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**Mixed Waste Management Facility
Monthly Report Summary
Oct-Dec 1993**

Ron Streit

January 1994

Lawrence
Livermore
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Mixed Waste Management Facility

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Oct-Dec 1993

January 31, 1994

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MWMF Project Monthly Report

For Activities from
October–December 1993

Dated
January 1994

Summary

As the initial monthly report, this document will overview activities through the first three months of FY94. Subsequent reports will be based on the previous month's activities.

During the first three months of FY94 the primary focus has been directed towards the Conceptual Design. We completed a series of "Point Design" meetings leading to definition of process flow and functional flow diagrams. A formal 30% Conceptual Design Review was held in December with a panel of senior Laboratory and outside reviewers, including DOE. Although awaiting formal input from the Scientific Advisory Board, the input provided during the wrap-up session supported the Project effort in completing the CDR activities.

A number of assurance milestones/markers were completed, including issuing of the Quality Assurance Plan, and initiating a contract with Roy W. Weston for the Preliminary Safety Analysis Report. In the Program Support area, a draft Project Management Plan was issued to DOE for review, and a number of key Project personnel (including Project Control Manager and Project Engineers) were selected.

Project Financial Summary

Based on the MWMF Project FY94 Plan, actual expenditures are tracking with the planned expenditures as shown in the summary table below. The somewhat higher OPEX costs shown in October relate to specific Project Management charges which will be adjusted in the coming months. During the first three months of FY94, a significant portion of the expenditures were charged against carry-over from FY93. Additional funds were released during December 1993; however, funding is expected to be fully expended before the end of January 1994. Additional funding will be required to meet the Project plans and obligations through the second quarter of FY94 (described in a letter to DOE, MWMF 94-066).

OPEX (\$K), cumulative:

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	425	820	1231	1628	2039	2423	2539	2655	2766	2905	3044	3160
Actual	512	850	1300									
Funding	680*	680	1630	1630								

CENRTC (\$K), cumulative:

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	148	273	416	593	846	1417	2154	3147	4087	5000	6332	7620
Actual	153	272	334									
Funding	370*	370	470	470								

* FY93 Carry-over

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WBS Element: 1.1.1 Quality Assurance

Task Description:

Quality Assurance provides quality assurance and safeguards support for and evaluations of the MWMF Project to ensure compliance with applicable DOE regulations, and environmental, safety, health, and NEPA/CEQA requirements. This effort includes development of the project's quality assurance documentation and oversight for conformance to the approved plan.

Summary of Activities:

The MWMF Quality Assurance Plan was completed and approved on Oct. 19, 1993. The plan was subsequently distributed to project team members as a controlled document. The QA manager has also identified a QA librarian, been working on maintaining QA files, issued a document control procedure (which is currently being revised), and attended miscellaneous project meetings to advise staff on QA matters.

Cost Summary: FY94 Budget: \$180K OPEX

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	9	11	11	13	15	16	17	17	17	18	18	18
Actual	11	11	8									

Major Procurements:

None

Key Milestones and Markers:

		Scheduled	
Item		Date	Status
L111-1	Develop and issue Quality Assurance Plan	Oct 93	Complete
L111-2	Develop and issue Document Control Plan	Jan 93	Open

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WBS Element: 1.1.2 PSAR

Task Description:

The PSAR provides the integration of safety input, design reviews, and safety analysis for the MWMF Preliminary Safety Analysis Report. Safety analysis includes the analysis, generation of documentation, and documentation review and approval. The element includes the generation of the Preliminary Safety Analysis Report (PSAR) and follow-on analysis required prior to the generation of the Final Safety Analysis Report (FSAR). This element provides additional criticality support to resolve safety issues.

Summary of Activities:

A contract was awarded to Roy F. Weston, Inc. in October 1993. Staff from ABB-Government Services Inc., a subcontractor to Weston, visited LLNL to gather data and began preparation of the safety analysis document. The contractor completed approximately 98% of the rough draft of the PSAR as of the end of December.

Cost Summary: FY94 Budget: \$230K OPEX

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	59	57	50	31	22	11	0	0	0	0	0	0
Actual	30	9	10									

Major Procurements:

Contract for services to prepare Safety Analysis Report: \$205K

Key Milestones and Markers:

		Scheduled	
Item		Date	Status
L112-1.1	Issue Contract	Oct 93	Complete
L112-1.2	Preliminary PSAR Review	Feb 94	Open
L112-1	PSAR to DOE for Review	Mar 94	Open
D112-1	PSAR Approved by DOE	Jun 93	Open

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WBS Element: 1.1.3 NEPA/CEQA

Task Description:

NEPA/CEQA provides for the preparation of input to the Environmental Assessment and all required follow-up documentation required for the NEPA/CEQA and necessary permitting. The effort includes preliminary evaluations, preparation of an implementation plan, preparation of technical information to support EA preparation, and comment resolution. This element prepares and coordinates approval of State, EPA, and local permits and supports public participation activities associated with the permits approvals.

Summary of Activities:

The Environmental Analyst who is preparing the Environmental Assessment has been gathering additional details on accident analyses from the Preliminary Hazards Analysis and PSAR contractors. Drafts of portions of the EA have been circulated internally for comment to identify any changes as work on the conceptual design proceeds.

The Assurances Manager and permitting staff have attended numerous technical meetings to become more knowledgeable about the details of the proposed project and to consult with principle investigators and engineers on ES&H items, particularly as they relate to environmental evaluations and permitting needs. Permitting staff have maintained contact with regulatory agency permitting staff to keep them informed of progress.

Cost Summary: FY94 Budget: \$290K OPEX

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	9	12	36	36	37	21	18	18	13	39	39	12
Actual	8	10	29									

Major Procurements:

None

Key Milestones and Markers:

	Item	Scheduled Date	Status
L113-1	Environmental Assessment (EA) submitted to DOE	Mar 94	Open
D113-1	EA approved by DOE	Aug 94	Open
L113-2	Air permit application submitted to BAAQMD	May 94	Open
L113-3	Research, Development & Demonstration (RD&D) permit application submitted to DTSC	Jul 94	Open
C113-2	Authority to Construct issued by BAAQMD	Oct 94	Open

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WBS Element: 1.1.4 ES&H

Task Description:

ES&H provides for Environment, Safety, and Health representation to the MWMF project to ensure that all activities are conducted in a safe and environmentally sound manner and to ensure that ES&H standards have been properly applied. This element provides for conducting and/or monitoring safety-related analyses and the resultant documentation. Specific activities include preparing and implementing various assurance plans; performing hazard evaluations and safety assessments; participating in design reviews to ensure compliance with safety and environmental standards and regulations; preparing safety and environmental procedures; and preparing input for permit applications and other documentation required for compliance with Federal and/or State requirements.

Summary of Activities:

Members of the ES&H team have attended numerous technical meetings to become more knowledgeable about the details of the proposed project and to consult with principal investigators and engineers on ES&H issues.

Cost Summary: FY94 Budget: \$120K OPEX

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	8	8	8	8	9	9	9	12	12	12	12	13
Actual	2	10	12									

Major Procurements:

None

Key Milestones and Markers:

	Item	Scheduled Date	Status
114-1.1	Review of 30% Conceptual Design	Dec 93	Complete
114-1.2	Review of 90% Conceptual Design	Mar 93	Open
114-1.3	Review 90% Preliminary Design	Sept 93	Open

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WBS Element: 1.1.5 Program Support

Task Description:

Program Support provides top-level planning, control, and support of MWMF project OPEX-funded activities. Specific activities include management of project assurances and interface with development activities. This element encompasses support for the Project Office, including organization, schedule and budgeting activities, project plans and reporting, personnel hiring and housing, project operations control, Building 494 occupant relocation, and OPEX-funded technical support.

Summary of Activities:

Cost Summary: FY94 Budget: \$1250K OPEX

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	230	157	151	145	122	121	56	53	53	53	53	56
Actual	331	161	191									

Major Procurements:

Service contract to SAIC for program support and independent technical and administrative reviews

Key Milestones and Markers:

Item	Scheduled Date	Status
L115-1.1 Project Management Plan (Draft)	Oct 93	Complete
L115-2 Select Project Engineers and Project Control Manager	Dec 93	Complete
L115-3 Submit FY94 Project Plan	Jan 93	In Process
L115-4 Initiate PTS and Monthly reporting	Jan 93	In Process
L115-5 Technology Selection and Implementation Plan	Feb 93	In Process
L115-6 Develop Design Basis Operations Plan	Mar 93	In Process
L115-1 Project Management Plan (Final)	Apr 93	Open
L115-7 Submit FY95 Project Plan (OPEX)	Sep 93	Open

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WBS Element: 1.1.6 Public Participation

Task Description:

Public Participation provides for public input to the planning and execution phases of the MWMF project. Included are a National Advisory Committee, a Community Newsletter and preparation and coordination of press releases and community tours.

Summary of Activities:

No results to report.

Cost Summary: FY94 Budget: \$150K OPEX

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	0	0	5	14	16	16	16	16	16	17	17	17
Actual	0	1	0									

Major Procurements:

Contracted support for Public Participation activities

Key Milestones and Markers:

Item	Scheduled Date	Status
L116-1.1 National Advisory Committee (NAC) formed	Feb 94	In process
L116-2.1 Issue first public newsletter	Mar 94	In process
L116-1.2 First meeting of NAC	Mar 94	Open
L116-1.3 Receive comments on CDR Draft from NAC	Apr 93	Open
L116-2.2 Issue second newsletter	Jun 94	Open
L116-1.4 Second meeting of NAC	Jul 94	Open
L116-2.3 Issue third newsletter	Sep 94	Open

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WBS Element: 1.2.1 Conceptual Design

Task Description:

Conceptual Design provides the project's technical, cost, and schedule baselines that form the basis for KD-1.

Summary of Activities:

A series of point design reviews (13 total) was held in October and November for each of the primary treatment and support systems. The principal focus was on the waste acceptance criteria and the identification of initial interfaces for and between each element of a treatment train. Significant action items were identified to be addressed during the completion of the CDR.

A formal 30% conceptual design review was held on December 17. The review panel consisted of senior LLNL scientists and off-site personnel representing significant experience in nuclear plant design and chemical processing. While several areas were noted for attention as the conceptual design evolves, the wrap-up comments were positive both as to the quality of the presentation and the maturity of the design information presented.

Cost Summary: FY94 Budget: \$940K OPEX

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	110	150	150	150	190	190	0	0	0	0	0	0
Actual	130	135	200									

Major Procurements:

Contracted services for CDR support: \$40K

Key Milestones and Markers:

		Scheduled	
Item		Date	Status
L121-1.1	Initiate Point Design Reviews	Oct 93	Complete
L121-1.2	Complete Point Design Reviews	Nov 93	Complete
L121-1	30% CDR Review	Dec 93	Complete
L121-2	90% CDR Review	Mar 94	Open
L121-3	Conceptual Design Review Issued	Apr 94	Open
D121-1	Preliminary Approval and Funding to Proceed into PD	Apr 94	Open
D121-2	KD-1/2 Decision Approved DOE	Jun 94	Open

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WBS Element: 1.2.2 Plant Start-Up Management

Task Description:

Plant Start-Up Management provides (1) operations and maintenance review of system designs, (2) the development of top-level plans for staffing, training, testing, and readiness review, (3) task analysis and preparation, review, and revision of site operating plan, maintenance, instrument calibration, and emergency response procedures, (4) recruiting, hiring, clearing, and providing general employee training for the plant staff, and (5) the development of training materials, training the trainers, and special technical and on-the-job training for the plant staff.

Summary of Activities:

No activities for this reporting period.

Cost Summary:: FY94 Budget: \$0K OPEX

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	0	0	0	0	0	0	0	0	0	0	0	0
Actual	0	0	0									

Major Procurements:

None

Key Milestones and Markers:

Item	Scheduled Date	Status
None		

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WBS Element: 1.2.3 Activation

Task Description:

Activation provides (1) the preparation, review, revision, and release of all Operational Test Procedures (OTPs); (2) plant systems activation, integration, and performance of Operational Test Procedures in each of the technology areas including Operational Readiness Reviews; (3) technical support for the preparation of Operational Safety Requirements (OSR) and Facility Safety Requirements (FSR), the identification and resolution of problems during plant operational testing, start-up, and activation, including finalization of design documentation for equipment and process modifications; (4) maintenance support to perform equipment or process modifications during start-up, testing, and activation; (5) all operational spares and the initial stores inventory; and (6) all manpower and materials required to deliver support services (e.g., utilities, power, etc.) during construction, testing, and activation of the MWMF.

Summary of Activities:

No activities for this reporting period.

Cost Summary: FY94 Budget: \$0K OPEX

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	0	0	0	0	0	0	0	0	0	0	0	0
Actual	0	0	0									

Major Procurements:

None

Key Milestones and Markers:

Item	Scheduled Date	Status
None		

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WBS Element: 1.3.1 Project Management

Task Description:

Project Management provides top-level project planning, direction, and control of the MWMF project's CENRTC-funded systems. Specific activities include project management and support of Project Office, project assurance (including quality assurance, safeguards, environmental, and safety oversight), management overview of information management and technical activities, and interface with DOE.

Summary of Activities:

No activities for this reporting period.

Cost Summary: FY94 Budget: \$300K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	0	0	0	0	0	0	50	50	50	50	50	50
Actual	0	0	0									

Major Procurements:

Service contract to SAIC for project support and independent technical and administrative reviews.

Key Milestones and Markers:

		Scheduled	Status
Item		Date	
L131-1.1	In-house Point Design Review	Jun 93	Open
L131-1	90% Preliminary Design Review ¹	Sep 93	Open
L131-2	Submit FY95 Project Plan (CENRTC)	Sep 93	Open

¹ Tied to April 1st KD-1/2 decision approval from DOE.

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WBS Element: 1.3.2 Project Control

Task Description:

Project Control provides for the project integration, configuration management, cost and schedule control, and administration of the CENRTC-funded systems. Develops and maintains the management systems used to monitor progress against the established baselines and to ensure configuration control (drawings, documents, etc.).

Summary of Activities:

No activities for this reporting period.

Cost Summary: FY94 Budget: \$300K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	0	0	0	0	28	34	39	39	44	38	39	39
Actual	0	0	0									

Major Procurements:

None

Key Milestones and Markers:

	Item	Scheduled Date	Status
L132-2.1	Prepare Configuration Control Plan	Feb 94	Open
L132-2.2	Prepare Design Review Procedure	Mar 94	Open
L132-1	Implement Cost planning/tracking systems	June 94	Open
L132-2	Implement technical baseline control system	May 94	Open
L132-3	Implement schedule control/tracking system	Aug 94	Open

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WBS Element: 1.3.3 Technical Systems Integration

Task Description:

Technical Systems Integration provides the oversight and performance studies intended to verify or document system integration performance, system analysis, special process diagnostics, and planning and analysis of the process aspects of integrated tests. It also includes the responsibility for assuring that the systems aspects of the overall processes are adequately addressed in the integrated design. Includes System Engineering Management Plan and System Design Requirements coordination. Specific topics include the integration of waste-treatment processes and facility, risk assessment, accountability, safety, radiation exposure, and availability.

Summary of Activities:

No activities for this reporting period.

Cost Summary: FY94 Budget: \$300K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	0	0	0	0	0	0	50	50	50	50	50	50
Actual	0	0	0									

Major Procurements:

None

Key Milestones and Markers:

		Scheduled	
Item		Date	Status
L133-1.1	Draft System Engineering Management Plan	Sept 94	Open

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WBS Element: 1.4.1 Receiving and Characterization

Task Description:

The principal objective of the Receiving and Characterization system is to provide for the receiving, logging, identification and characterization of all incoming waste containers and to determine the acceptability for processing the waste. Receiving and Characterization provides the management, system analysis and support, design (Title I, II, III) engineering, procurement, installation of Receiving and Characterization equipment, Title III inspection, and acceptance test procedures (ATP). Receiving and Characterization includes both receiving and characterization equipment and systems integration.

Summary of Activities:

No activities for this reporting period.

Cost Summary: FY94 Budget: \$200K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	0	0	0	0	0	20	30	30	30	30	30	30
Actual	0	0	0									

Major Procurements:

None

Key Milestones and Markers:

		Scheduled	
Item		Date	Status
L141-1.1	Pilot characterization studies complete	Jun 94	Open
L141-1.2	Equipment identified and floor plan defined	Sep 94	Open
L141-1	90% Preliminary Design Review	Sep 94	Open

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WBS Element: 1.4.2 Solids Feed Preparation

Task Description:

The principal objective of the Solids Feed Preparation system is to provide for the receipt, characterization, preparation for processing, and handling of homogeneous and heterogeneous solids received from storage and other processes in the facility. This includes segregating the incoming waste stream into combustible solids, heterogeneous solids, homogeneous inorganic solids and metals, and liquids that were not previously identified. Solids Feed Preparation provides the management, system analysis and support, design (Title I, II, III) engineering, procurement, installation of Solids Feed Preparation equipment, Title III inspection, and acceptance test procedures (ATP). Solids Feed Preparation includes both solids feed preparation equipment and systems integration.

Summary of Activities:

No activities for this reporting period.

Cost Summary: FY94 Budget: \$600K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	0	0	0	0	0	130	70	90	90	70	70	80
Actual	0	0	0									

Major Procurements:

Support contracts to NWC sites: \$100K

Mechanical segregation test equipment: \$100K

Prototype equipment for waste handling evaluations: \$100K

Key Milestones and Markers:

	Item	Scheduled Date	Status
L142-1.1	Surrogate feeds defined	May 94	Open
L142-1.2	Initial suite of characterization equipment identified	Jun 94	Open
L142-1.3	Validation of characterization, isolation and segregation methods complete	Sep 94	Open
L142-1.4	Preliminary operator control station design complete	Sep 94	Open
L142-1	90% Preliminary Design Review	Sep 94	Open

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WBS Element: 1.4.3 Liquids Feed Preparation

Task Description:

The principal objective of the Liquids Feed Preparation system is to provide for the receipt, characterization, preparation for processing and handling of homogeneous and heterogeneous liquids and solids/liquids mixtures from storage and other processes in the treatment system. This includes segregating the incoming waste stream into aqueous with Trimsol, chlorinated organic liquids, oils, scintillation cocktails and solvents. Liquids Feed Preparation provides the management, system analysis and support, design (Title I, II, III) engineering, procurement, installation of Liquids Feed Preparation equipment, Title III inspection, and acceptance test procedures (ATP). Liquids Feed Preparation includes both liquids feed preparation equipment and systems integration.

Summary of Activities:

No activities for this reporting period.

Cost Summary: FY94 Budget: \$400K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	0	0	0	0	0	75	75	50	50	50	50	50
Actual	0	0	0									

Major Procurements:

Support contracts to NWC sites: \$50K

Liquid/liquid and liquid/solid separation test equipment: \$80K

Key Milestones and Markers:

Item	Scheduled Date	Status
L143-1.1 Surrogate feeds defined	May 94	Open
L143-1.2 Liquids feed prep general arrangement plan finalized	Jul 94	
Open		
L143-1.3 Validation of liquid/liquid and liquid/solid separation methods complete	Sep 94	Open
L143-1 90% Preliminary Design Review	Sep 94	Open

WBS Element: 1.5.1 Mediated Electrochemical Oxidation

Task Description:

The principle objective of Mediated Electrochemical Oxidation (MEO) is to receive appropriately characterized mixed waste streams, and completely convert the organic portions to CO₂ and water, to recycle acid and silver, and to remove ash containing the radioactive constituents. The MEO project element provides the management, system analysis and support, design (Title I, II, III) engineering, procurement, and installation of the MEO equipment, Title III inspection, and acceptance test procedures (ATP) covering both equipment and system integration activities.

Summary of Activities:

During the first quarter of FY 94, the following activities took place in addition to the Conceptual Design effort. Tests were initiated on the conversion of nitrous acid to nitric acid. The conversion of nitrous acid is very important for the nitric acid-based MEO process, since it substantially reduces the amount of NO_x that would otherwise be generated. It also reduces the amount of make-up acid required. The tests were carried out on a bench-scale electrochemical reactor. A turbo-aerator was installed on the cathode side loop and an oxygen line was plumbed into the aerator. The turbo-aerator designed by our group is a compact device for mixing oxygen gas with the electrolyte. Since oxygen is sparingly soluble, the aerator must allow the gas to come in repeated contact with the fluid. The preliminary results show that high conversion efficiencies can be achieved with our turbo-aerator design. The conversion efficiencies at 75 and 50°C were approximately 98 and 99%, respectively. Further tests will be conducted to determine scalability parameters so the device can be scaled up for the MWMF.

Tests were also initiated on recovery of silver from silver chloride. During the first quarter the emphasis was on recovery of silver using moderate-to-high temperature processes. Two processes were investigated. In the first, silver chloride was reduced by hydrogen (in a safe gas mixture with argon) at temperatures ranging from 590 to 1000°C. The results indicate that at temperatures below 700°C, the reaction rates were too slow for practical purposes (although equilibrium calculations show that the reaction is favored). Reaction rates appeared to be adequate at 1000°C, but the high temperatures also caused substantial evaporation of silver chloride, which would have to be condensed and trapped. The other process involved adding aluminum powder to molten silver chloride at about 550°C. In this case the reaction was rapid, but the silver appeared to contain substantial amounts of aluminum, which would require an additional separation step. Subsequent tests on silver recovery will focus on low-temperature processes.

Cost Summary: FY94 Budget: \$950K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	67	67	67	69	70	70	90	90	90	90	90	90
Actual	57	56	70									

Major Procurements:

None

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Key Milestones and Markers:

Item		Scheduled Date	Status
L151-1.1	Complete tests on turbo-aerator for nitrous acid acid conversion	Mar 94	In Progress
L151-1.2	Initiate steady-state flow and chemistry balance tests	Apr 94	Open
L151-2.1	Preliminary Process Flow Diagram	Jun 94	Open
L151-1.3	Initiate instrumentation and control system tests	Jul 94	Open
L151-2.2	Preliminary Equipment Layout	Sept 94	Open
L151-1.4	Complete tests for silver recovery	Sept 94	Open
L151-1	Engineering characterization tests complete	Sept 94	Open
L151-2	90% Preliminary Design Review	Sept 94	Open

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WBS Element: 1.5.2 Molten Salt Oxidation

Task Description:

The principal objectives of Molten Salt Oxidation (MSO) are to receive appropriately characterized mixed waste streams and completely convert the organic portions to CO₂ and water, to remove ash containing the radioactive constituents, and to recycle/process the spent salt. The MSO project element provides the management, system analysis and support, design (Title I, II, III) engineering, procurement, and installation of the MEO equipment, Title III inspection, and acceptance test procedures (ATP) covering both equipment and system integration activities.

Summary of Activities:

Bench-scale rubber destruction tests and documentation was completed.
Design Basis Specification was started.

Cost Summary: FY94 Budget: \$1260K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	29	15	17	22	25	24	34	34	56	83	431	490
Actual	16	12	6									

Major Procurements:

Contract for MSO system definitive design: \$750K

Key Milestones and Markers:

Item		Scheduled Date	Status
L152-1	Complete bench-scale rubber destruction tests	Dec 93	Complete
L152-2.1	Advertise in the CBD	Apr 94	In Process
L152-2.2	Complete Specification	May 94	Open
L152-3.1	Preliminary Process Flow Diagram complete	Jun 94	Open
L152-2.3	Select industrial partner	Jul 94	Open
L152-2	Award contract	Aug 94	Open
L152-3.2	Initiate Preliminary Design	Aug 94	Open
L152-3	30% Preliminary Design Review	Sept 94	Open

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WBS Element: 1.5.3 Wet Oxidation

Task Description:

The principle objective of Wet Oxidation (WOX) is to demonstrate treatment of organic mixed wastes using a wet oxidation process to convert the organic portions to CO₂, water, and inorganic ions, leaving ash, salts, metals, and radionuclides in a residual solution/slurry. The WOX project element provides the management, system analysis and support, design (Title I, II, III) engineering, procurement, and installation of the WOX equipment, Title III inspection, and acceptance test procedures (ATP) covering both equipment and system integration activities.

Summary of Activities:

Homogenizer system testing continued. Successful dispersion of surrogate oil was demonstrated in a 95°C tank-homogenizer loop. Dispersion of shredded cellulosic material was not successful with the existing homogenizer test equipment. Alternative methods for dispersing cellulosic material are under experimental investigation. Discussions were held with alternative vendors of homogenizers and colloid mills.

Technical discussions were held with AEA Technology, a vendor of wet oxidation systems, to learn about their pilot experience in destroying radionuclide-containing ion exchange resins, and their laboratory experience in destroying hazardous organics. Their laboratory and staff are well equipped to perform treatability tests on surrogate wastes of specific interest to the MWMF, to provide information on treatment rates, reagent requirements, output stream compositions, and best operating strategy.

Cost Summary: FY94 Budget: \$560K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	7	7	7	7	16	32	76	56	60	67	165	60
Actual	11	11	12									

Major Procurements:

Treatability Tests, if commissioned from vendor (incl. analytical costs): \$90K

Dispersion test equipment: \$30K

Key Milestones and Markers:

Item	Scheduled Date	Status
L153-1.1 Advertise in the CBD	Feb 94	Open
L153-2.1 Dispersion system test and design complete	May 94	Open
L153-2.2 Preliminary treatability tests complete	Jun 94	Open
L153-1.2 Issue RFQ for treatment unit w/ completed specification	Jun 94	Open
L153-2.3 Preliminary Process Flow Diagram complete	Jun 94	Open
L153-2.4 Preliminary P&ID for Support System complete	Jul 94	Open
L153-1 Award contract	Sept 94	Open
L153-2 30% Preliminary Design Review	Sept 94	Open

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WBS Element: 1.5.4 Ultraviolet Photolysis

Task Description:

The principle objective of Ultraviolet Photolysis (UVP) is to demonstrate ultraviolet-driven treatment of the hazardous and toxic organic constituents in the condensate from the Wet Oxidation process (WBS 1.5.3) to produce a sewerable water stream. The UVP project element provides the management, system analysis and support, design (Title I, II, III) engineering, procurement, and installation of the UVP equipment, Title III inspection, and acceptance test procedures (ATP) covering both equipment and system integration activities.

Summary of Activities:

No results to report for this period.

Cost Summary: FY94 Budget: \$300K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	2	2	2	5	6	12	26	33	99	42	36	35
Actual	2	2	2									

Major Procurements:

Treatability Tests, commissioned from vendor (incl. analytical costs): \$55K

Key Milestones and Markers:

	Item	Scheduled Date	Status
L154-1	Preliminary treatability tests complete	Jul 94	Open
L154-2.1	UVP Process Flow Diagram	Jul 94	Open
L154-2.2	P&ID for UVP Support System	Jul 94	Open
L154-2.3	UVP equipment layout	Aug 94	Open
L154-2	UVP 90% Preliminary Design Review	Sept 94	Open

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WBS Element: 1.5.5 Experimental Off-Gas

Task Description:

The objective of the Experimental Off-Gas Treatment (XOGT) is to demonstrate advanced, more effective off-gas treatment technologies that minimize secondary waste. These are: improved Selective Catalytic Reduction (SCR) of NO_x to nitrogen in gaseous phase, conversion of NO_x to nitrogen in aqueous urea, and use of cleanable metal HEPA filters. The XOGT project element provides the management, system analysis and support, design (Title I, II, III) engineering, procurement, and installation of XOGT equipment, Title III inspection, and acceptance test procedures (ATP) covering both equipment and system integration activities. The XOGT will be backed by the Process off-gas system representing best available control technology (BACT).

Summary of Activities:

A Russian monolith catalyst for SCR was tested over the temperature range of 200–500°C, air flow 1–10 m^3/h and NO_x concentrations of 500–10000 ppm. For residence time $t \geq 0.2$ s (space velocity $\leq 20000 \text{ h}^{-1}$) the window of operability with efficiency $> 90\%$ was found to be between 200 and 400°C. The top performance ($\approx 100\%$ efficiency at $t \geq 0.05$ s) was achieved between 260°C and 280°C where any excess of ammonia over stoichiometric was destroyed.

A high intensity gas-liquid contactor, designed and built at LLNL, was tested. Its gas recirculation capacity $\approx 10 \text{ m}^3/\text{h}$ per 1 kW of power input is an order of magnitude greater than the maximum off-gas rate at the MEO where the new contactor was installed. Used for nitric acid regeneration, the contactor achieved 98% acid recovery at 70°C and 99% recovery at 55°C.

A comprehensive, cost-effective strategy of treating off-gas at the source is being developed with the ultimate goal of making the treatment a part of the primary process.

Cost Summary: FY94 Budget: \$250K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	5	5	5	12	22	32	28	29	30	29	27	26
Actual	7	7	7									

Major Procurements:

Catalyst blocks: \$6K

gas/liquid contactor: \$13K

gas analyzer lease: \$25K

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Key Milestones and Markers:

	Item	Scheduled Date	Status
L155-1.1	Fabricate prototype gas-liquid contactor for acidic urea NO _x destruction	Jun 94	Open
L155-1.2	Complete tests on urea and SCR DeNO _x	Jul 94	Open
L155-1	Engineering characterization tests complete	Jul 94	Open
L155-2.1	Initiate instrumentation and control system test	Aug 94	Open
L154-2.2	Preliminary Equipment Layout	Sept 94	Open
L155-2	90% Preliminary Design Review	Sept 94	Open

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WBS Element: 1.6.1 Process Transport and Storage

Task Description:

The principal objective of the Process Transport and Storage system is to collect, transfer, deposit, store and handle containers, discrete items, dry and wet bulk materials, slurries, and liquids. Process Transport and Storage provides the management, system analysis and support, design (Title I, II, and III) engineering, procurement, installation of Process Support Systems equipment, Title III inspection, and acceptance test procedures (ATP). Process Transport and Storage includes both process transport and storage equipment and systems integration.

Summary of Activities:

No activities for this reporting period.

Cost Summary: FY94 Budget: \$250K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	0	0	0	0	0	25	30	55	55	35	25	25
Actual	0	0	0									

Major Procurements:

Equipment for material transport interface development - \$75K

Key Milestones and Markers:

	Item	Scheduled Date	Status
L161-1.1	Select standard transport container designs	Jun 94	Open
L161-1.2	Finalize transport handling capacity	Jul 94	Open
L161-1.3	Finalize transport equipment selection	Aug 94	Open
L161-1.4	Validation of bagless interface complete	Sep 94	Open
L161-1	60% Preliminary Design Review	Sep 94	Open

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WBS Element: 1.6.2 Analytical Laboratory Transport and Storage

Task Description:

The principal objective of the Analytical Lab Transport and Storage system is to transport and store both liquid and solid samples within the process areas. Analytical Lab Transport and Storage provides the management, system analysis and support, design (Title I, II, III) engineering, procurement, installation of Analytical Lab Transport equipment, Title III inspection, and Acceptance Test Procedures (ATP). Analytical Lab Transport and Storage includes both analytical lab transport and storage equipment and systems integration.

Summary of Activities:

No activities for this reporting period.

Cost Summary: FY94 Budget: \$50K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	0	0	0	0	0	7	7	7	7	7	7	8
Actual	0	0	0									

Major Procurements:

None

Key Milestones and Markers:

	Item	Scheduled Date	Status
L162-1.1	Select standard transport container designs	Jun 94	Open
L162-1.2	Finalize transport handling capacity	Jun 94	Open
L162-1.3	Finalize transport equipment selection	Aug 94	Open
L162-1	90% Preliminary Design Review	Sep 94	Open

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WBS Element: 1.6.3 Water Treatment

Task Description:

The principle objectives of Water Treatment are to manage aqueous streams to meet discharge requirements and address future waste water management regulations that would affect an operating mixed waste treatment facility. The Water Treatment project element provides the management, system analysis and support, design (Title I, II, III), engineering, procurement, and installation of the Water Treatment equipment, Title III inspection, and acceptance test procedures (ATP) covering both equipment and system integration activities.

Summary of Activities:

No results to report for this period.

Cost Summary: FY94 Budget: \$150k CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	0	0	0	0	0	11	11	21	25	23	31	28
Actual	0	0	0									

Major Procurements:

None for this reporting period.

Key Milestones and Markers:

Item		Scheduled Date	Status
L163-1	Water Treatment Process Flow Diagram	Jun 94	Open
L163-2.1	P& ID for Water Treatment	Jul 94	Open
L163-2.2	Tanks and Water Treatment Units Layout	Aug 94	Open
L163-2	90% Preliminary Design Review	Sep 94	Open

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WBS Element: 1.6.4 Final Forms

Task Description:

The Final Forms task will immobilize the residues from treatment of the mixed waste input streams. The waste form for primary treatment residues will be a high durability ceramic. Final Forms will also condition the wastes resulting from secondary support processes that are integral to the primary treatment processes.

Summary of Activities:

Samples of ceramic waste forms incorporating elements to simulate residues from each of the primary treatment processes were characterized using SEM, XRD, and TEM. Positive identification of the desired phase assemblage was achieved. Two samples were leach tested using a miniaturized version of the EPA TCLP test. Samples showed excellent resistance to leaching. The System Design Requirements draft was completed for final ceramic waste forms. Material was prepared for the 30% conceptual design review and was presented at the review. A paper describing the ceramic immobilization of residues for the MWMF was written and presented at the Materials Research Society meeting (Nov. 29-Dec 3). The paper will be published in the proceedings of the symposium on the Scientific Basis for Nuclear Waste Management. A new staff member was recruited to serve as the full time liaison between the final forms task and the rest of the project.

Cost Summary: FY94 Budget: \$550K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	18	9	25	27	31	29	31	44	114	109	61	52
Actual	18	9	31									

Major Procurements:

Polymer immobilization evaluation for NaCl wastes: \$20K
Blender/granular (trial unit): 20K
Furnace (trial unit): 20K
Rotary calciner (trial unit): 20K

Key Milestones and Markers:

Item	Scheduled Date	Status
L164-1.1 Preliminary process flow diagram complete	Jul 94	Open
L164-1.2 Preliminary equipment layout complete	Aug 94	Open
L164-1.1 Preliminary process parameters for ceramic forms complete	Sept 94	In Progress
L164-1 90% Preliminary Design Review	Sept 94	Open
L164-2 NaCl encapsulation evaluation complete	Sept 94	Proposal in hand

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WBS Element: 1.6.5 Supervisory Instrumentation and Control

Task Description:

Instrumentation and Control (I&C) systems will provide and integrate controls to develop, demonstrate, test, and evaluate mixed waste destruction technologies in a safe, environmentally acceptable, reliable, and cost-effective manner. I&C systems provide the management, system analysis and support, design (Title I, II, III) engineering, procurement, equipment installation, Title III inspection, and acceptance test procedures (ATP) covering equipment and system integration activities for Central Monitoring and Control, Safety Control Systems, Standard Process I&C, Analytical Laboratory I&C, and intercom communication, surveillance CCTV, and telepresence systems.

Summary of Activities:

- Hired the I&C Project Engineer
- Completed Point Design Reviews
- Completed 30% Conceptual Design Summary Review
- Continued identification of system interfaces, requirements, and criteria
- Continued conceptual design activities for all Control System subsystem elements
- Initiated evaluation of front-end-processors (FEP)
- Initiated evaluation of supervisory control systems (DCS and SCADA)
- Initiated evaluation of work-cell controllers
- Continued activities in support of Project Technical Planning Documentation
- Initiated requirements/design of an Instrumentation and Equipment Database
- Initiated General Arrangement Plan development activities

Cost Summary: FY94 Budget: \$1200K CENRTC

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Plan	20	20	20	35	55	70	90	315	90	140	170	175
Actual	19	21	11									

Major Procurements:

Process Control System front-end-processor hardware/software, fast prototype: \$45K
Supervisory Control System hardware/software, fast prototype components: \$135K
Handling system open architecture controller, fast prototype components: \$30K
Telerobotics platform, fast prototype components: \$60K
Teleoperator controller, fast prototype components: \$60K

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Key Milestones and Markers:

Item		Scheduled Date	Status
L165-1.1	General arrangement plan complete	Mar 94	Open
L165-1.2	Process Control System FEP hardware/software selected	Apr 94	Open
L165-1.3	Supervisory Control System hardware/software selected	Apr 94	Open
L165-1.4	Handling Systems open architecture controller selected	Jul 94	Open
L165-1.5	Analytical laboratory LIMS selected	Jul 94	Open
L165-1.6	Telerobotics platform selected	Aug 94	Open
L165-1.7	Teleoperator controller selected	Sep 94	Open
L165-1	90% Preliminary Design Review	Sep 94	Open

DATE

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