power Laboratory at Niskayuna, New York, and Knolls Atomic Power Laboratory at Kesselring, New York, due to their close, geographic proximity.

While not eliminated from further evaluation, it was agreed to lower the evaluation priority of an additional four sites. Issues such as the technical capabilities of the site, the volume of mixed waste that may be generated by the sites, and the acceptability of off-site waste contributed to a conclusion that further evaluation of some sites should not be a high priority. DOE and the states agreed to evaluate these sites in terms of their capability to dispose of their own mixed waste if no other off-site disposal options could be identified. These sites will not be considered for disposal of wastes from other sites, and may be eliminated from further analysis if sufficient evidence suggests the potential for disposal is too limited. The sites in this category are:

Site	State
Weldon Spring Remedial Action Project	Missouri
Brookhaven National Laboratory	New York
Mound Plant	Ohio
Bettis Atomic Power Laboratory	Pennsylvania

Performance Evaluation

The performance evaluation being conducted for the 16 sites identified for further evaluation entails the collection of more detailed site-specific data related to the site characteristics. The

performance evaluation methodology is based on the principles of radiological performance assessments and was developed by DOE performance assessment experts. Additionally, the evaluation will be based on RCRA-compliant engineered facilities. This information will be used to evaluate the sites and estimate the radionuclide concentration limits of waste that may be disposed at a given site. The performance evaluations were initiated in August 1994. The 16 sites for which performance evaluations are being prepared are:

Site	State
Lawrence Livermore National Laboratory, Site 300	California
Rocky Flats Environmental Technology Site	Colorado
Idaho National Engineering Laboratory	Idaho
Argonne National Laboratory	Illinois
Paducah Gaseous Diffusion Plant	Kentucky
Nevada Test Site	Nevada
Los Alamos National Laboratory	New Mexico
Sandia National Laboratories	New Mexico
Knolls Atomic Power Laboratory-Kesselring	New York
West Valley Demonstration Project*	New York
Fernald Environmental Management Project	Ohio
Portsmouth Gaseous Diffusion Plant	Ohio
Savannah River Site	South Carolina
Oak Ridge Reservation	Tennessee
Pantex Plant	Texas
Hanford Site	Washington

* Because the West Valley Demonstration Project Act does not authorize the site to accept off-site wastes, the site will only be evaluated for disposal of on-site wastes.

8.2.2 Next Steps in the Evaluation Process

As illustrated in Figure 8.1, progress has been made in the planning of the disposal process. The following steps outline future activities that are either ongoing or are to be completed to facilitate an informed decision about the disposal of DOE MLLW. Coordination with the states will continue to ensure stakeholder input and to resolve concerns at the earliest possible stage.

Complete Remaining Performance Evaluations

To date, 10 performance evaluations have been completed for the following sites: Savannah River, Oak Ridge Reservation, Idaho National Laboratory, Hanford, Sandia National Laboratories, Rocky Flats Environmental Technology Site, Los Alamos National Laboratory, Pantex Plant, Nevada Test Site, and Lawrence Livermore Laboratory. Performance evaluations for the remaining 6 sites are scheduled to be completed by June 1995. A progress report for the performance evaluation activities has been issued at approximately the same time frame as the final Proposed Site Treatment Plans (PSTPs) in order to keep the states and other interested parties informed of the progress.

Develop Estimates of Waste Volumes and Radionuclide Concentrations in Treated Residuals

Once treatment methods for the MLLW waste streams are finalized through the FFCAct process, estimates of the volumes and radionuclide concentrations of the treated residuals will be developed for all waste streams; this analysis will take place after the PSTPs have been approved by the appropriate regulatory agencies. These estimates are needed to compare to the performance evaluation-derived radionuclide concentration guides.

Compare Estimates of Radionuclide Concentration in Treated Residuals to Performance Evaluation-Derived Radionuclide Concentration Guides

Radionuclide concentrations for each treated residual will be compared to those disposal values derived in the performance evaluation in this step. Comparing radionuclide concentrations in treated residuals with performance evaluation concentration guides will compare MLLW stream characteristics to potential disposal sites' capabilities. This evaluation will also include offsite DOE and commercial disposal site candidates for those treated waste streams which do not have onsite capabilities. Confirmation of the candidates streams and sites will be attained through detailed performance assessment efforts.

Develop Sample Configurations for Disposal of Treated Residuals

An Options Analysis Team (OAT) approach will be employed to develop sample complex-wide configurations for the disposal of treated MLLW residuals. These configurations will take into account such technical issues as compatibility of radionuclides (both handled at the site and those considered acceptable by the performance evaluations), capacity to handle projected residual volumes, etc. Under the OAT approach, other types of issues will be weighed during the configuration discussions such as transportation costs and distances.

Develop a Draft Disposal System Configuration

Using the sample configurations as a starting point, DOE will develop with state and stakeholder input, a draft disposal system configuration. This configuration will be the basis for determining future funding and schedules for proposed disposal facilities. The Final EM PEIS will provide bounding analysis of potential environmental impacts for the range of sample configurations considered. It will identify preferred sites for further development as disposal facilities. Following the issuance of the ROD for the EM PEIS, DOE may initiate site-specific NEPA evaluations for the proposed disposal facilities; initiate performance assessment analyses for compliance with DOE Order 5820.2A; and initiate processes for permitting disposal facilities.

8.3 INTEGRATION WITH THE STP PROCESS

The FFCAct does not require disposal to be included in the STPs; however, given the complex issues involved, DOE recognizes the importance of state input to facilitate resolution of issues related to disposal. Chapter 8.0 information is provided in the PSTP to continue to involve the states and inform them of DOE's continued work on the disposal issue. For more detailed information on the ongoing performance evaluation process, refer to the *Progress Report on Performance Evaluation of DOE Sites' Capabilities for Mixed Low-Level Waste Disposal.* As the disposal planning process moves forward, further information will be provided and coordination with the states will continue.

9.0 REFERENCES

This section provides a summary of references and guidance documents referenced throughout this volume.

1. Lawrence Livermore National Laboratory, *Conceptual Site Treatment Plan*, October 1993.

2. U.S. Department of Energy, Albuquerque Operation Office, *AL Mixed Waste Treatment Plan,* March 1994.

3. U.S. Department of Energy, *DOE Waste Treatability Groups Guidance*, Final Draft, September 1993.

4. U.S. Department of Energy, *Draft Site Treatment Plan Development Framework*, Revision 7, April 7, 1994.

5. U.S. Department of Energy, Federal Facility Compliance Act Task Force, *Draft Site Treatment Plan Cost Information Guidance*, Revision 1, April 21, 1994.

6. U.S. Department of Energy, Office of Environmental Restoration and Waste Management, *Hanford Site Waste Acceptance Criteria*, Document No. WHC-EP-0063-4, November, 1993.

7. U.S. Department of Energy, *Mixed Waste Inventory Report*, Phase 2, May 1994.

8. U.S. Department of Energy, Chemical/Physical Treatment Technical Support Group, *Technical Area Status Report for Chemical/Physical Treatment*, Draft Volume 1, May 1993.

9. Lawrence Livermore National Laboratory, *Draft Site Treatment Plan*, August 1994.

10. U.S. Department of Energy, *Overall DOE Preferred Mixed Waste Treatment Configuration*, February 1995.

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Appendix A

PROPOSED OFFSITE TREATMENT FACILITY AGREEMENTS FOR DOE/OAK MIXED WASTES

PROPOSED OFFSITE TREATMENT FACILITY AGREEMENTS

Mixed waste streams have been identified for treatment at offsite facilities in some of the DOE/OAK Proposed Site Treatment Plans. For these options, it was necessary for DOE/OAK to initiate discussions with the offsite treatment facility(s) to develop an offsite shipping agreement for implementation of the option.

DOE/OAK initiated the process for developing an offsite shipping agreement by developing a proposed agreement. The proposed agreement was transmitted to the DOE Operations Office responsible for the respective offsite treatment facility. The proposed offsite shipping agreement(s) related to this PSTP are included in this Appendix. The proposed agreements include all DOE/OAK managed waste streams planned for treatment at the respective offsite treatment facility, not just those identified in this PSTP.

DOE/OAK is presently coordinating activities with the offsite treatment facilities to obtain formal approval or concurrence on the proposed offsite shipping agreements. Major issues that still require resolution are the pre-treatment storage of wastes and the storage of post-treatment residuals at the treatment site. Treatment options that involve pre- and/or post-treatment storage at the treatment site may require additional discussions between DOE, States, regulators, and interested members of the public. These discussions could impact the schedule dates for shipping the affected waste streams to the receiving site. For example, one resolution of the pre- and/or post-treatment storage issue could be that mixed waste will not be shipped to an offsite treatment facility until the treatment facility becomes operational and/or treats the existing onsite mixed waste backlog first. This resolution could result in a delay in the actual shipping date.

DOE/OAK recognizes that although these proposed offsite shipping agreements may require further discussions prior to approval or concurrence, such proposals should be presented in the PSTPs.

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DOE F 1325.8
(8-89)
United States Government **Department of Energy**

memorandum

DATE: February 9, 1995

REPLY TO ATTN OF: DOE Oakland Operations Office

SUBJECT: Federal Facility Compliance Act Proposed Site Treatment Plans: Proposed Offsite Shipping Agreement with Idaho National Engineering Laboratory (INEL) for Pre-treatment Storage, Treatment, and Post-treatment Residual Management of DOE/OAK Mixed Wastes

TO: Don Rasch, DOE/Idaho (DOE/ID)

As required under the Federal Facility Compliance Act of 1992, DOE is required to prepare Site Treatment Plans (STPs) for sites which generate and store DOE mixed waste subject to the RCRA LDR storage prohibition. Consistent with DOE Headquarters protocol for finalizing offsite waste treatment options, the DOE Oakland Operations Office (DOE/OAK) and its proposed receiving sites have agreed to develop "Offsite Shipping Agreements" which will be incorporated (along with supporting documentation), as an Appendix into applicable DOE/OAK Proposed Site Treatment Plans (PSTPs) .

This memorandum requests concurrence from DOE/ID on the attached Offsite Shipping Agreement, addressing the shipment, pre-treatment storage, treatment, and post-treatment management of residuals of DOE/OAK mixed wastes. Table 1 of the Shipping Agreement has been developed to include: Shipping and Receiving Site Contacts; Waste Stream ID Numbers and Volumes; Pre-treatment and Post-treatment Storage Locations; Treatment Facilities; and Milestone Dates for "Requesting Shipping Schedules" (from INEL), as well as "Approved Shipping Dates." An Approved Shipping Date will be added to Column 5 of Table 1 based upon DOE/IDs response to this memorandum.

The following information request and proposed terms of the Offsite Shipping Agreement include:

Treatment Facility Scheduling Information: Consistent with DOE Headquarters guidance regarding the development of treatment options in the PSTPs, DOE/OAK is requesting treatment schedule information for four separate INEL Facilities, including: WEDF (the Waste Engineering Development Facility); WERF (the Waste Experimental Reduction Facility); IWPF (the Idaho Waste Processing Facility); and ICPP (the ICPP Decontamination Facility). Treatment schedule data will be incorporated into the PSTP Background Volumes for the DOE/OAK sites proposing to ship to these facilities.

Pre-treatment Storage: Please note that DOE/OAK is proposing pre-treatment storage of it's mixed wastes at INEL. Based on the small volume of waste to be shipped, it is DOE/OAKs position that compliant storage capacity at INEL should not be significantly impacted.

Approved Shipping Dates: In order to develop PSTP Milestones and/or Target Dates for shipment of mixed wastes to INEL, DOE/OAK is requesting acceptable shipping dates for each waste stream. The information provided by DOE/ID will be added to Table 1, and will be incorporated into both the PSTP Background and Compliance Plan Volumes of the applicable DOE/OAK sites' as an acceptable Milestone and/or Target Date.

Post-treatment Residual Storage: DOE/OAK is also proposing that post-treatment residuals be managed at the INEL site pending the outcome of the DOE disposal-site evaluations (described in Section 8.0 of the PSTPs). DOE/OAK believes that until the outcome of the disposal issue is resolved, post-treatment storage of residuals at the treatment site is a technically and economically sound management approach, especially when considering the very small volumes likely to be generated.

In order for DOE/OAK to submit its PSTPs to DOE Headquarters according to schedule (March 3, 1995), DOE/OAK is requesting a response to this memorandum . no later than February 17, 1995. Should you have any questions, please contact me at (510) 637-1625, or Dave Osugi at (510) 637-1628.

Sincerely,

Alex E. Dong

Alex E. Dong
Deputy Director,
Waste Management Division

Enclosures (2): -DOE/OAK - DOE/ID Offsite Shipping Agreement
-Table 1: DOE/OAK Mixed Waste Identified for Treatment at INEL

cc w/ encl: Patty Bubar, EM-352
Dan Ruge, GC-51

DOE/OAK / DOE-ID Off-Site Shipping Agreement

Transportation Safety Standards: DOE/OAK will assure that the shipping sites identified in the following table, adhere to all appropriate shipping requirements including those identified by the Idaho National Engineering Laboratory (INEL).

Off-site Pretreatment Storage: In the case where the waste streams are identified for treatment at: WEDF (the Waste Engineering Development Facility); WERF (the Waste Experimental Reduction Facility); IWPF (the Idaho Waste Processing Facility); and ICPP (the Idaho Chemical Processing Plant Decontamination Facility), waste streams will be shipped to the INEL prior to the operation of the facility.

Shipping Date: DOE/OAK has identified in the accompanying table the date that the site will request a shipping date from the INEL. This request is to take place after all technical issues regarding the shipment of the waste stream to the INEL have been addressed. The date identified for "the request of a shipment date" coincides with the date for this milestone included in the DOE/OAK Proposed Site Treatment Plan. Additionally, it is indicated in the DOE/OAK PSTPs that the shipment of mixed waste to the INEL for treatment will take place no later than 6 months after the approved shipping date provided by the INEL.

Treatment Residuals Management Plan: Treatment residuals will be stored at the INEL site pending the outcome of the disposal investigations (as described in Section 8 of the Proposed Site Treatment Plan Background Volume). Following the completion of the disposal investigation, DOE/OAK will work with DOE-ID to identify the appropriate disposal site for the DOE/OAK treatment residuals. If a California disposal site is selected, it is likely that the disposal of the DOE/OAK treatment residuals would be disposed at this site.

Funding Requirements: DOE/OAK agrees to provide funding to DOE-ID for the purpose of pretreatment storage, treatment and management of the treatment residuals for the mixed wastes described in the attached table. The amount of funding provided by DOE/OAK will be consistent with the yet to be developed Idaho National Engineering Laboratory (INEL) treatment costs for off-site waste.

Table 1 - DOE/OAK Mixed Waste Identified For Treatment at the Idaho National Engineering Laboratory

Shipping Site / Contact	Waste ID / Volume (M^3)	Projected Annual Future Generation (M3)[1]	Receiving Site / Contact	Pretreatment Storage Facility / Treatment Facility	Request Shipping Schedule (MM/YY)/ Approved Shipping Date	Treatment Residuals Storage Facility
LBL/Maxwell Yao	LB-W001/0.74	0.3	INEL/	INEL/INEL	11/98 / TBD	INEL
LBL/Maxwell Yao	LB-W011/Included in LB-W001	Included in LB-W001	INEL/	INEL/INEL	11/98 / TBD	INEL
LBL/Maxwell Yao	LB-W002/1.0	0.4	INEL/	INEL/INEL	4/99 / TBD	INEL
LBL/Maxwell Yao	LB-W012/Included in LB-W002	Included in LB-W002	INEL/	INEL/INEL	4/99 / TBD	INEL
LBL/Maxwell Yao	LB-W004/3.3	1.14	INEL/	INEL/INEL	6/98 / TBD	INEL
LBL/Maxwell Yao	LB-W014/Included in LB-W004	Included in LB-W004	INEL/	INEL/INEL	6/98 / TBD	INEL
LBL/Maxwell Yao	LB-W006/0.11	0.0	INEL/	INEL/INEL	9/98 / TBD	INEL
	LB-W007/0.0	Less Than 1.0	INEL	INEL/INEL	6/98 / TBD	INEL
	LB-W017/0.0	Included in LB-W007	INEL	INEL/INEL	6/98 / TBD	INEL
LBL/Maxwell Yao	LB-W008/0.15	0.06	INEL/	INEL/INEL	6/98 / TBD	INEL
LBL/Maxwell Yao	LB-W018/Included in LB-W008	Included in LB-W008	INEL/	INEL/INEL	6/98 / TBD	INEL
LBL/Maxwell Yao	LB-W009/0.11	0.05	INEL/	INEL/INEL	6/98 / TBD	INEL
LBL/Maxwell Yao	LB-W019/Included in LB-W009	Included in LB-W009	INEL/	INEL/INEL	6/98 / TBD	INEL
LBL/Maxwell Yao	LB-W101/Less than 5 liters[2].	TBD	INEL/	INEL/INEL	TBD / TBD	INEL
LBL/Maxwell Yao	LB-W111/Less than 10 liters[2].	TBD	INEL/	INEL/INEL	TBD / TBD	INEL
LLNL/Glenn May	LL-W003/0.7	1.4	INEL/	INEL/INEL	10/98 / TBD	INEL
LLNL/Glenn May	LL-W006/15.2	1.0	INEL/	INEL/INEL	10/98 / TBD	INEL

Table 1 - DOE/OAK Mixed Waste Identified For Treatment at the Idaho National Engineering Laboratory

Shipping Site / Contact	Waste ID / Volume (M^3)	Projected Annual Future Generation (M3)[1]	Receiving Site / Contact	Pretreatment Storage Facility / Treatment Facility	Request Shipping Schedule (MM/YY)/ Approved Shipping Date	Treatment Residuals Storage Facility
LLNL/Glenn May	LL-W017/50.7	10.0	INEL/	INEL/INEL	10/98 / TBD	INEL
LLNL/Glenn May	LL-W021/0.8	0.3	INEL/	INEL/INEL	10/98 / TBD	INEL
LLNL/Glenn May	LL-W024/0.09	0.01	INEL/	INEL/INEL	10/98 / TBD	INEL
LLNL/Glenn May	LL-W001/5.5[3]	1.0	INEL/	INEL/INEL	TBD / TBD	INEL
LLNL/Glenn May	LL-W008/7.1[3]	2.0	INEL/	INEL/INEL	TBD / TBD	INEL
LLNL/Glenn May	LL-W009/3.6[3]	1.7	INEL/	INEL/INEL	TBD / TBD	INEL
LLNL/Glenn May	LL-W014/13.7[3]	4.0	INEL/	INEL/INEL	TBD / TBD	INEL
LLNL/Glenn May	LL-W016/0.3[3]	0.2	INEL/	INEL/INEL	TBD / TBD	INEL
LLNL/Glenn May	LL-W026/1.2[3]	1.0	INEL/	INEL/INEL	TBD / TBD	INEL
ETEC/Ravnesh Amar	ET-W020/0.15	0.0	INEL/	INEL/INEL	9/96 / TBD	INEL
ETEC/Ravnesh Amar	ET-W023/0.0002	0.0	INEL/	INEL/INEL	9/96 / TBD	INEL

Footnotes:

1 - The annual mixed waste projection identifies waste to be generated after October 1995. These wastes will be shipped to the INEL pursuant to updated agreements as necessary. Updated mixed waste volumes will be provided in the Annual Updates to the STP.

2 - These non-defense related waste streams are undergoing characterization. It is possible that the characterization results will indicate that these are MTRU waste streams. If the waste stream is determined to be MTRU, DOE/OAK will propose that the preferred treatment option be the IWPF.

3 - The preferred treatment option for these waste streams is the Mixed Waste Management Facility at LLNL. The INEL WERF Incinerator has been included as the alternative for these waste streams if the preferred treatment option cannot be implemented.

DOE F 1325.8
(8-89)
United States Government **Department of Energy**

memorandum

DATE: February 9, 1995

REPLY TO ATTN OF: DOE Oakland Operations Office

SUBJECT: Federal Facility Compliance Act Proposed Site Treatment Plans: Proposed Offsite Shipping Agreement with Hanford for Pre-treatment Storage, Treatment, and Post-treatment Residual Management of DOE/OAK Mixed Wastes

TO: Ed MacAlister, DOE/Richland (DOE/RL)

As required under the Federal Facility Compliance Act of 1992, DOE is required to prepare Site Treatment Plans (STPs) for sites which generate and store DOE mixed waste subject to the RCRA LDR storage prohibition. Consistent with DOE Headquarters protocol for finalizing offsite waste treatment options, the DOE Oakland Operations Office (DOE/OAK) and its proposed receiving sites have agreed to develop "Offsite Shipping Agreements" which will be incorporated (along with supporting documentation), as an Appendix into applicable DOE/OAK Proposed Site Treatment Plans (PSTPs) .

This memorandum requests concurrence from DOE/RL on the attached Offsite Shipping Agreement, addressing the shipment, pre-treatment storage, treatment, and post-treatment management of residuals of DOE/OAK mixed wastes. Table 1 of the Shipping Agreement has been developed to include: Shipping and Receiving Site Contacts; Waste Stream ID Numbers and Volumes; Pre-treatment and Post-treatment Storage Locations; Treatment Facilities; and Milestone Dates for "Requesting Shipping Schedules" (from Hanford), as well as "Approved Shipping Dates." An Approved Shipping Date will be added to Column 5 of Table 1 based upon DOE/RLs response to this memorandum.

The following information request and proposed terms of the Offsite Shipping Agreement include:

WRAP IIA Scheduling Information: Consistent with DOE Headquarters guidance regarding the development of treatment options in the PSTPs, DOE/OAK is requesting treatment schedule information for the WRAP IIA Facility. Treatment schedule data will be incorporated into the PSTP Background Volumes for the DOE/OAK sites proposing to ship to WRAP IIA.

Pre-treatment Storage: Please note that DOE/OAK is proposing pre-treatment storage of it's mixed wastes at Hanford. Based on the small volume of waste to be shipped, it is DOE/OAKs position that compliant storage capacity at Hanford should not be significantly impacted.

Approved Shipping Dates: In order to develop PSTP Milestones and/or Target Dates for shipment of mixed wastes to Hanford, DOE/OAK is requesting acceptable shipping dates for each waste stream. The information provided by DOE/RL will be added to Table 1, and will be incorporated into both the PSTP Background and Compliance Plan Volumes of the applicable DOE/OAK sites' as an acceptable Milestone and/or Target Date.

Post-treatment Residual Storage: DOE/OAK is also proposing that post-treatment residuals be managed at the Hanford site pending the outcome of the DOE disposal-site evaluations (described in Section 8.0 of the PSTPs). DOE/OAK believes that until the outcome of the disposal issue is resolved, post-treatment storage of residuals at the treatment site is a technically and economically sound management approach, especially when considering the very small volumes likely to be generated.

In order for DOE/OAK to submit its PSTPs to DOE Headquarters according to schedule (March 3, 1995), DOE/OAK is requesting a response to this memorandum no later than February 17, 1995. Should you have any questions, please contact me at (510) 637-1625, or Dave Osugi at (510) 637-1628.

Sincerely,

Alex E. Dong

Alex E. Dong
Deputy Director,
Waste Management Division

Enclosures (2): -DOE/OAK - DOE/RL Offsite Shipping Agreement
-Table 1: DOE/OAK Mixed Waste Identified for Treatment at the Hanford Site

cc w/ encl: Patty Bubar, EM-352
Dan Ruge, GC-51

DOE/OAK / DOE-RL Off-Site Shipping Agreement

Transportation Safety Standards: DOE/OAK will assure that the shipping sites identified in the following table, adhere to all appropriate shipping requirements including those identified by the Hanford Site.

Off-site Pretreatment Storage: The attached Table identifies waste streams to be treated at the WRAP IIA Facility. These waste streams will be shipped to the Hanford Site prior to the operation of the WRAP IIA facility. The waste streams identified for treatment at the WRAP IIA Facility are currently located at 4 sites in California and 1 site in Missouri.

Shipping Date: DOE/OAK has identified in the accompanying table the date that the site will request a shipping date from the Hanford Site. This request is to take place after all technical issues regarding the shipment of the waste stream to the Hanford Site have been addressed. The date identified for "the request of a shipment date" coincides with the date for this milestone included in the DOE/OAK Proposed Site Treatment Plan. Additionally, it is indicated in the DOE/OAK PSTPs that the shipment of mixed waste to the Hanford Site for treatment will take place no later than 6 months after the approved shipping date provided by the Hanford Site.

Treatment Residuals Management Plan: The treatment residuals will be stored at the Hanford Site pending the outcome of the disposal investigations (as described in Section 8 of the Proposed Site Treatment Plan Background Volume). Following the completion of the disposal investigation, DOE/OAK will work with DOE-RL to identify the appropriate disposal site for the DOE/OAK treatment residuals. If a California disposal site is selected, it is likely that the disposal of the DOE/OAK treatment residuals would be disposed at this site.

Funding Requirements: DOE/OAK agrees to provide funding to DOE-RL for the purpose of pretreatment storage, treatment and management of the treatment residuals for the mixed wastes described in the attached table. The amount of funding provided by DOE/OAK will be consistent with the Hanford Site treatment costs for off-site waste.

Table 1 - DOE/OAK Mixed Waste Identified For Treatment at the Hanford Site						
Shipping Site / Contact	**Waste ID / Volume (M^3)**	**Projected Annual Future Generation (M3)[1]**	**Receiving Site / Contact**	**Pretreatment Storage Facility / Treatment Facility**	**Request Shipping Schedule (MM/YY) / Approved Shipping Date (MM/YY)**	**Treatment Residuals Storage Facility**
LBL/Maxwell Yao	LB-W005/0.42	0.0	Hanford/	Hanford/Hanford	6/98 / TBD	Hanford
LLNL/Glenn May	LL-W015/3.0	3.0	Hanford/	Hanford/Hanford	10/98 / TBD	Hanford
LLNL/Glenn May	LL-W007/3.9	1.0	Hanford/	Hanford/Hanford	10/98 / TBD	Hanford
GA/Brian Laney	GA-W007/0.208	0.0	Hanford/	Hanford/Hanford	8/96 / TBD	Hanford
GA/Brian Laney	GA-W013/1.04	0.0	Hanford/	Hanford/Hanford	8/96 / TBD	Hanford
GA/Brian Laney	GA-W003/1.47	0.0	Hanford/	Hanford/Hanford	8/96 / TBD	Hanford
Univ. of Mo. / Mike Azizi	MU-W001/1.0	1.33	Hanford/	Hanford/Hanford	12/96 / TBD	Hanford
ETEC/Ravnesh Amar	ET-W009/0.64	0.0	Hanford/	Hanford/Hanford	3/96 / TBD	Hanford
ETEC/Ravnesh Amar	ET-W019/2.45	0.0	Hanford/	Hanford/Hanford	3/96 / TBD	Hanford
ETEC/Ravnesh Amar	ET-W026/0.1	0.0	Hanford/	Hanford/Hanford	3/96 / TBD	Hanford

Footnote:

1 - The annual mixed waste projection identifies waste to be generated after October 1995. These wastes will be shipped to the Hanford site pursuant to updated agreements as necessary. Updated mixed waste volumes will be provided in the Annual Updates to the STP.

Appendix B

GLOSSARY

The terms defined below (a) have been collected or derived from documentation for regulatory agencies and U.S. Department of Energy (DOE) sites and environmental and other sources of regulations and documents or (b) were written as part of the Site Treatment Plan development. The words and phrases are listed alphabetically. Common abbreviations, if any, follow the term. In cases where the regulatory definition differs from the definition provided in this section, the regulatory definition has been used.

Amalgamation - Mixing liquid mercury, at room temperature, with powdered reagents such as copper, zinc, tin, nickel, gold, and/or sulfur to yield a metal alloy with no free mercury.

Aqueous Liquids (as a waste matrix) - Liquids/slurries with a Total Organic Carbon (TOC) content less than 1%. Slurries must be pumpable (e.g., suspended/settled solids can be up to approximately 35-40%). Only liquids/slurries packaged/stored in bulk form (i.e., tank-stored, drummed, bulk free liquids) are included in this category. Liquids packaged in a laboratory pack-type configuration are categorized as "lab packs."

Best Available Technology (BAT) or Best Demonstrated Available Technology (BDAT) - (1) The preferred technology for treating a particular process liquid waste selected from among others after taking into account factors related to technology, economics, public policy, and other parameters. As used in DOE Order 5400.5, BAT is not a specific level of treatment but the conclusion of a selection process that includes several treatment alternatives. (2) Treatment technologies that have been shown through actual use to yield the greatest environmental benefit among competing technologies that are practically available.

Biodegradation (BIODG) - The degradation of organics or non-metallic inorganics (i.e., inorganics that contain the elements of phosphorous, nitrogen, and sulfur) in units operated under either aerobic or anaerobic conditions such that a surrogate compound or indicator parameter has been substantially reduced in concentration in the residuals (e.g., TOC can often be used as an indicator parameter for the biodegradation of many organic constituents that cannot be directly analyzed in wastewater residues).

Capacity (of a facility) - The annual process throughput, in cubic meters per year (m^3/yr) under normal operating conditions. "Normal operating conditions" are defined as the shift schedule under which the facility normally operates (i.e., one 8-hour shift/day, five days per week; two shifts/day, five days per week; 24 hours/day, seven days per week).

Carbon Adsorption (CARBN) - A treatment technology used to treat wastewaters containing dissolved organics at concentrations less than about 5% and, to a lesser extent, dissolved metal and other inorganic contaminants. The most effective metals removal is achieved with metal complexes. The two most common carbon adsorption processes are Granular Activated Carbon (GAC), which is used in packed beds, and Powdered Activated Carbon (PAC), which is added loosely to wastewater.

Cemented Solids (as a waste matrix) - Sludges or solids (e.g., particulates) that have been solidified/stabilized with cement or other solidifying agents but do not meet Land Disposal Restriction (LDR) treatment standards. These wastes may require pretreatment (e.g., crushing/grinding) before subsequent LDR treatment.

Characterization - The determination of waste contents and properties, whether by review of process knowledge, Nondestructive Examination/Nondestructive Assay (NDE/NDA), or sampling and analysis.

Chemical Fixations - Any waste treatment process that involves reactions between the waste and certain chemicals and results in solids that encapsulate, immobilize, or otherwise tie up hazardous components in the waste to minimize the leaching of such components and to render the waste nonhazardous and more suitable for disposal.

Chemical Oxidation (CHOXD) - Chemical or electrolytic oxidation utilizing the following oxidation reagents (or waste reagents) or combinations of reagents: (a) hypochlorite (e.g., bleach), (b) chlorine, (c) chlorine dioxide, (d) ozone or UV- (ultraviolet light-) assisted ozone, (e) peroxides, (f) persulfates, (g) perchlorates, (h) permanganates, and/or (i) other oxidizing reagents of equivalent efficiency, performed in units operated such that a surrogate compound or indicator parameter has been substantially reduced in concentration in the residuals. For example, TOC can often be used as an indicator parameter for the adsorption of many organic constituents that cannot be directly analyzed in wastewater residues. Chemical oxidation specifically includes what is commonly referred to as alkaline chlorination.

Chemical Reduction (CHRED) - Chemical reduction utilizing the following reducing reagents (or waste reagents) or combination of reagents: (a) sulfur dioxide or (b) sodium, potassium, or alkali salts of sulfites, bisulfites, metabisulfates, and polyethylene glycols (e.g., Total Organic Halogens can often be used as an indicator parameter for the reduction of many halogenated organic constituents that cannot be directly analyzed in wastewater residues). Chemical reduction is commonly used for the reduction of hexavalent chromium to the trivalent state.

Cleanup - (1) Actions undertaken during a removal or remedial response to physically remove or treat a hazardous substance that poses a threat or potential threat to human health and welfare, the environment, and/or real and personal property. Sites are considered cleaned up when removal or remedial programs have no further expectation or intention of returning to the site and threats have been mitigated or do not require further action. (2) Actions taken to deal with a release or threat of release of a hazardous substance that could affect humans and/or the environment. The term "cleanup" is sometimes used interchangeably with either remedial action, removal action, response action, or corrective action.

Closure - Operational Closure: Those actions that are taken upon completion of operations to prepare the disposal site or disposal unit for custodial care (e.g:, addition of cover, grading, drainage, erosion control). **Final Site Closure**: Those actions that are taken as part of a formal decommissioning or remedial action plan, the purpose of which is to achieve long-term stability of the disposal site and to eliminate to the extent practical the need for active maintenance so that only surveillance, monitoring, and minor custodial care are required.

Compliance Agreements - Legally binding agreements between regulators and regulated entities that set standards and schedules for compliance with environmental statutes. Includes Consent Order and Compliance Agreements, Federal Facilities Agreements, and Federal Facility Compliance Agreements.

Concentration-Based Standard - A restricted waste for which a concentration-based standard has been developed for an extract of the waste or treatment residue, or the constituent concentration in the waste or treatment residue. Concentration-based standards are based on BDAT and the waste, waste extract, or treatment residue must not exceed these concentrations if the waste is to be land disposed.

Contact-Handled Waste (CH Waste) - Waste or waste containers whose external surface dose rate does not exceed 200 millirems (mrem) per hour at the surface of the container.

Corrosive/Corrosivity - (1) A solid waste exhibits corrosivity if (a) a sample of the waste is either aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5, or (b) it is a liquid and corrodes steel at a rate greater than 6.35 millimeters (mm) (0.25 inch) per year at a test temperature of 55°C (130°F). (2) A chemical agent that reacts with the surface of a material causing it to deteriorate or wear away. (3) Identifies waste that must be segregated because of its ability to extract and solubilize toxic contaminants (especially heavy metals) from other waste; identifies waste that requires the use of corrosion-resistant containers for disposal.

Deactivation (DEACT) - The removal of the hazardous characteristics of a waste due to its ignitability, corrosivity, and/or reactivity.

Debris - Materials that are primarily nongeologic in origin such as grass, trees, stumps, and man-made materials such as concrete, clothing, partially buried whole or empty drums, capacitors, and other synthetic manufacturing items (such as liners). (Debris does not include synthetic organic chemicals but may include materials contaminated with these chemicals.)

Decommissioning - (1) Actions taken to reduce the potential health and safety impacts of contaminated DOE facilities, including activities to stabilize, reduce, or remove radioactive materials or to demolish the facilities. (2) Preparations taken for retirement of a nuclear facility from active service, accompanied by the execution of a program to reduce or stabilize radioactive contamination. (3) The process of removing a facility or area from operation and decontaminating and/or disposing of it or placing it in a condition of standby with appropriate controls and safeguards.

Decontamination - The removal of unwanted material (typically radioactive material) from facilities, soils, or equipment by washing, chemical action, mechanical cleaning, or other techniques.

Delist - Use of the petition process to have a waste stream's toxic designation rescinded.

Delisting - According to 40 Code of Federal Regulations (CFR) 260.20 and 260.22, to be exempted from the Resource Conservation and Recovery Act (RCRA) hazardous waste "system," a listed hazardous waste, a mixture of a listed and solid waste, or a derived-from waste must be delisted. Characteristic hazardous wastes never need to be delisted but can be treated to no longer exhibit the characteristic. A contained-in waste also does not have to be delisted; it only has to "no longer contain" the hazardous waste.

Department of Energy Waste - Radioactive waste generated by activities of the DOE (or its predecessors); waste for which DOE is responsible under law or contract; or other waste for which the DOE is responsible.

Derived-From Rule - The derived-from rule states that any solid waste derived from the treatment, storage, or disposal of a listed RCRA hazardous waste is itself a listed hazardous waste (regardless of the concentration of hazardous constituents). For example, ash and scrubber water from the incineration of a listed waste are hazardous wastes on the basis of the derived-from rule. Solid wastes derived from a characteristic hazardous waste are hazardous wastes only if they exhibit a characteristic.

Disposal - The permanent isolation of waste with no intent of recovery.

Disposal Facility - (1) The land, structures, and equipment used for the disposal of waste. (2) A facility or part of a facility at which waste is intentionally placed into or on the land or water and at which waste will remain after closure.

Effluent - (1) Airborne and liquid wastes discharged from a DOE site or facility following such engineering waste treatment and all effluent controls, including onsite retention and decay, as may be provided. This term does not include solid wastes, wastes for shipment offsite, wastes that are contained (e.g., underground nuclear test debris) or stored (e.g., in tanks), or wastes that are to remain onsite through treatment or disposal. (2) Wastewater (treated or untreated) that flows out of a treatment plant, sewer, or industrial outfall. May refer to wastes discharged into surface waters.

Elemental Lead (activated and non-activated, as a waste matrix) - Both surface-contaminated and activated elemental lead. Activated lead includes lead from accelerators or other neutron sources that may result in irradiation. Surface-contaminated lead materials include bricks, counterweights, shipping casks, and other shielding materials.

Environmental Impact Statement (EIS) - (1) A document prepared in accordance with the requirements of Section 102(2)(C) of the National Environmental Policy Act (NEPA). (2) A tool for decision making; it describes the positive and negative effects of the undertaking and lists alternative actions. A draft environmental impact statement (DEIS) is prepared by the U.S. Environmental Protection Agency (EPA), or under EPA guidance, and attempts to identify and analyze the environmental impacts of a proposed action and feasible alternatives. DEIS is circulated for public comment before preparation of the final environmental impact statement (FEIS).

Environmental Restoration (ER) - Measures taken to clean up and stabilize or restore a site that has been contaminated with hazardous substances during past production or disposal activities to previolation conditions.

Environmental Restoration Waste - Waste generated by environmental restoration program activities.

Existing Facility - (1) Any equipment, structure, system, process, or activity that fulfills a specific purpose. Examples include accelerators, storage areas, fusion research devices, nuclear reactors, production or processing plants, coal conversion plants, magnetohydrodynamics experiments, windmills, radioactive waste disposal systems and burial grounds, testing laboratories, research laboratories, transportation activities, and accommodations for analytical examinations of irradiated and unirradiated

components. (2) Buildings and other structures; their functional systems and equipment, including site development features such as landscaping, roads, walks, and parking areas; outside lighting and communications systems; central utility plants; utilities supply and distribution systems; and other physical plant features. (3)(a) Any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft or (b) any site or area where a hazardous substance has been deposited, stored, disposed of, placed, or otherwise come to be located but does not include any consumer product in consumer use or any vessel.

Facilities - Buildings and other structures; their functional systems and equipment, including site development features such as landscaping, roads, walks, and parking areas; outside lighting and communications systems; central utility plants; utilities supply and distribution systems; and other physical plant features.

Federal Facility Compliance Agreement (FFCAct) - An agreement between the DOE and a host state with respect to how and/or when some waste-related activity will be conducted to achieve compliance with applicable regulations in a timely manner. A major driver or constraint on activities that a particular site must undertake for waste operations.

Filtration - Removal/separation of particles from a mixture of fluid and particles by a medium that permits the flow of the fluid but retains the particles. Usually, the larger the particles, the easier they are to remove from the fluid.

Generation - Includes the wastes resulting from new production, rework operations, wastes generated from decontamination and decommissioning (D&D) operations and the wastes resulting from environmental restoration operations, including the recovery of pre-1970 wastes, should their recovery be determined to be necessary.

Generator - Refers to current or previously operated facilities that have produced or are producing RCRA-regulated waste.

Glovebox - (1) A sealed volume penetrated by leaded-rubber gloves that allow safe manipulation of some alpha-emitting materials. (2) A windowed, low-leakage enclosure equipped with one or more pairs of flexible gloves to allow personnel on the outside to handle radioactive material within the enclosure.

Hazardous Waste (HW) - Solid waste that possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity) or that is listed as described by 40 CFR 261.

Heterogeneous Debris (as a waste matrix) - Wastes with matrices meeting the definition of debris pursuant to the August 18, 1992, LDR debris rulemaking (57 Federal Register [FR] 37194, August 18, 1992). This category includes debris that does not meet the criteria for categorization as either *Organic Debris* or *Inorganic Debris*. This category also includes mixtures of debris and solid process residues and soil, provided debris constitutes no more than 50% of the waste.

Ignitability - A waste property describing waste with a flash point lower than 140°F.

Immobilization - Treatment of waste through macroencapsulation, microencapsulation, or sealing to reduce surface exposure to potential leaching media or to reduce the leachability of the hazardous constituents.

Immobilized Materials - Materials that are fixed in a matrix.

Incineration - (1) The controlled process by which combustible solid, liquid, or gaseous wastes are burned and changed into noncombustible gases and solid ash. (2) A treatment technology using combustion to destroy organic constituents and reduce the volume of wastes.

Inorganic Debris (as a waste matrix) - Wastes with matrices meeting the definition of debris pursuant to the August 18, 1992, LDR debris rulemaking (57 FR 37194, August 18, 1992). More specifically, inorganic debris is defined as wastes that contain greater than 90% inorganic debris. Inorganic debris includes metal shapes (e.g., equipment, scrap), metal turnings, glass (e.g., light tubes, leaded glass), ceramic materials, concrete, and rocks.

Inorganic Sludges/Particulates (as a waste matrix) - Solid process residues with a predominately inorganic matrix. Solid process residues are solids that do not fit the definition of debris. Typically, these solids are sludge or particulate materials. Wastes in this category may also contain some debris materials, provided the amount of debris is less than 50% (based on the LDR debris rule). The solids in this category may be contaminated with or contain organics such that thermal treatment is required. However, the matrices are predominantly inorganic such that thermal treatment would result in a high residue. Waste materials in this category include sludges, ashes, sand-blasting media, absorbed aqueous or organic liquids (or inorganic particulate absorbents), ion exchange resins, and paint chips/residues.

Ion Exchange - A process used to separate a mixed waste into its radioactive and hazardous constituents if the radioactive components are ionic. It will also concentrate the radioactive ionic species into a small volume, leaving a nonradioactive aqueous phase. The principal mixed waste application of this process is to recover metallic radionuclides from wastewaters or acid leach liquors.

Key Decision (KD) - DOE projects proceed through several discrete phases: research, design, and operation. These phases are separated by KD points, which are numbered consecutively from KD-0 to KD-4.

Lab Packs with Metals and Lab Packs without Metals (as waste matrices) - Wastes with one or more small containers of free liquids or solids surrounded by solid materials (virgin or waste materials) within a larger container. These categories include scintillation fluids that are packaged in vials. These categories are differentiated by contaminants in the wastes. Wastes contaminated with toxicity characteristic (TC) metals are categorized as "Lab packs with Metals." Wastes that are not contaminated with TC metals are categorized as "Lab packs without Metals."

Land Disposal Restrictions (LDRs) - (1) Provisions of the Hazardous and Solid Waste Amendments (HSWA) requiring phased-in treatment of hazardous wastes before disposal. (2) A RCRA program that restricts land disposal of RCRA hazardous wastes and requires treatment to promulgated treatment standards. (See **Thirds Rule**.)

Leachate - (1) Any liquid, including any suspended components in the liquid, that has percolated through or drained from hazardous waste. (2) A contaminated liquid resulting when water percolates or trickles through waste materials and collects components of those wastes. Leaching may occur at landfills and may result in hazardous substances entering soil, surface water, or groundwater.

Legacy Waste - The backlog of stored waste remaining from the development and production of U.S. nuclear weapons, about which a permanent disposal determination remains to be made (i.e., waste that is currently in warehouse storage, retrievable storage on bermed pads, or disposed of in trenches and that has not been examined by DOE's Environmental Management, Environmental Restoration Group (EM-40) and determined to be permanently disposed of). Also called backlog waste.

Listed Waste - Wastes, listed as hazardous under RCRA, that have not been subjected to the Toxic Characteristics Listing Process because the dangers they present are considered self-evident.

Liquid-Liquid Extraction (LLEXT) - Extraction (often referred to as solvent extraction) of organics from liquid wastes into an immiscible solvent for which the hazardous constituents have a greater solvent affinity, resulting in (a) an extract high in organics that must undergo either incineration, reuse as a fuel, or other recovery/reuse and (b) a raffinate (extracted liquid waste) proportionately low in organics that must undergo further treatment as specified in the standard.

Liquid Mercury (as a waste matrix) - Any wastes containing bulk volumes of elemental liquid mercury. The category includes lab packs of strictly liquid mercury or other containers containing bulk mercury.

Low-Level Radioactive Waste (LLW) - (1) Waste that contains radioactivity and is not classified as high-level waste, transuranic (TRU) waste, or spent nuclear fuel or the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source-material content. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as LLW provided the concentration of TRU elements is less than 100 nanocuries/gram (nCi/g).
(2) Radioactive waste not classified as high-level waste, TRU waste, spent nuclear fuel, or by-product material.

Macroencapsulation (MACRO) - Application of surface-coating materials such as polymeric organics (e.g., resins and plastics) or a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media. Macroencapsulation specifically does not include any material that would be classified as a tank or container according to 40 CFR 260.10.

Metals Recovery (RMETL) - Recovery of metals or inorganics utilizing one or more of the following direct physical/removal technologies: ion exchange, resin or solid (i.e., zeolites) adsorption, reverse osmosis, chelation/solvent extraction, freeze crystallization, ultrafiltration, and/or simple precipitation (i.e., crystallization). Note: This does not preclude the use of other physical phase separation or concentration techniques such as decantation, filtration (including ultrafiltration), and centrifugation when used in conjunction with the direct physical/removal technologies.

Microencapsulation - Stabilization of the debris with the following reagents (or waste reagents) such that the leachability of the hazardous contaminants is reduced: portland cement or lime/pozzolans (e.g., fly ash and cement kiln dust). Reagents (e.g., iron salts, silicates, clay) may be added to

enhance the set/cure time and/or compressive strength or to reduce the leachability of the hazardous constituents.

Mixed Low-Level Waste (MLLW) - Low-level waste that also includes hazardous materials as identified in 40 CFR 261, Subparts C and D.

Mixed Waste - (1) Radioactive waste [as defined by the Atomic Energy Act (AEA)] that contains material listed as hazardous waste in Subpart D of 40 CFR 261 or that exhibits any of the hazardous waste characteristics identified in Subpart C of 40 CFR 261. (2) Waste that contains both radioactive and hazardous components as defined by the AEA and RCRA. The term "radioactive component" refers only to the actual radionuclides dispersed or suspended in the waste substance.

Mixture Rule - Under the mixture rule, when any solid waste and a listed hazardous waste are mixed, the entire mixture is a listed hazardous waste. Mixtures of solid wastes and characteristic hazardous wastes are hazardous only if the mixture exhibits a characteristic [40 CFR 261.3(a)(2)].

Neutralization (NEUTR) - Use of the following reagents (or waste reagents) or combinations of reagents: acids, bases, or water (including wastewaters) resulting in a pH greater than 2 but less than 12.5 as measured in the aqueous residuals.

Onsite - (1) Within a single research or production site of the DOE complex; for example, Lawrence Livermore National Laboratory (LLNL) is a site, as is the Lawrence Berkeley Laboratory (LBL), the Sandia National Laboratory-California (SNLC). (2) The contaminated area and all potential areas in very close proximity to the contamination that must be taken into account for effective implementation of the response action.

Onsite Facility - A hazardous waste treatment, storage, or disposal area that is located on the generating site.

Operable Unit (OU) - (1) A discrete action that consists of an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration or eliminates or mitigates a release, threat of release, or pathway of exposure. The cleanup of a site can be divided into a number of OUs, depending on the complexity of the problems associated with the site. OUs may address geographical portions of a site, specific site problems, or initial phases of an action or may consist of any set of actions performed over a period of time or any actions that are concurrent but located in different parts of a site. (2) A discrete portion of a site consisting of one or more release sites considered together for assessment and cleanup activities. The primary criteria for placement of release sites into an OU include geographic proximity, similarity of waste characteristics and site type, and the possibilities for economy of scale. (3) An overall response action that by itself eliminates or mitigates a release, a threat of a release, or an exposure pathway.

Organic Debris (as a waste matrix) - Wastes with matrices meeting the definition of debris pursuant to the August 18, 1992, LDR debris rulemaking (57 FR 37194, August 18, 1992). More specifically, organic debris is defined as wastes that contain greater than 90% organic debris. Organic debris includes rags (including "solvent rags") plastic/rubber, paper, wood, glovebox gloves (including lead-lined), and animal carcasses.

Organic Liquids (as a waste matrix) - Liquids/slurries with a TOC content greater than or equal to 1%. Slurries must be pumpable (e.g., suspended/settled solids can be up to approximately 35-40%). Only liquids/slurries packaged or stored in bulk form (i.e., tank-stored, drummed, bulk free liquids) are included in this category. Liquids packaged in a lab pack-type configuration are categorized as lab packs.

Organic Sludges/Particulates (as a waste matrix) - Solid process residues with an organic matrix. Solid process residues are solids that do not fit the definition of debris. Typically, these solids are sludges or particulate materials. Waste in this category may also contain some debris materials provided the amount of debris is less than 50% (based on the LDR debris rule). As opposed to inorganic sludges/particulates, wastes in this category would not leave a large residue when thermally treated. Waste materials in this category include organic sludges (e.g., sewage sludges), activated carbon, organic resins, and absorbed liquids (organic particulate absorbents).

Package - A barrel, box, or other container into which waste is initially placed. A waste is placed in packaging before transportation.

pH - (1) Used to describe the hydrogen-ion activity of a system. The logarithm (the exponent that indicates the power to which a number must be raised to produce a given number) of the reciprocal of hydrogen-ion concentration ($-\log_{10}[H^+]$, where $[H^+]$ is hydrogen-ion concentration in moles per liter). (2) A symbol for the degree of acidity or alkalinity.

Precipitation (PRECP) - Treatment of metals and other inorganics to form insoluble precipitates of oxides, hydrides, carbonates, sulfides, sulfates, chlorides, fluorides, or phosphates. The following reagents (or waste reagents) are typically used alone or in combination: lime (i.e., containing oxides and/or hydroxides of calcium and/or magnesium), caustic (i.e., sodium and/or potassium hydroxides), soda ash (i.e., sodium carbonate), sodium sulfide, ferric sulfate or ferric chloride, alum, or sodium sulfate. Additional flocculating, coagulating, or similar reagents/processes that enhance sludge dewatering characteristics are not precluded from use.

Pretreatment Processes - Processes (e.g., shredding, grinding, physical separation) that make the waste amenable to the treatment process, which ultimately destroys, removes, or immobilizes the hazardous contaminants or characteristics.

Radiation - (1) Ionizing radiation that includes any or all of the following: gamma rays and x-rays, alpha and beta particles, high-speed electrons, neutrons, high-speed protons, and other atomic particles. This definition does not include nonionizing radiations, such as soundwaves, microwaves, radiowaves or visible, infrared, or ultraviolet light. (2) The process of emitting energy in the form of rays or particles that are thrown off by disintegrating atoms. The rays or particles emitted may consist of alpha, beta, or gamma radiation.

Radioactive Waste - (1) Solid, liquid, or gaseous material that contains radionuclides regulated under the AEA of 1954, as amended, and that is of negligible economic value considering costs of recovery. (2) A solid, liquid, or gaseous material of negligible economic value that contains radionuclides in excess of threshold quantities. Does not include material contaminated by radionuclides from nuclear weapons testing.

Radioactivity - (1) The spontaneous nuclear decay of a material with a corresponding release of energy in the form of particles and/or electromagnetic radiation. (2) The property or characteristic of radioactive material to spontaneously "disintegrate" with the emission of energy in the form of radiation. The unit of radioactivity is the curie (or becquerel).

Radionuclide - (1) A species of atom having an unstable nucleus that is subject to spontaneous decay. (2) Any nuclide that emits radiation. A nuclide is a species of atom characterized by the constitution of its nucleus, hence by the number of protons, the number of neutrons, and the energy content.

Reactive Metals (as a waste matrix) - Bulk reactive metals and equipment contaminated with reactive metals. Bulk reactive metals include sodium, alkali metal alloys, aluminum fines, uranium fines, zirconium fines, and other pyrophoric materials. Contaminated equipment includes piping, pumps, and other materials with a residue or reactive metals that cannot be separated from the equipment medium.

Reactivity - (1) A characteristic of a waste that is explosive, reacts violently with water, or generates toxic gases when exposed to water or liquids that are moderately acidic or alkaline. (2) An EPA characterization of hazardous waste that identifies waste that, under routine management, presents a hazard because of instability or extreme reactivity.

Remote-Handled Waste (RH Waste) - Packaged waste with an external surface dose rate that exceeds 200 mrem per hour.

Resource Conservation and Recovery Act (RCRA) Part A Permit - The first part of a RCRA permit application that identifies treatment, storage, and disposal units within a to-be-permitted facility.

Resource Conservation and Recovery Act (RCRA) Part B Permit - The second part of a RCRA permit application that describes in detail waste to be managed, waste quantities, and facilities.

Segregation - The separation of waste materials to facilitate handling, storage, treatment, transportation, or disposal.

Site - (1) A geographic entity comprising land, buildings, and other facilities required to perform program objectives. Generally a site has, organizationally, all the required facilities for management functions; that is, it is not a satellite of some other site. (2) For the purposes of the Environmental Restoration and Waste Management (ER&WM) Five-Year Plan, sites are lands, installations, and/or facilities for which DOE has or shares responsibility for ER&WM activities. (3) An area or a location at which hazardous substances have been stored, treated, disposed of, placed, or otherwise come to be located. This includes all contiguous land, structures, other appurtenances, and improvements on the land used for treatment, storage, or disposal of hazardous substances. A site may consist of several treatment, storage, or disposal facilities (e.g., impoundments, containers, buildings, equipment).

Stabilization (STABL) - A broad class of treatment processes that immobilize hazardous constituents in a waste. For treatment of metals in mixed low-level wastes and for TRU wastes containing low-level radioactive components, stabilization technologies will reduce the leachability of the hazardous metal constituents (regardless of whether the metals are radioactive) in non-wastewater matrices.

Storage - (1) Temporary holding of waste pending treatment or disposal. Storage may include containers, tanks, waste piles, and surface impoundments. (2) The containment of hazardous waste, either on a

temporary basis or for a period of years, in such a manner as not to constitute disposal of such hazardous waste. (3) Retrievable retention of waste pending disposal.

Storage Facility - Land area, structures, and equipment used for the storage of waste.

Storage Unit - A discrete part of the storage facility in which waste is stored.

Supercompaction - A volume-reduction method relying on mechanical compaction.

Technology-Based Standard - A restricted waste for which a technology-based standard is specified may be land-disposed after it is treated using that specified technology or an equivalent treatment method approved by the EPA Administrator.

Thermal Treatment - The treatment of hazardous waste in a device that uses elevated temperatures as the primary means to change the chemical, physical, or biological character or composition of the hazardous waste. Examples of thermal treatment processes are incineration, pyrolysis, calcination, wet air oxidation, and microwave discharge.

Transuranic (TRU) Waste - The following core definition appears in modified form in various relevant documents: Waste containing alpha-emitting radionuclides with an atomic number greater than 92, half-lives greater than 20 years, and at concentrations greater than 100 nCi/g of waste. Modifications include the following. (1) DOE Order 5820.2A, for purposes of management, (a) considers TRU waste, as defined above, "without regard to source or form" [the proposed revision to the Order (DOE Order 5820.2A, "Major Issues for Revision," May 6, 1992) contemplates removing this clause]; (b) allows heads of field elements to determine whether wastes containing other alpha-emitting radionuclides must be managed as TRU waste; and (c) adds "at time of assay," implying both that the classification of a waste as TRU is to be made based on an assay and that such classification can be superseded only by another assay. (2) For purposes of setting standards for management and disposal, 40 CFR 191.02(i) adds "except for: (a) high-level radioactive wastes; (b) wastes that the DOE has determined, with the concurrence of the EPA Administrator do not need the degree of isolation required by this part; or (c) wastes that the [Nuclear Regulatory] Commission (NRC) has approved for disposal on a case-by-case basis in accordance with 10 CFR 61 ["Licensing Requirements for Land Disposal of Radioactive Wastes"].

Treatability Group - Based on the radioactive characteristics, hazardous components, and physical/chemical matrices (see relevant discussions elsewhere in this Glossary), DOE has grouped its wastes to reflect salient treatment considerations for each waste stream. These "treatability groups" are used to relate waste streams and waste quantities to treatment facilities and technology development needs.

Treatment - (1) Any method, technique, or process designed to change the physical or chemical character of waste to render it less hazardous; safer to transport, store, or dispose of; or reduced in volume.
(2) Any activity that alters the chemical or physical nature of a hazardous waste to reduce its toxicity, volume, or mobility, or render it amenable for transport, storage, or disposal.

Treatment Facility - The specific area of land, structures, and equipment dedicated to waste treatment and related activities.

Treatment, Storage, and Disposal (TSD) Facility - Any building, structure, or installation where a radioactive or hazardous substance has been treated, stored, or disposed of.

Treatment System - The equipment and processes used for similar waste types at treatment facilities. A treatment system is the unit treatment operation or sequence of unit treatment operations carried out on all wastes that enter the system (e.g., a treatment system may consist of chemical reduction followed by precipitation, or an incinerator and a vitrification unit for the ash).

Volatile Organic Compound (VOC) - (1) Any reactive organic compound as defined in 40 CFR 60.2. (2) An organic (carbon-containing) compound that evaporates (volatilizes) readily at room temperature.

Waste Acceptance Criteria (WAC) - The criteria used to determine whether waste and waste packages are acceptable for treatment, storage, transportation, and disposal purposes.

Waste Characterization - Activities to determine the extent and nature of the waste. Note: Waste characterization may be based on process knowledge, nonintrusive or nondestructive (NDE, NDA) examination, or intrusive examination, such as sampling and analysis.

Waste Form - The physical form of the waste (e.g., sludges, combustibles, metals).

Waste Isolation Pilot Plant (WIPP) - (1) The project authorized under Section 213 of the DOE National Security and Military Applications of Nuclear Energy Authorization Act of 1980 (Public Law 96-164; 93 Stat. 1259, 1265) to demonstrate the safe disposal of radioactive waste materials generated by atomic energy defense activities. (2) A research and development facility, located near Carlsbad, New Mexico, to be used for demonstrating the safe disposal of TRU wastes from DOE activities.

Waste Management - The planning, coordination, and direction of those functions related to generation, handling, treatment, storage, transportation, and disposal of waste, as well as associated surveillance and maintenance activities.

Waste Minimization - (1) An action that effectively avoids or reduces the generation of waste by source reduction, improving energy usage, or by recycling. This action is consistent with the general goal of minimizing present and future threats to human health and safety and the environment. (2) The reduction, to the extent feasible, of hazardous waste that is generated before treatment, storage, or disposal of the waste. Waste minimization includes any source reduction or recycling activity that results in either reduction of total volume of hazardous waste or reduction of toxicity of hazardous waste, or both.

Waste Segregation - The separation of waste materials before the packaging or repackaging process to facilitate handling, storage, treatment, transportation, or disposal.

Waste Stream - A flow of waste materials with specific definable characteristics that remain the same throughout the life of the process that generates the waste stream. A waste stream is produced by a single process or subprocess; however, that process or subprocess may be one that combines two or more input waste streams together to produce a single output waste stream.

Wastewaters - Wastes that contain less than 1% by weight TOC and less than 1% by weight Total Suspended Solids (TSS) with the following exception: F001, F002, F003, F004, or F005 wastewaters are solvent-water mixtures that contain less than 1% by weight TOC or less than 1% by weight total F001, F002, F003, F004, or F005 solvent constituents listed in 40 CFR 286.41, Table CCWE (Constituent Concentrations in Waste Extract).

Wet Air Oxidation (WETOX) - A treatment technology applicable to wastewaters containing organics and oxidizable inorganics such as cyanide. The basic principle of operation for WETOX is that the enhanced solubility of oxygen in water at high temperatures and pressures aids in the oxidation of organics.

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FEDERAL FACILITY COMPLIANCE ACT
PROPOSED SITE TREATMENT PLAN
FOR
LAWRENCE LIVERMORE NATIONAL LABORATORY
LIVERMORE, CALIFORNIA

COMPLIANCE PLAN VOLUME

Prepared for

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March 1995

DOE/OAK DOC. NO. 94-W 465/5400.2.a.3.1

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1.0 PURPOSE AND SCOPE OF THE COMPLIANCE PLAN VOLUME

1.1 The U.S. Department of Energy (DOE) is required to prepare a plan for developing treatment capacities and technologies for each facility at which DOE generates or stores mixed waste, pursuant to Section 3021(b) of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6939c(b), as amended by Section 105(a) of the Federal Facility Compliance Act (P.L. 102-386, FFCAct). Upon submission of the plan to the appropriate regulatory agency, the FFCAct requires the recipient agency to solicit and consider public comments and approve, approve with modification, or disapprove the plan within 6 months. The agency is to consult with the U.S. Environmental Protection Agency (EPA) and any state in which a facility affected by the plan is located. Upon approval of a plan, the regulatory agency must issue an order (FFCAct Order) requiring compliance with the approved plan.

1.2 The DOE Oakland Operations Office (DOE/OAK) has prepared this Site Treatment Plan (STP) for mixed waste at the Lawrence Livermore National Laboratory (LLNL) which identifies how DOE/OAK proposes to obtain treatment for this mixed waste or develop technologies where technologies do not exist or need modification. For some waste streams, a plan and schedules for characterizing wastes, undertaking technology assessments, and for providing the required plans and schedules for developing capacities and technologies, as appropriate, are provided.

1.3 The purposes of this STP include:

1.3.1 Fulfilling the requirements of the FFCAct;

1.3.2 Establishing an enforceable framework in conjunction with the FFCAct Order in which DOE/OAK will develop and treat or otherwise meet RCRA land disposal restrictions (LDRs)

for all covered LDR mixed wastes currently in storage or that will be generated or received in the future; and

1.3.3 Allowing for storage of current and projected covered LDR mixed wastes at LLNL during implementation of this STP and the FFCAct Order.

1.4 The Compliance Plan Volume, in conjunction with the Background Volume, comprises the STP. The Compliance Plan Volume provides overall schedules with milestones and target dates for achieving compliance with LDRs, a general framework for the establishment and review of milestones and target dates and the conversion of target dates in to milestones, and other provisions for implementing the approved STP that will be enforced under the FFCAct Order. Discussion in the Background Volume and its Appendices is provided for informational purposes only.

1.5 When this STP is approved and an FFCAct Order issued, the requirements contained in the Federal Facility Compliance Act of 1992, RCRA Section 3021 will be fulfilled. Therefore, pursuant to Section 105(a) of the FFCAct (RCRA Section 3021(b)(5)), this STP and FFCAct Order shall stand in lieu of any other interpretations of DOE/OAK's requirement to develop and submit a plan for the development of treatment capacities and technologies pursuant to RCRA Section 3021.

2.0 IMPLEMENTATION OF THE SITE TREATMENT PLAN

This section establishes the mechanisms and procedures for administering and implementing the treatment plans and schedules in Sections 3.0 through 5.0 of the Compliance Plan Volume of the STP.

2.1 COVERED MATTERS

The Compliance Plan Volume and implementing FFCAct Order of the STP address LDR requirements pertaining to storage and treatment of covered wastes, whether such wastes were generated or accumulated in the past, present or future. Covered wastes are all mixed waste at LLNL identified in the STP or added to the STP in accordance with Section 2.4, except those mixed wastes that (1) meet LDR requirements, regardless of the time of generation or that (2) are being stored or will be stored when generated solely for the purpose of accumulating sufficient quantities of mixed waste necessary to facilitate proper recovery, treatment, or disposal.

2.2 COMPLIANCE SCHEDULES

2.2.1 The Compliance Plan Volume of the STP provides overall schedules for achieving compliance with LDR requirements for mixed wastes at LLNL. The schedules include those activities required to bring existing waste treatment facilities or technologies into operation and those required to develop new facilities and capacity for treatment. The Compliance Plan Volume shows target dates and milestones for treatment technologies and facilities for wastes covered under the STP. The schedules symbolically depict and differentiate between milestones and target dates that will be converted to milestones. Other schedule information may be depicted in the Background Volume of the STP, but such information is provided solely for informational purposes.

2.2.1.1 For the purposes of this STP, milestones and target dates shall identify dates or time frames by which a certain activity (including an event such as submittal of a deliverable) is scheduled to occur, as set forth in the Compliance Plan Volume, or any other dates or deliverables that are properly incorporated into the approved STP.

2.2.1.2 The assumptions upon which individual schedules are dependent are contained in Sections 3.0 through 5.0 of the Background Volume and this Compliance Plan Volume. The schedules may be affected if the underlying assumptions are incorrect or change.

2.2.1.3 *Milestones* are fixed, firm, and enforceable dates as set forth in the Compliance Plan Volume. Milestones correspond to the categories of milestones set forth in Section 2.2.3. Changes or revisions to milestones are subject to approval, approval with modifications, or disapproval by California Department of Toxic Substances Control (DTSC) according to the process and framework set forth in this STP. Milestones are set based on target dates, defined in Section 2.2.1.4 below, in accordance with the process in Section 2.2.2.

2.2.1.4 *Target dates* mark the anticipated completion of tasks that have not been designated as milestones. Target dates correspond to the categories of milestones set forth in Section 2.2.3. Target dates are not requirements and are not enforceable. Target dates are converted into enforceable milestones in accordance with the process set forth in Section 2.2.2.

2.2.2 *Approach to Setting Milestones and Target Dates*. DOE proposes using the rolling milestone approach outlined in the Addendum to this Compliance Plan Volume, "Milestone Approach and Environmental Management Budget Formulation Process."

2.2.3 Categories of Milestones and Target Dates. Examples of categories of activities for which milestones and target dates will be provided for different types of treatment approaches in the Compliance Plan Volume are listed in the Tables 2-1 through 2-4 and in other provisions below. The categories of activities are based on Section 3021(b)(1)(B)(i), (ii) and (iii) of RCRA, to the extent appropriate. Depending upon the status of the facility (e.g., operating

under interim status or at differing stages of development), certain types of target dates or milestones may not be necessary, activities may appear in a different order, or an alternative activity more appropriate to the facility or treatment approach may be provided.

2.2.3.1 Plans Where Treatment Technology Exists Onsite. For some of the mixed wastes, treatment technologies have been identified and developed. For wastes that will be treated onsite, the categories of milestones and target dates identified in Table 2-1, "Schedule For Wastes With Existing Treatment Technologies" shall apply.

TABLE 2-1

SCHEDULE FOR WASTES WITH EXISTING TREATMENT TECHNOLOGIES

Categories of Milestones/Target Dates:

a. Submit RCRA permit applications to DTSC.
b. Procure contracts.
c. Initiate construction.
d. Commence systems testing.
e. Commence operations.
f. Submit a schedule for processing backlogged and currently generated mixed wastes.

2.2.3.2 Plans Where Technology Must Be Developed. For some mixed wastes, no treatment technologies have been identified and developed, or treatment technology must be modified or adapted to be made applicable for mixed waste. For wastes which will be treated onsite, the categories of milestones and target dates identified in Table 2-2, "Schedule for Waste Without Existing Treatment Technologies" shall apply.

TABLE 2-2

SCHEDULE FOR MIXED WASTES WITHOUT EXISTING TREATMENT TECHNOLOGIES

Categories of Milestones/Target Dates:

a. Identify funding requirements for identification and development of technology.
b. Identify and develop technology.
c. Submit treatability study exemption application.
d. Submit Research, Development, and Demonstration (RD&D) permit applications.
e. Submit schedule in accordance with Table 2-1 or new schedule for development of alternative treatment technologies in accordance with this section.

2.2.3.3 Requirements Pertaining to Radionuclide Separation. The FFCAct sets additional requirements in cases where DOE intends to conduct radionuclide separation of mixed waste. Should DOE/OAK determine to conduct radionuclide separation of such mixed wastes onsite, DOE/OAK will provide those milestones and target date

categories identified in Table 2-3, "Schedule for Radionuclide Separation of Mixed Waste."

TABLE 2-3

SCHEDULE FOR RADIONUCLIDE SEPARATION OF MIXED WASTES

Categories of Milestones/Target Dates:

a. Complete an estimate of the volume of waste generated by each case of radionuclide separation.
b. Complete an estimate of the volume of waste that would exist or be generated without radionuclide separation.
c. Complete an estimate of the costs of waste treatment and disposal if radionuclide separation is used compared to the estimated costs if it is not used.
d. Provide the assumptions underlying such waste volume and cost estimates.
e. Submit a plan for treatment or management of residues, as appropriate, in accordance with this section.

2.2.3.4. Plans for Other Types of Activities. The Compliance Plan Volume may contain additional milestones and target dates for other types of situations related to treatment of DOE/OAK's mixed wastes, including:

a. For mixed waste that shall be shipped offsite for treatment, LLNL must first request approval from the offsite treatment facility to ship the waste. This request will be followed by the offsite treatment facility providing a date when LLNL can ship waste to the offsite treatment facility. Currently, LLNL has not requested shipping dates. Obtaining a date to ship waste to an alternate treatment facility will satisfy the completion of the first milestone. The completion of the waste shipment will be accomplished no later than 6 months following the designated date for shipment provided by the offsite treatment facility. Information supporting the development or use of offsite treatment capacity or technology for treatment of such wastes is provided in the background volume of the STP. In the event that assumptions used to develop the schedule for offsite treatment are incorrect and impact the schedules in DOE/OAK's Compliance Plan Volume, DOE/OAK shall notify DTSC, and DOE/OAK and DTSC shall negotiate necessary changes in accordance with Sections 2.5, "Revisions," or 2.6, "Extensions," as appropriate, and subject to Section 2.10, "Disputes." Table 2-4 contains some examples of milestones/target dates that may be provided for mixed wastes shipped offsite for treatment.

TABLE 2-4

SCHEDULE FOR MIXED WASTE TO BE SHIPPED OFFSITE FOR TREATMENT

Examples of Milestones/Target Dates:

a. Request approval to ship the waste offsite.
b. Complete shipment of waste(s) offsite.

b. In the event that DOE decides to treat waste at an offsite facility in lieu of plans to treat such waste onsite, DOE shall so notify DTSC, and the schedules, target dates and pre-existing milestones pertaining to management of that particular waste will no longer be applicable or enforceable. DOE shall propose a new schedule with milestone and target dates, as appropriate, as part of the notice, which shall be subject to approval by DTSC under Section 2.8, "Procedures for Review and Approval," and, if applicable, shall also be subject to Section 2.5, "Revisions." Where waste will be shipped to another DOE facility, it is the expectation that DOE/OAK shall ensure notification (or DTSC shall notify if so agreed) of the proposed shipment to the regulatory agency of the state in which the receiving facility is located.

c. For mixed wastes that are not sufficiently characterized to allow identification of appropriate treatment, or for which technology assessment has not been completed, the Compliance Plan Volume will contain schedules for characterizing such wastes and/or completing technology assessment. The last activity for such a schedule will be the requirement for DOE/OAK to either identify the facility that will receive the waste and any necessary changes to the pertinent schedule for that facility or submit a proposed schedule as described in this section.

d. TRU Waste - Notwithstanding any other provision of this Compliance Plan Volume, the provisions of Section 4.0 shall apply regarding schedules for MTRU wastes destined for WIPP in lieu of other schedule requirements of this Section 2.0 of the Compliance Plan Volume.

e. Storage of mixed wastes for purposes of allowing for radioactive decay of the radioactive portion of the mixed waste shall be considered to be storage for the purpose of accumulation of such quantities of waste as are necessary to facilitate proper recovery, treatment, or disposal in compliance with RCRA Section 3004(j). Such storage may be included in the schedules of the Compliance Plan Volume, as appropriate, including treatment schedules or schedules related to radionuclide separation.

2.3 ANNUAL SITE TREATMENT PLAN UPDATES

2.3.1 This section provides a mechanism to (1) communicate and exchange information about schedule, technology development, funding and other concerns that affect the implementation of the STP; (2) update the Background Volume to the STP in a timely fashion, including information on new waste streams; (3) propose and establish the next ensuing milestones; and (4) update and propose revisions to the Compliance Plan Volume.

2.3.2 Each fiscal year after the fiscal year in which this STP is approved and accompanying FFCAct Order executed, DOE/OAK shall provide an Annual Update to the STP to DTSC for review and comment. The Annual Update shall (1) provide DTSC with information to track progress on milestones and target dates; (2) allow input from the public, affected states, and EPA to be obtained when revisions to the STP are proposed; (3) bring the STP current to the end of the previous fiscal year (September 30); and will minimize the paperwork necessary to document changes, which will be handled by page changes to the extent practicable. These changes will be marked for comparison to the previous STP. If there are no changes to the information, milestones, or target dates in the STP, a letter to that effect will be sent to DTSC in lieu of an Annual Update.

2.3.3 The Annual Update of the STP shall update the Background Volume and the Compliance Plan Volume.

2.3.3.1 The update to the Background Volume will provide the following information:

a. The amount of each covered waste stored at LLNL as follows: (1) the estimated amount in storage at the end of the previous fiscal year, and (2) the estimated amount anticipated to be placed in storage in the next five fiscal years.

b. A description of progress made up to the end of the last fiscal year on treatment or technology development of each treatment facility or activity scheduled in the STP. If applicable, DOE will also describe current or anticipated alternative treatment technology which is being evaluated for use in lieu of treatment technologies or capacities identified in the STP. This description will include potential alternate commercial treatment and offsite DOE treatment capacity or technology development.

c. An evaluation of characterization, packaging, and/or treatment capabilities and/or plans for MTRU waste to ensure that the activities and commitments included in the STP remain consistent with the Waste Isolation Pilot Plant (WIPP) waste acceptance criteria (WAC), No-Migration Variance petition, RCRA Part B permit, and/or compliance certification development.

d. A description of DOE's funding for STP-related activities and any funding issues that may impact the schedule.

e. The status of any pending or planned extension, treatability variance, or no-migration petition.

f. Information that has changed or has not been previously included regarding waste form, waste code, technology, and capacity needs, including new waste streams in accordance with Section 2.4.2.

g. Notification of the deletion of waste streams in accordance with Section 2.7.1.

2.3.3.2 The Annual Update will update the Compliance Plan Volume and may also contain notification of changes or requests for approval of changes to the Compliance Plan Volume. These notifications or requests for approval may include, as appropriate:

a. Any changes to the Compliance Plan Volume incorporated since the previous Annual Update;

b. Any proposed revisions or conditionally approved revisions;

c. Any proposed new milestones, in accordance with Setion 2.2; and

d. Any other changes to the overall schedules.

The Annual Update would clearly identify proposed changes requiring approval under Sections 2.8, "Procedures for Review and Approval," and 2.5, "Revisions."

2.3.4 DOE shall make the Annual Update publicly available. When the update includes proposed revisions to the Compliance Plan Volume, the provisions of Section 2.5, "Revisions," also apply to such proposed revisions.

2.4 INCLUSION OF NEW WASTE STREAMS

2.4.1 This section establishes a method for including new mixed waste streams at LLNL in the STP, including mixed wastes that are newly discovered, identified, generated, or received from offsite and mixed wastes that are generated through environmental restoration (ER) and decontamination and decommissioning (D&D) activities to the extent such wastes are expected to become a covered waste.

2.4.2 DOE/OAK shall notify DTSC of additional or new mixed wastes or waste streams that have been generated or stored and may notify DTSC of mixed wastes that are anticipated to be generated or stored at LLNL, and that are expected to be covered wastes. Unless otherwise specified in the notification, the mixed waste will be a covered waste and subject to the requirements of this Compliance Plan Volume upon receipt of such notification or when generated or stored at LLNL, whichever is later. To the extent practicable, DOE/OAK shall provide a description of the waste code, waste form, volumes, technology, and capacity needs, and similar pertinent information in the notification. In general, additional detail on the waste and the proposed plan and schedules consistent with Section 2.2, "Compliance Schedules," will be provided in the next regularly scheduled Annual Update, or a date for submittal of such a proposed plan and schedules will be provided if additional time is required for its preparation. The information provided pursuant to this subsection is subject to DTSC approval to the extent provided for in Section 2.4.4.

2.4.3 If DOE/OAK cannot provide such information or schedules as required by Section 2.4.2 because of inadequate characterization or because it is otherwise impracticable, DOE/OAK shall include appropriate justification, supporting information, and proposed plans for approval as a deliverable under Section 2.8, "Procedures for Review and Approval," for developing such information and schedules consistent with Section 2.2, "Compliance Schedules."

2.4.4 DOE/OAK may propose changes to the Compliance Plan Volume of the STP to accommodate new waste streams. If any such changes are required, DOE/OAK shall submit the changes for approval as a deliverable under Section 2.8, "Procedures Review and Approval." Also, DOE/OAK may propose revisions to the Compliance Plan Volume of the STP as necessary to accommodate new waste streams subject to Section 2.5, "Revisions."

2.5 REVISIONS

2.5.1 A revision is a change to the Compliance Plan Volume of the STP that requires, for those affected portions of the STP, publication of a notice of availability to the public and consultation with affected states and EPA pursuant to this STP and Section 3021(b)(2) and (3) of RCRA. A revision is (1) the addition of a treatment facility at LLNL or technology development not previously included in the Compliance Plan Volume to the STP; or (2) an extension to a milestone (including an extension by mutual agreement under Section 2.6 or a proposed milestone converting a target date under Section 2.2) for a period greater than one year. Changes in waste volume; the addition or deletion of wastes or waste types; extensions; changes to milestones for a period less than a year; or changes to target dates shall not, by themselves, constitute a revision.

2.5.2 Revisions to the STP shall be made as follows:

2.5.2.1 DOE/OAK shall identify to DTSC the need to revise the Compliance Plan Volume of the STP and provide supporting information on the basis for the revision as a deliverable pursuant to Section 2.8, "Procedures for Review and Approval." Under these procedures, within 30 days of receipt, DTSC may conditionally approve the revision, return it to DOE/OAK with comments so that changes can be made for resubmittal, or disapprove it. In reviewing the revision, DTSC shall consider the need for regional treatment facilities. Conditional approval of a revision is a determination by DTSC that the revision is acceptable subject to the results of public comment and consultation with affected states and EPA.

2.5.2.2 Within 30 days subsequent to conditional approval, DTSC shall publish a notice of availability and make the revision to the STP available to the public for review and comment and to affected states and EPA for consideration and consultation. Revisions shall be approved or approved with modification by DTSC within 6 months after DTSC's receipt of the proposed revision. DTSC shall either (1) notify DOE/OAK that the revision has final approval or (2) notify DOE/OAK that DTSC received comments from the public, affected states, or EPA indicating that such revision should be modified before approval. Any proposed modifications to the

revision shall include supporting explanation and information. DOE/OAK shall have 30 days to discuss the proposed modifications with DTSC. If agreement is not reached on the proposed modifications in this 30-day period, the procedures of Section 2.10, "Disputes," will apply.

2.5.3 To the extent practicable, comments from the public, affected states, and EPA on conditionally approved revisions will be obtained in conjunction with the Annual Update to the STP, governed by Section 2.3, "Annual Site Treatment Plan Updates." However, in the event a conditionally approved revision is proposed to become effective before it could be addressed in the regularly scheduled Annual Update, DTSC shall publish a Notice of Availability and consult with affected states and EPA, as appropriate, within 30 days of such conditional approval.

2.6 EXTENSIONS

2.6.1 DOE/OAK shall implement this STP in accordance with the milestones set forth in the STP, as well as milestones subsequently developed pursuant to this STP. DOE/OAK further agrees to adopt all reasonable measures to avoid or minimize any delays in the implementation of this STP.

2.6.2 A milestone that is established according to the provisions of the FFCAct Order shall be extended upon receipt by the DTSC of a timely request for extension, provided good cause, as defined in this section, exists for the requested extension. Any request for extension by DOE/OAK shall be made to the DTSC prior to the milestone date in the manner described below and shall specify:

a. The milestone that is sought to be extended;

b. The length of the extensions sought;

c. The good cause(s) for the extension; and

d. Any related milestone or target date that would be affected if the extension were granted.

2.6.3 Good cause for an extension includes, but is not limited to:

a. An event of *force majeure* (as defined in Section 2.6.6 below);

b. A delay caused by the DTSC's failure to meet any requirement of this STP;

c. A delay caused by the good faith invocation of dispute resolution or the initiation of administrative or judicial action; and

d. A delay caused, or which is likely to be caused, by the grant of an extension in regard to another milestone;

e. A delay caused by additional work agreed to by DOE/OAK and the DTSC;

f. Circumstances that are unforeseen at the time this STP was prepared and that significantly affect the work required under the STP;

g. Delay in the DTSC's review of a permit application or issuance of a permit required to conduct the work specified in the STP or to meet a milestone;

h. Inconsistency with the requirements of any other existing permit, order, or agreement to which DOE is a party;

i. A delay caused by a change to a planning assumption, as specified in the STP, that results from either a request by the DTSC or is identified by DOE but does not represent a failure of DOE or its contractor to properly manage the work specified in the STP;

j. A stop-work order by the DTSC; or

k. Any other event or series of events mutually agreed upon by DOE/OAK and the DTSC as constituting good cause.

2.6.4 In the absence of agreement between the DOE/OAK and the DTSC with respect to the existence of good cause, the parties may seek and obtain a determination through the dispute resolution process, Section 2.10, whether good cause exists.

2.6.5 For extension requests by DOE/OAK, except for extensions sought on the basis of *force majeure* (defined in Section 2.6.6), the following procedures shall apply:

a. DOE/OAK requests for an extension for one or more milestones shall be made to the DTSC no less than thirty (30) days prior to the date of the first milestone for which the extension is sought, either in writing or orally with a written follow-up request within ten (10) business days of the request.

b. Within fifteen (15) business days of receipt of a written request for an extension of a milestone, the DTSC shall advise DOE/OAK in writing whether it shall approve, approve in part, or deny the request. Any failure by the DTSC to respond within the fifteen (15) day period shall be deemed to constitute the DTSC's approval of the requested extension. If the DTSC approves in part or denies the requested extension, it shall explain in its written response to DOE/OAK its reasons for the partial approval or denial of the requested extension.

c. If the DTSC approves the requested extension, then the affected milestone(s) shall be extended accordingly. If the DTSC approves in part or denies the requested extension, then the affected milestone(s) shall not be extended except as set forth in Paragraph b of this section, or in accordance with a determination resulting from the dispute resolution process.

d. Within fifteen (15) business days of receipt of the DTSC's written determination to approve in part or deny DOE/OAK's extension request, the DOE/OAK may invoke dispute resolution. If DOE/OAK does not invoke dispute resolution within this time period, then DOE/OAK shall be deemed to have accepted the DTSC's determination and the existing milestone schedule set forth in the STP.

2.6.6 *Force Majeure*

2.6.6.1 The DOE/OAK shall perform the requirements of this FFCAct Order within the time limits set forth in the STP, unless performance is prevented or delayed by events which constitute a *force majeure*. A *force majeure* is defined as any event arising from a cause not foreseeable and beyond the control of the DOE/OAK, which could not be avoided or overcome by due diligence and which delays or prevents performance by a date required by the FFCAct Order. Such a cause shall be considered an event of *force majeure* and shall include, but not be limited to:

a. Acts of God, fire, war, insurrection, civil disturbance, or explosion;

b. Adverse weather conditions that could not be reasonably anticipated;

c. Unusual delays in transportation beyond the control of DOE/OAK;

d. Unanticipated malfunction or breakdown of, or accident to, machinery, equipment, or lines of pipe not due to negligence, inadequate maintenance, or improper operation;

e. Restraint by court order or order of public authority;

f. Inability to obtain, at reasonable cost and after exercise of reasonable diligence, any necessary authorizations, approval, permits, or licenses due to untimely

action or failure to act of any governmental agency or authority other than the DOE/OAK;

g. Delays caused by compliance with applicable statutes or regulations such as those governing contracting, procurement, or acquisition procedures, despite the exercise of reasonable diligence;

h. A strike, lockout, or other labor difficulty whether or not within the control of the DOE/OAK;

i. Unavailability of equipment despite reasonable diligence used to obtain the equipment in a timely manner;

j. Lack of or inability to obtain raw materials, labor, fuel, or supplies; or

k. Unanticipated condition or hazard posed to persons or property.

2.6.6.2 To claim *force majeure* the DOE/OAK shall give prompt oral notification to the DTSC within forty-eight (48) hours after the event which the DOE/OAK knows or should know constitutes a *force majeure*, and shall serve written notice on the DTSC not less than seven (7) days after such oral notification. The written notice shall contain an estimate of the anticipated length of delay, a description of the cause of delay, a plan for implementing measures to correct the problem and avoid such delays in the future, and an estimated schedule for implementation of these measures. The DOE/OAK shall adopt all reasonable measures to avoid and minimize the delay. If the suspension of obligation(s) under this section would, in the DTSC's opinion, render compliance with this FFCAct Order impossible or impracticable, the DTSC reserves the right to terminate this FFCAct Order or to seek judicial enforcement, or both.

2.6.6.3 Except as otherwise provided in this FFCAct Order, the DTSC shall notify the DOE/OAK in writing of the DTSC's determination regarding the asserted claims of *force majeure*. If the DTSC agrees that the delay or anticipated delay is attributable to a *force majeure* event, the time for performance of the obligations under this FFCAct Order that are affected by the *force majeure* event shall be extended by the DTSC for such time as corresponds to the delay shown to have resulted from the *force majeure* event or for such longer period of time that is reasonable under the circumstances. An extension of the time for performance of the obligations affected

by the *force majeure* event shall also extend the time for performance of any subsequent obligation that is affected by such delay. If the DTSC does not agree that the delay or anticipated delay has been or will be caused by a *force majeure* event, the DTSC shall notify the DOE/OAK in writing of its decision.

2.6.6.4 If the DOE/OAK elects to invoke the dispute resolution procedures set forth in this FFCAct Order in response to the DTSC's determination that a delay or anticipated delay has not been or will not be caused by a *force majeure* event, the DOE/OAK shall do so no later than thirty (30) days after receipt of this written determination from the DTSC. In any such proceeding, the DOE/OAK shall have the burden of demonstrating, by a preponderance of the evidence, that the delay or anticipated delay has been or will be caused by a *force majeure* event, that reasonable efforts were exercised to avoid and mitigate the effects of the delay, and that the DOE/OAK reasonably complied with all requirements imposed by this section. If the DOE/OAK carries this burden, the delay at issue shall not be deemed to be a violation by the DOE/OAK of the affected obligation of this FFCAct Order.

2.6.7 A timely and good faith request for extension shall toll any assessment of penalties or the initiation of any action to enforce the affected milestone(s) until a decision by DTSC is reached on whether to approve, approve in part, or deny the requested extension. If dispute resolution is invoked and the contested portion of the extension request is denied, penalties may be assessed based on an accrual date of the original milestone(s) for which the extension request was sought. Following the approval of an extension request, the DTSC may assess penalties or initiate any action to enforce the affected milestone(s) based on the most recently approved new milestone(s).

2.6.8 Extension requests made in writing by the DTSC to DOE/OAK shall be deemed approved if the DOE/OAK does not invoke dispute resolution within fifteen (15) business days after receiving written notice of the request.

2.7 DELETION OF WASTES AND TERMINATION OF THE STP

2.7.1 Deletion of Wastes. The requirements of this Compliance Plan Volume shall terminate with regard to any covered waste upon DOE/OAK's notice to DTSC of the following:

a. Completion of activities required pursuant to a milestone under the Compliance Plan Volume for treatment of such waste;

b. Shipment of wastes offsite for treatment, disposal, or storage pending treatment or disposal;

c. Changes to statute or regulation or determinations of the regulatory authority that causes a waste or waste categories to be no longer subject to the requirements of RCRA or the LDR requirements of RCRA;

d. Storage for the sole purpose of accumulating such quantities of covered wastes as are necessary to facilitate proper recovery, treatment, or disposal;

e. Information demonstrating the waste meets the treatment standards of RCRA, Section 3004 (m);

f. Treatment in accordance with the conditions of an approved LDR treatability variance; or

g. Mutual agreement between DOE/OAK and DTSC.

2.7.2 Inasmuch as the intent of the FFCAct requirement to develop an STP is to address compliance with RCRA Section 3004(j), this STP shall terminate either at such time as (1) there is no longer any mixed waste, regardless of when generated, being stored or generated at LLNL which does not meet LDR requirements or (2) the mixed waste being stored or generated at LLNL is being stored, or will be stored when generated, solely for the purpose of accumulating sufficient quantities of mixed wastes as are necessary to facilitate proper recovery, treatment, or disposal.

2.7.3 DOE/OAK will notify DTSC of such termination independently and/or in the Annual Updates to the STP. DTSC will provide DOE/OAK with a written response to the notification within 30 days. DTSC's response to this notice shall be subject to the provisions of Section 2.10, "Disputes."

2.8 PROCEDURES FOR REVIEW AND APPROVAL

2.8.1 Deliverables developed by DOE/OAK pursuant to this Compliance Plan Volume shall be submitted by DOE/OAK to DTSC for review and comment as provided in this section. Deliverables include documents or notices signifying completion of milestones, identifying new wastes, and supporting proposed revisions as required or permitted under this Compliance Plan Volume. Where DTSC approval of a deliverable is expressly required in this Compliance Plan Volume, the approval provisions in this section apply. Permit applications and National Environmental Policy Act (NEPA) documents shall not be subject to the procedures of this section. Permit applications shall be submitted and reviewed under applicable regulations, and NEPA documents shall be submitted and reviewed under the DOE regulations implementing NEPA. Each submittal of a deliverable shall specify the milestone or other provision of this Compliance Plan Volume requiring submittal of that deliverable.

2.8.2 Unless otherwise noted, each deliverable shall be transmitted directly to the project manager of DTSC responsible for implementation of this STP.

2.8.3 DTSC will promptly review each deliverable submitted by DOE/OAK required to be approved pursuant to this Compliance Plan Volume, within the time frames established in this section unless other time frames are agreed to in writing. In the course of their review, DTSC will consult with DOE/OAK regarding the adequacy of each deliverable. Oral comments made during these discussions shall not require a written response.

2.8.4 Deliverables that do not require DTSC approval shall be provided to DTSC for review and comment. In the event that DOE/OAK disagrees with DTSC's comments, DOE/OAK shall respond to DTSC's comments in writing explaining the DOE/OAK's position. If DOE/OAK has not received comments from DTSC within 30 days of submittal of the deliverable, it will be deemed that DTSC has no comments.

2.8.5 For any deliverable that requires DTSC approval under the provisions of this Compliance Plan Volume, the following procedures shall apply:

2.8.5.1 DTSC shall, within 30 days of receipt, take action as follows: (1) approve, conditionally approve (if the deliverable is a revision), or disapprove the deliverable as submitted; or (2) return the deliverable to DOE/OAK with comments so that changes can be made for resubmittal. Conditionally approved revisions will be approved or approved with modification after public review and comment and consultation with affected states and EPA pursuant to Section 2.5, "Revisions." DTSC may extend this review period by an additional 30 days by notifying DOE/OAK. This period may be further extended for an additional period of time, as may be agreed to by DTSC and DOE/OAK. Comments on the deliverable shall be provided with adequate specificity so that DOE/OAK can make the appropriate changes to the document. To the extent applicable, comments should refer to specific paragraphs of any sources of authority or references on which the comments are based; and upon request of DOE/OAK, DTSC shall provide a copy of the cited authority or reference.

2.8.5.2 If DTSC fails to take one of the actions specified above within the time frames required by this STP, the deliverable shall be considered approved or conditionally approved as submitted. If DTSC extends the review period for a deliverable, any milestones or target dates dependent upon the results of deliverable review will automatically be extended an equivalent amount of time as the time taken beyond the specified time frame for review. DOE/OAK will notify DTSC in writing of any enforceable milestones that will need to be extended or revised.

2.8.5.3 In the event that DTSC returns the deliverable to DOE/OAK with comments, within thirty (30) days of receipt, DOE/OAK shall incorporate the comments and shall retransmit the deliverable. DOE/OAK may extend this period by an additional 30 days by notifying DTSC. This period may be further extended for an additional period of time, as may be agreed to by DTSC and DOE/OAK. In the event DOE/OAK disagrees with DTSC's comments and the parties are unable to resolve their disagreement, DOE/OAK may invoke the dispute resolution provisions of Section 2.10, "Disputes."

2.9 FUNDING

2.9.1 DOE proposes DTSC an opportunity to input into formulating the DOE/OAK budget and setting the DOE/OAK budget priorities as outlined in the addendum to this STP, "Milestone Approach and Budget Formulation Process." Nothing in the STP affects DOE's authority over its budget and funding level submissions. Further, it is DOE's position that any requirement for the payment or obligation of funds by DOE established by the terms of the STP and FFCAct Order requiring compliance with the STP would be subject to the availability of appropriated funds, and that no provision of the STP or FFCAct Order should be interpreted to require the obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. Section 1341, as amended. In cases where the payment or obligation of funds would constitute a violation of the Anti-Deficiency Act, the dates established requiring the payment or obligation of such funds should be appropriately adjusted.

2.10 DISPUTES

2.10.1 Except as specifically set forth elsewhere in this STP, any action which leads to or generates a dispute regarding compliance with this STP, is subject to resolution under this section. DOE/OAK and DTSC must exhaust the dispute resolution process prior to seeking any administrative or judicial relief.

2.10.2 DOE/OAK and DTSC shall make reasonable efforts to informally resolve disputes as expeditiously as possible at the project manager/division director levels. If resolution cannot be achieved informally, the disputing party may elevate the dispute for formal resolution in accordance with this section.

2.10.3 To initiate formal dispute resolution, the disputing party shall submit to the other party a written Notice of Dispute specifying:

a. The nature of the dispute;

b. The work affected by the dispute;

c. The disputing party's position; and

d. The information the disputing party is relying upon to support its position.

2.10.4 Upon receipt of the Notice of Dispute, the DTSC Assistant Director for Hazardous Waste Management shall notify the DOE/OAK Assistant Manager for Environmental Management and Support to begin attempts at formal dispute resolution. The parties (or their respective delegates) shall have thirty (30) days from the date of the receipt by DTSC of the Notice of Dispute to resolve the dispute. If the parties cannot agree on a resolution of the dispute, the dispute shall be escalated by the disputing party to the Director, DTSC. Within thirty (30) days of escalation, the DTSC Director shall consult with the Manager, DOE/OAK, and issue a final written determination of DTSC. This 30-day period may be extended by mutual agreement of the parties. The decision of DTSC shall be binding upon the parties unless timely appeal is taken.

2.10.5 DOE shall have the right to seek administrative or judicial relief from DTSC's final determination under this section, as provided for by law. During the pendency of any dispute, DOE/OAK agrees that it shall continue to implement those portions of this STP affected by the dispute that can be reasonably implemented pending final resolution of the issue(s) in dispute. All elements of work required by this Compliance Plan Volume that are not affected by the dispute shall continue and be completed in accordance with the applicable schedule.

2.10.6 Unless timely appeal is made, DOE/OAK shall incorporate the resolution and final determination into the appropriate plan, schedule, or procedure and proceed with implementation in accordance with the amended plan, schedule, or procedure within forty-five (45) days after resolution of the dispute pursuant to the procedures specified in this section, in order for Section 2.11, "Covenants and Reservations," to remain effective for the affected waste stream.

2.10.7 States affected by the dispute and/or EPA may be consulted by the parties as part of the dispute resolution process, as appropriate.

2.11 COVENANTS AND RESERVATIONS

2.11.1 This STP and implementing FFCAct Order shall stand in lieu of any administrative, legal, and equitable remedies which are available to the DTSC against DOE, its contractors and subcontractors at any tier and all persons bound by this STP and implementing FFCAct Order with respect to the matters covered by this STP and implementing Order, so long as DOE and all parties bound by this STP and implementing FFCAct Order are in compliance with the STP and implementing FFCAct Order as determined by DTSC or a court of competent jurisdiction.

2.11.2 Except as specifically set forth herein, DOE reserves and does not waive any rights, authority, claims or defenses, including sovereign immunity, that it may have or wish to pursue in any administrative, judicial or other proceeding with respect to any person; nor does DOE waive any claim of jurisdiction over matters which may be reserved to DOE by law, including the Atomic Energy Act. Nothing in this STP and implementing FFCAct Order shall constitute an admission on the part of DOE, in whole or in part, in any proceeding except in a proceeding to enforce the FFCAct Order implementing this STP. DOE specifically reserves all rights it may have by law to seek and obtain administrative or judicial review or appeal according to law of any determination made by DTSC during DOE/OAK's performance of its obligations under this STP and implementing FFCAct Order. DOE also specifically reserves all rights it may have by law to seek and obtain administrative or judicial review or appeal of permit requirements.

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3.0 MIXED LOW-LEVEL WASTE TREATMENT PLAN AND SCHEDULES

This section describes the proposed treatment plans and schedules for mixed low-level waste (MLLW) streams at LLNL. These schedules represent enforceable milestones for the purposes of the FFCAct. More detailed information regarding the preferred treatment options, including additional breakdowns of schedules and target dates, is provided in the Background Volume. It is DOE/OAK's intention to develop enforceable milestones only as specifically required by the FFCAct.

3.1 MLLW STREAMS FOR WHICH TECHNOLOGY EXISTS

The preferred treatment option for LLNL waste streams for which technology exists are identified in Table 3-1, with detailed schedule information provided in Tables 3-4 (a) or (b), as appropriate. Additional schedule information and a description of the interim steps needed to bring these wastes into compliance with RCRA LDR requirements are included in Section 3.1 of the Background Volume. Preferred treatment options selected will meet RCRA LDR standards as defined in 22 CCR 66268 (40 CFR 268) and will be conducted in accordance with all RCRA requirements. This includes, but is not limited to, adhering to waste analysis plans written in accordance with RCRA and maintaining/developing the applicable record-keeping, notification, and/or certification requirements mandated by RCRA.

3.2 MLLW STREAMS FOR WHICH TECHNOLOGY EXISTS BUT NEEDS ADAPTION OR FOR WHICH NO TECHNOLOGY EXISTS

The preferred treatment option for LLNL waste streams for which technology exists but needs adaptation or for which no technology exists are identified in Table 3-2, with detailed schedule information provided in Tables 3-4 (c) or (d), as appropriate. Additional schedule information and a description of the interim steps needed to bring these wastes into compliance with RCRA LDR requirements are included in Section 3.2 of the Background Volume.

3.3 MLLW STREAMS REQUIRING FURTHER CHARACTERIZATION, OR FOR WHICH TECHNOLOGY ASSESSMENTS HAVE NOT BEEN DONE

The LLNL waste streams requiring additional characterization or technology assessment are identified in Table 3-3, with detailed schedule information provided in Table 3-4 (e). Additional information on these waste streams is provided in Section 3.3 of the Background Volume.

TABLE 3-1

TREATMENT PLAN FOR LLNL MLLW STREAMS USING EXISTING TECHNOLOGY

Waste Stream No.	Waste Stream Description	Preferred Treatment Option
LL-W002	Inorganic Sludges/Particulates	Onsite Existing Treatment
LL-W003	Inorganic Debris	INEL WERF/IWPF
LL-W004	Aqueous Liquid	Onsite Existing Treatment
LL-W005	Inorganic Sludges/Particulates	Onsite Existing Treatment
LL-W006	Inorganic Debris	INEL IWPF
LL-W007	Elemental Lead	Hanford WRAP II-A
LL-W010	Soils	Onsite Existing Treatment
LL-W011	Reactive Metals	Onsite Small Scale Treatment
LL-W015	Inorganic Debris	Hanford WRAP II-A
LL-W017	Heterogeneous Debris	INEL WERF/IWPF
LL-W021	Lab Packs with Metals	INEL WERF/IWPF
LL-W023	Soil with Debris	Onsite Existing Treatment
LL-W024	Liquid Mercury	INEL WEDF Amalgamation
LL-W025	Cemented Solids	Onsite Existing Treatment

Key: INEL WEDF = Idaho National Engineering Laboratory Waste Engineering Development Facility
INEL WERF = Idaho National Engineering Laboratory Waste Experimental Reduction Facility
INEL IWPF = Idaho National Engineering Laboratory Idaho Waste Processing Facility
MWMF = Mixed Waste Management Facility
WRAP IIA = Waste Receiving and Processing

TABLE 3-2

TREATMENT PLAN FOR LLNL MLLW STREAMS REQUIRING TECHNOLOGY DEVELOPMENT OR TREATABILITY STUDIES

Waste Stream No.	Waste Stream Description	Preferred Treatment Option
LL-W001	Organic Liquids with Water	Onsite Treatment, Mixed Waste Management Facility Technology
LL-W008	Organic Liquids with Water	Onsite Treatment, Mixed Waste Management Facility Technology
LL-W009	Organic Liquids with Water	Onsite Treatment, Mixed Waste Management Facility Technology
LL-W014	Organic Liquids with Water	Onsite Treatment, Mixed Waste Management Facility Technology
LL-W016	Organic Liquids with Water	Onsite Treatment, Mixed Waste Management Facility Technology
LL-W026	Organic Liquids with Water	Onsite Treatment, Mixed Waste Management Facility Technology

TABLE 3-3

LLNL MLLW STREAMS REQUIRING CHARACTERIZATION OR TECHNOLOGY ASSESSMENT

Waste Stream No.	Waste Stream Description	Current Volume (m^3)	Projected Future Volume (m^3)
LL-W022	Depleted Uranium Chips with Coolant (Requires Additional Characterization	TBD	TBD
LL-W027	Other Reactives (Requires Technology Assessment)	4.4	1.0

TABLE 3-4 (a)

SCHEDULE: MLLW STREAMS TO BE TREATED ONSITE WITH EXISTNG TECHNOLOGIES

Activity	Waste Stream No.					
	LL-W004	LL-W002	LL-W005	LL-W010	LL-W023	LL-W025
Milestone						
Treat 100% of waste generated prior to 10/1/95.	9/30/96	--	--	--	--	--
Target Date						
Treat 100% of waste generated prior to 10/1/95.	--	9/30/98	9/30/98	9/30/98	9/30/98	9/30/98

Note:

Compliance Plan schedule tables generally show only activities that have not yet been completed. Where a milestone is shown as completed for a waste stream in the table, the next target date becomes the milestone for that waste stream.

TABLE 3-4 (b)

SCHEDULE: MLLW STREAMS TO BE TREATED OFFSITE WITH EXISTING TECHNOLOGIES

Activity	Waste Stream No.						
	LL-W003	LL-W006	LL-W017	LL-W021	LL-W015	LL-W007	LL-W024
Offsite Treatment	INEL WERF	INEL IWPF	INEL WERF	INEL WERF	Hanford WRAP II-A	Hanford WRAP II-A	INEL WEDF
Target Dates							
Request an acceptable shipping schedule for waste generated prior to 10/1/95.	10/15/98	10/15/98	10/15/98	10/15/98	10/15/98	10/15/98	10/15/98
Complete shipment of the waste(s) generated prior to 10/1/95 to the treatment site.	Assumption #1	Assumption #1	Assumption #1	Assumption #1	Assumption #1	Assumptio #1	Assumption #1

Assumptions:

1. Wastes will be shipped within 6 months after the approved shipping date is provided by the treatment facility (in response to LLNL's request shown as the first milestone)

Note:

Compliance Plan schedule tables generally show only activities that have not yet been completed. Where a milestone is shown as completed for a waste stream in the table, the next target date becomes the milestone for that waste stream.

TABLE 3-4 (c)

SCHEDULE: MLLW STREAMS TO BE TREATED ONSITE AT THE MIXED WASTE MANAGEMENT FACILITY

Activity	Waste Stream Nos. LL-W001, LL-W008, LL-W009, LL-W014, LL-W016, LL-W026
Milestones	
Begin construction of building.	9/96*
Target Dates	
Begin MSO tests. All permits are in place to begin testing.	7/00*
Begin MEO tests. All permits are in place to begin testing.	7/01*
Submit modifications to LLNL Part B Permit to the state, to permit waste treatment using MSO.	7/02*
Submit modifications to LLNL Part B Permit to the state, to permit waste treatment using MEO.	10/03*
Submit Schedule to the State of California for the treatment of the waste backlog.	1/04*

* = These are proposed dates based on State and DOE approvals.

Note:

Compliance Plan schedule tables generally show only activities that have not yet been completed. Where a milestone is shown as completed for a waste stream in the table, the next target date becomes the milestone for that waste stream.

TABLE 3-4 (d)

SCHEDULE: MLLW STREAMS REQUIRING SMALL SCALE TREATMENT

Activity	Waste Stream No. LL-W011
Onsite Small Scale Treatment	**Deactivation**
Target Dates	
Complete treatment of 100% of the waste generated prior to 10/1/95.	6/30/98

Notes:

Completion of this activity by 6/30/98 is contingent upon receipt of the RCRA permit from the State of California by 6/30/96.

Compliance Plan schedule tables generally show only activities that have not yet been completed. Where a milestone is shown as completed for a waste stream in the table, the next target date becomes the milestone for that waste stream.

TABLE 3-4 (e)

SCHEDULE: MLLW STREAMS REQUIRING CHARACTERIZATION OR TECHNOLOGY ASSESSMENT

Activity	Waste Stream No.	
	LL-W022	LL-W027
Milestone		
Complete necessary characterization or technology assessment to allow the identification of a treatment option.	6/1/96	9/30/96
Target Date		
Select a treatment option and submit a treatment schedule with the STP Annual Update	3/31/97	3/31/97

4.0 MIXED TRANSURANIC WASTE TREATMENT PLAN AND SCHEDULES

This section describes the proposed treatment plans and schedules for DOE/OAK mixed transuranic (MTRU) wastes located at LLNL. These schedules represent enforceable milestones for the purposes of the FFCAct. More detailed information regarding the preferred treatment options, including additional breakdowns of schedules and target dates is provided in the Background Volume. It is DOE/OAK's intention to develop enforceable milestones only as specifically required by the FFCAct.

4.1 MTRU WASTE EXPECTED TO GO TO WIPP

As discussed in greater detail in Section 4 of the Background Volume of this STP, DOE plans to achieve compliance with the requirements of the FFCAct for MTRU destin for WIPP by using the no-migration variance petition approach described in 40 CFR section 268.6. Under this strategy, DOE intends to continue interim storage of such MTRU, continue preparation of such wastes for shipment to WIPP, and then ship and dispose of such wastes in WIPP. Within twelve months of the Secretary's decision to operate WIPP as a disposal facility, LLNL will submit a supplemental plan outlining schedules and additional activities required to prepare the MTRU waste for shipment to WIPP if not already included in this plan or in the event that significant changes transpired as a result of the final permit or the final no-migration determination. In addition, at that time LLNL will provide a timetable for submitting a shipment schedule to WIPP for its MTRU waste. LLNL will coordinated with the Carlsbad area office in developing the shipment schedule to ensure proper throughput and receipt of waste at WIPP.

LLNL will begin discussions with the DTSC regarding alternative treatment options for MTRU waste in January 1998 if the Secretary of Energy does not decide to operate WIPP as a disposal facility by that time, or at such earlier time as DOE determines that (1) there will be a delay in the opening of WIPP substantially beyond 1998, or (2) the no-migration variance petition is not

granted by the EPA. DOE shall propose modifications to the STP for approval by DTSC within a timeframe agreed upon between the DOE and DTSC. These modifications will describe planned activities and schedules for the new MTRU strategy.

DOE shall include information regarding progress of MTRU waste management in the update to the STP required by section Section 2.0 of this Compliance Plan Volume. This will include, as applicable and appropriate, the status of the no-migration variance petition, and information related to characterization, packaging, and/or treatment capabilities or plans for MTRU waste related to WIPP Waste acceptance criteria and disposal.

Table 4-1 summarizes the DOE/OAK defense-related MTRU waste stream located at LLNL, which is ultimately expected to go to WIPP. Table 4-2 (a) identifies the schedule for managing this waste stream.

4.2 MTRU WASTES NOT DESTINED FOR WIPP

There are no DOE/OAK non-defense-related MTRU waste streams at LLNL which fall in this category.

TABLE 4-1

MANAGEMENT PLAN FOR DOE/OAK MTRU WASTE STREAMS LOCATED AT LLNL

Waste Stream No.	Description	Management Option
MTRU, Elemental Lead, CH		
LL-W018	MTRU Debris	Further characterization required; No LDR treatment required; Disposal at WIPP

TABLE 4-2 (a)

SCHEDULE: MTRU WASTE STREAMS SCHEDULED FOR DISPOSAL AT WIPP

Activity	Waste Stream No. LL-W018
Offsite Disposal	**WIPP**
Milestone	
Provide schedule for completing characterization of MTRU	9/30/96
Target Dates	
Provide schedule for offsite shipment of waste to WIPP. This will include schedule dates for requesting the WIPP WAC, submitting a written certification plan, conducting additional sampling and analysis of waste if needed to meet WAC, requesting an acceptable shipping schedule from WIPP, and a date to complete shipment of waste offsite.	12/30/98

5.0 MIXED HIGH-LEVEL WASTE STREAMS

DOE/OAK has not generated or stored mixed high-level waste (HLW) at LLNL requiring treatment prior to land disposal, nor are mixed HLW requiring treatment prior to land disposal anticipated to be generated as a result of DOE/OAK activities at LLNL in the future.

Addendum

MILESTONE APPROACH AND ENVIRONMENTAL MANAGEMENT BUDGET FORMULATION PROCESS

March 1995

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-ADDENDUM-

MILESTONE APPROACH AND ENVIRONMENTAL MANAGEMENT BUDGET FORMULATION PROCESS

In view of recent budget cuts and future budget uncertainties, the Department of Energy (DOE) faces a significant challenge in maintaining an environmental program that complies with environmental laws, including the Federal Facility Compliance Act (FFCAct), in a manner that maximizes use of DOE's resources and addresses the most serious risks first. DOE must work closely with regulatory agencies and stakeholders to develop less costly and more efficient approaches to achieving compliance while recognizing fiscal constraints. DOE is moving forward on several fronts to meet this challenge, including initiatives to improve internal efficiency and productivity, to involve regulatory agencies and stakeholders in a "bottom-up" process for setting environmental management budgets and priorities, and to seek increased flexibility in the appropriation process for DOE's Environmental Management Program. A key element in meeting this challenge is the development of a process for setting milestones that provides accountability, focuses resources on high priority activities, and recognizes fiscal and technical uncertainties.

To meet these objectives, DOE proposes using a two-year rolling milestone approach to implement the schedules provided in the Compliance Plan Volume of the Site Treatment Plan. Under this approach, schedule dates are designated as either "milestones" or "target dates." Milestones and target dates would be established in accordance with available Environmental Management funding for the site. Milestones are enforceable deadlines for near-term activities (i.e., the current fiscal year plus one additional year). Milestones are established for near-term activities because there is greater fiscal and technical certainty about these activities. Target dates are non-enforceable deadlines for longer-term activities and would be converted to milestones on an annual basis. Each year, after receipt of the Approved Funding Program that reflects the final Congressional appropriation for that fiscal year, existing milestones would be reviewed,

and adjusted if necessary, based on funding availability, new technical information, and other factors. An additional year of milestones would also be established by converting upcoming target dates to milestones, adjusting the target dates as necessary before converting them to milestones. Affected out-year target dates would also be adjusted as necessary. To the extent practical, this process would coincide with the process for the Annual Site Treatment Plan Updates and would be conducted in a consistent time-frame across the DOE sites (for example, no later than March 31 of each year).

During the annual review and establishment of milestones and target dates, DOE and the regulatory agencies would consider a variety of factors, including: funding availability; latest information on cost estimates; site priorities identified through consultations among DOE, regulatory agencies, and stakeholders; new or emerging technologies; and other relevant factors.

Because the process for modifying and extending milestones is resource-intensive for both DOE and regulatory agencies, only major project activities required by the FFCAct and other statutes should be designated as enforceable milestones. Other mechanisms, such as submission of the Annual Site Treatment Plan Updates, would provide regulatory agencies with information on progress on enforceable milestones and interim activities.

Target dates would be established using realistic assumptions. DOE and the regulatory agencies must recognize the uncertainties associated with long-term target dates which set forth DOE's strategic vision of how it plans to accomplish the project.

DOE will work with the regulatory agencies to resolve disputes concerning the establishment of milestones. DOE proposes that the parties agree to exhaust all available dispute resolution mechanisms prior to resorting to formal enforcement actions for disputes involving insufficient funding.

As noted above, DOE will provide the regulatory agencies and other stakeholders an opportunity to participate in developing the Environmental Management budget and priorities. Open discussions between DOE, regulatory agencies, and other stakeholders will facilitate the development of a sensible Environmental Management program and budget proposal that uses DOE's resources wisely in light of budget constraints confronting DOE.