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WBS 1.3.1

Expedited Technology Demonstration Project

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(Revised Mixed Waste
Management Facility Project)

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*Project Baseline
Revision 2.2*

and

FY96 Plan

July 1996

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Preface

This rebaseline of the Mixed Waste Management Facility Project is designated as "Project Baseline Revision 2.2." Although the last approved baseline was identified as 1.2, DOE guidance for the Project Preliminary Design resulted in a rebaseline document 2.0. Revision 2.0 was completed in January 1996 subsequent to the Preliminary Design Review (November 1995), however, was put on hold pending DOE decision on proceeding with the MWMF Project. When it became clear that the Project would not be approved as revised due to funding constraints, Revision 2.0 was issued to document DOE guidance and the Project Plan as of the Preliminary Design. Revision 2.0 was sent to DOE in April 1996. Revision 2.1 was then initiated which still coordinated activities with DWTF, but was significantly reduced in scope - in line with expected DOE guidance. Revision 2.1 was an internal revision to focus design efforts on more attainable milestones and was not issued as a formal baseline document. Project Baseline Revision 2.2, is also based on informal DOE guidance, and incorporates further reductions in scope and separation from the DWTF complex.

This revised baseline document details the system deployment phase of the project covering the later half of FY96 through FY98. As originally discussed with DOE, the plan was to complete the expedited demonstration in FY97 based on a funding profile of \$3.5M for the remainder of FY96 and \$3.0M in FY97. However due to further budget constraints and carryover issues, only \$2.0M was approved for FY97 (see Appendices A & B). As such, essentially all MSO operational demonstration activities will be delayed to FY98 as well as the integration with feed preparation and final forms.

1.0 Introduction

The Expedited Technology Demonstration Project Plan, MWMF Revised Baseline 2.2, replaces and significantly modifies the MWMF current baseline. The revised plan will focus efforts specifically on the demonstration of an integrated Molten Salt Oxidation (MSO) system. In addition to the MSO primary unit, offgas, and salt recycle subsystems, the demonstrations will include feed preparation and feed delivery systems, and the generation robust final forms from process mineral residues. A simplified process flow chart for the expedited demonstration is shown in Fig. 1.0-1. To minimize costs and to accelerate the schedule for deployment, the integrated system will be staged in an existing facility at LLNL equipped to handle hazardous and radioactive materials. The MSO systems will be activated in FY97, followed by the activation of feed preparation and final forms in FY98.

Figure 1.0-1 Expedited Technology Demonstration Flow Diagram

1.1 Plan Summary

The mission and goals of the expedited technology demonstration will be to;

- Deploy a fully integrated MSO system that can be transitioned to treatment as required.
- Resolve conclusively the value of MSO as an integrated system for the treatment of mixed, radioactive and hazardous waste by demonstrating
  - operability of all major system components
  - engineered features of molten salt system
  - organic destruction efficiency for both solid and liquid feeds
  - control and retention of toxic constituents
  - separation of mineral residues from spent salt
  - ability to clean salt to meet California LDR.
  - preparation of solid and liquid surrogate and mixed waste streams for treatment by MSO
  - preparation and effectiveness of ceramic final forms
  - encapsulation of salt residues for problematic salt streams
- Coordinate deployment with industrial partners.
- Coordinate engineering development, design, and system operations data with DOE's Defense Programs (HE destruction) and DoD (energetic materials and hazardous waste treatment) molten salt activities.
- Support California EPA interest in evaluating technologies which are alternatives to incineration for commercial hazardous and mixed waste processing (e.g., medical, R&D, etc.).
- Demonstrate telerobotic assisted feed preparation system that can be transitioned to treatment as required. Functions that will be demonstrated include;
  - Demonstrate telerobotic manipulation system with pre-planned and automated path planning
  - Demonstrate force queuing
  - Demonstrate collision avoidance system suitable for real time operations
  - Demonstrate operator interface for waste characterization and sorting.

Although significantly downscoped from the original project, the basic goal – to evaluate the effectiveness of an alternative to incineration – is maintained. In addition, this solution also preserves the more global requirement to involve stakeholders, regulators, and industrial participants who are critical to the success of future deployment.

To provide for the broadest possible application of MSO technology, the system will be down-sized and reconfigured. The complete system will be configured so

that it may be skid mounted for possible relocation. This has the following advantages:

- Easily moved to and set-up at a permitted site for treatment of waste, or for the demonstration of treatment capability at other sites;
- Increased opportunities to demonstrate additional commercial applications;
- Modularity will significantly reduce facility costs.

1.2 Schedule Summary

The Project Schedule (IPS) associated with this Project Baseline revision is presented in Figure 1.2-1. Key milestones include:

• Configuration frozen, under configuration control	6/96
• Initiate long lead procurements	7/96
• Final design complete	10/96
• Beneficial occupancy of Bldg. 292, begin staging of systems	1/97
• Approval to Operate, begin surrogate testing in MSO	8/97
• Approval to initiate treatability studies in MSO	2/98
• Initiate operations of integrated system with feed preparation and final forms.	4/98
• Project complete - system fully operational and initial demonstration completed.	9/98

Appendix E is an updated milestone log for this project. Because of the significant change in Project scope and schedule, all existing previous milestones are being superseded by the revised plan. To avoid confusion, a new numbering sequence will be used; milestones for the Expedited Demonstration will start with an "E" followed by a three-digit number indicating the WBS element, and, finally, a milestone number.

To meet the very aggressive schedule for deploying the MSO system and to reduce the amount of potential unencumbered funds carryover to FY97, major procurements will be initiated during final design. As key elements are designed and approved for purchase/fabrication, including many of the standard pieces of equipment, e.g., pumps, tanks, etc., purchase requisitions will be submitted - placing a lien on FY96 funding. Most equipment, however will not be costed until delivery in FY97. To protect against purchasing equipment which has only a very limited applicability, the project will coordinate its requirements with HWM where appropriate (e.g., feed handling and preparation equipment).

The installation, test, and acceptance phases of the Project have been significantly reduced and integrated into the technical elements where possible.

Where pre-staging is appropriate prior to availability of Bldg. 292, equipment will be set-up in Bldg. 241 for check-out.

The schedule also calls for continuing demonstrations into FY98. Under the current DOE plans, however, funding into FY98 is not fully resolved (see Appendix C), and only system demonstration guidance is included in Appendix F. A formal plan for these activities will be developed at a later date.

Expedited Technology Demonstration Schedule

LEGEND
 ETD/MSO
 FPP/FFM

Jul 17, 1996

Figure 1.2-1 ETD Schedule

1.3 Financial Summary

Cost estimates are based on a revised estimate using data generated in preparing Project Baseline 2.0. As with the Project Baseline 2.0, Excel spreadsheets which automatically apply the proper LLNL overhead taxes, depending on cost type, were used. Schedule information for each activity were also entered into the spreadsheets. Unlike the previous effort, however, the files will not be translated and up-loaded into Primavera for cost roll-up and schedule generation. Rather, the Excel spreadsheets will be used directly for both funding and schedule information. The "9 Sheet Excel Workbook" will be utilized to summarize costs, add Management Reserve, and apply escalation to out-year costs. Cost reconciliation and other detail financial information are contained in Section 3.0. The summary tables in Section 3 are generated directly from this workbook.

The table below shows the funding for the system deployment and demonstrations as approved by DOE, and the funding agreed upon with LLNL for facility upgrade. Funding is included to complete the MSO system deployment and initial phase of demonstrations in the latter months of FY97. Completion of the integrated system with the addition of feed preparation and final forms, and treatability studies will continue into FY98.

Funding Source	May 96 to end of FY96 (\$M)	FY97 (\$M)	FY98 (\$M)
DOE EM-30	3.5	2.0	2.0
Commercial support (est.)	0.3	1.0	1.0
Upgrade of Bldg. 292		0.7	

The revised TPC for the MWMF Project has been reduced to \$26.5M. The cost to go for May through September FY96 and FY97/8 has been set per DOE guidance with a basic philosophy of "build to cost." In general, all costs associated with facility infrastructure or the general testbed mission have been eliminated. Demonstration feed preparation activities will be curtailed subsequent to meeting specific engineering demonstration milestones by the end of FY96. Other feed preparation, instrumentation and controls, and other support systems have been down-scoped to specifically meet the demonstration requirements of MSO. Additionally Plant Start-up and Activation activities have been reduced to the start up of the demonstration systems. Much of the external interactions have also been significantly reduced or eliminated.

Summary of Changes Reported in Section 2

Cost estimate data was developed for the Preliminary Design, Title I, Project Baseline 2.0. This data has been significantly modified to reflect the major changes in scope and schedule directed by DOE. Based on discussions with DOE, the system design will be sized so as to meet budget constraints. As such, the cost estimate will be well defined, however, the "contingency" will be in the scope of the deliverable system.

Section 2 contains details of scope and cost for the revised plan at each WBS Level 3. Following is a summary of the major cost changes associated with this revision:

- **Project Management / Project Control / Technical Systems Integration:** Management functions covered under this element include both fixed cost and level-of-effort activities. A major component of the fixed cost is the OFC charges for offices. This will be reduced by reducing the size of the project team and consolidating into one Trailer, T1877. The level of effort activities will also be reduced as much as possible by reducing staff. As such, project management and reporting will be reduced to a skeletal effort.
- **Feed Preparation:** A minimum conventional feed preparation will be deployed to support the demonstrations of MSO. The system will be capable of preparing solid and liquid feeds of both surrogate and actual waste. Feeds will be prepared in a batch mode to support daily operations of the MSO primary system. The demonstration feed preparation system elements will be closed subsequent to meeting specific milestones. Funding will be included for close-out of activities or until the effort is picked up by DWTF for incorporation into HWM future operations.
- **Molten Salt Oxidation:** This is the key element of the Expedited Technology Demonstration Project. A revised system design will be completed based on encompassing all elements of a treatment train including: feed distribution, primary reactor, offgas, and salt recycle systems, however will not have all plant-like operations.
- **Final Forms:** This is a key element of the Expedited Technology Demonstration Project. The revised design effort will be directed to meeting the schedule/cost profile with emphasis on ceramic final forms, however, back-up capability for salt polymer encapsulation will be maintained.
- **Process Diagnostics Services:** Effort will be on an as requested basis. Under the new scope, no new equipment will be procured for an analytical laboratory and a LIMS system will not be deployed.

- **Receiving and Shipping, Water Treatment, Mediated Electrochemical Oxidation, Process Transport and Storage, Supervisory Instrumentation and Control:** These elements have been or are in the process of being closed under the reduced scope.

2.0 WBS Level 3 Summaries

In this section, the specific plan for the remainder of FY96 and FY97-98 are discussed relative to each WBS element. Each specific plan is divided into 5 topics: Task Description, FY96 Plan, Budget, Procurement, and Milestones and Markers. The "Task Description" is duplicated from the WBS dictionaries as previously approved. For those "Task Descriptions" which require modification, the revisions are shown and are indicated by a revision bar in the right margin. These revisions will be reflected in update revisions to the WBS dictionaries. The budget shown, by month, is the total expected commitment to the account. It includes all manpower and expenses as well as liens on that element. To this end, management reserve is folded in as a cost in the later months, and procurements are added when the order is placed (funds liened). Consistent with this budget estimate, procurements identified in the following tables are based on the date the order is expected to be placed. The last section is a new milestone and marker list base on the revised project plan. All previous milestones and markers associated with the previous plans are being suspended in light of the major change in project scope. To avoid confusion, new LLNL milestones and markers are identified with a suffix "E" indicating they relate to the expedited demonstration.

WBS Element 1.1.1. Quality Assurance

Task Description

Quality Assurance provides quality assurance (QA) support to the MWMF Project. This effort includes development and implementation of the Project's QA program and oversight for conformance to the approved plan and other quality and ES&H requirements. This WBS element covers only a proportional fraction of the OPEX QA effort, with the CENRTC portion contained under WBS 1.3.2, Project Control.

FY96 Plan

The majority of QA activities prior to Start-Up and Activation are covered under CENRTC cost elements. Minimal support is identified in operations beginning in the 2nd Quarter of FY97.

Budget

FY96 Spending profile for remainder of FY (\$K, OPEX)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	0	0	0	0	0	0	0

Total Element Costs to Date (thru 3/96): \$127K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, OPEX): \$1K
Total Procurements: None

FY98

Total Budget (\$K, OPEX): \$31K
Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
None	Level-of-effort activity	

WBS Element 1.1.2. PSAR

Task Description

The *Preliminary Safety Analysis Report* (PSAR) provides the integration of safety input, design reviews, and safety analysis for MWMF Project. Safety analysis includes analysis, generation of documentation, and documentation review and approval. The element includes the generation of the PSAR, which must be completed prior to major procurements and follow-on analysis required for the generation of the *Final Safety Analysis Report* (FSAR). The FSAR is required after construction and prior to operation.

FY96 Plan

PSAR to be revised for Building 292 during FY96. No activities are planned for FY97/98.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	0	0	9.3	9.3	0	0	18.6

Total Element Costs to Date (thru 3/96): \$367K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
E112-1	Complete revised PSAR safety assessment for B292	Aug 96

WBS Element 1.1.3 Environmental Documentation

Task Description

The National Environmental Policy Act (NEPA) portion of this WBS element provides for the preparation of the *Environmental Assessment* (EA) and all required follow-up documentation required by DOE to make a determination about impacts. The effort includes preliminary evaluations, preparation of technical information, EA preparation, and comment resolution.

The California Environmental Quality Act (CEQA) and permitting portion of this WBS element provide for the preparation of permit applications and associated environmental analysis to support the regulatory agency permitting and CEQA review process. The effort includes preliminary evaluations, preparation of technical information to support the agency CEQA document and permit evaluation, and comment resolution. This element prepares and coordinates approval of State and local permits and supports public participation activities associated with the permit approvals.

FY96 Plan

Environmental specialists will continue to provide assistance to Project staff to interface with regulatory agencies, prepare necessary documentation such as air permit applications, and advise on hazardous waste management regulations. Documentation will pertain to operations in Building 292 with surrogate feeds and actual waste within treatability study limits.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	0.3	0.2	1.4	7.2	2.8	1.9	13.8

Total Element Costs to Date (thru 3/96): \$385K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, CENRTC): \$10K

Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$0K

Total Procurements: None

Milestones and Markers

<u>ID No.</u>	<u>Milestone/Marker</u>	<u>Scheduled Date</u>
C113-1	Authorization to construct issued by BAAQMD	Oct 96
E113-1	Submit air permit to BAAQMD	Aug 96

WBS Element 1.1.4. ES&H

Task Description

ES&H provides for on-going Environment, Safety, and Health (ES&H) representation to the MWMF Project by ES&H specialists 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.

FY96 Plan

ES&H specialists, as requested, will provide review and guidance to MWMF staff on proposed designs to ensure that activities are performed in a safe and compliant manner.

Budget

FY96 Spending profile for remainder of FY (\$K, OPEX)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	-0.9	0.0	3.7	3.7	3.7	3.7	13.9

Total Element Costs to Date (thru 3/96): \$388K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, OPEX): \$18K

Total Procurements: None

FY98

Total Budget (\$K, OPEX): \$56K

Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
None	Level of effort activity	

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, facility technical support, and OPEX-funded technical support.

FY96 Plan

Management functions covered under this element will be maintained at a minimum. These include, but are not limited to, the following: developing project plans, budgets and schedules; placing personnel; ensuring housing/office requirements for MWMF personnel; developing industrial participation; and providing for technical support to the Project office.

Budget

FY96 Spending profile for remainder of FY (\$K, OPEX)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	8.2	5.7	4.8	2.5	0	0	21.2

Total Element Costs to Date (thru 3/96): \$2,294K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, OPEX): \$24K

Total Procurements: None

FY98

Total Budget (\$K, OPEX): \$29K

Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
E115-1	Submit FY96 Plan/Project Baseline Revision 2.2	Jul 96

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 Review Panel (NRP), a community newsletter (the *MWMF Letter*), and preparation and coordination of press releases and community tours.

FY96 Plan

Public Participation will continue to support public interactions including the National Review Panel(NRP), public meetings, and newsletters, however, at a significantly reduced funding level. This element will address interactions with the DTSC for establishing a California Certification Program.

Budget

FY96 Spending profile for remainder of FY (\$K, OPEX)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	2.4	1.0	5.0	5.0	5.0	5.0	23.4

Total Element Costs to Date (thru 3/96): \$129K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, OPEX): \$74K

Total Procurements: None

FY98

Total Budget (\$K, OPEX): \$20K

Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
E116-2.1	NRP Meeting	Jun 96
E116-2	ETD Letter	Jul 96
E116-1.1	NRP Meeting	Jan 97
E116-1	ETD Letter	Feb 97

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.

FY96 Plan

The Conceptual Design element is complete. No FY96/FY97 activities.

Budget

FY96 Spending profile for remainder of FY (\$K, OPEX)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	0	0	0	0	0	0	0

Total Element Costs to Date (thru 3/96): \$2,235K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, OPEX): \$0K
Total Procurements: None

FY98

Total Budget (\$K, OPEX): \$0K
Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
None	No activity	

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.

FY96 Plan

The scope/budget of this element has been reduced as a result of the reduced scope of the project. Plant Start-Up activities will begin during the construction and staging phase of the Project when participation in, and review of, the MWMF systems from an operational viewpoint commence. Conceptual development of operational methodology, organization, operational and acceptance testing, maintenance, etc., are required to support this effort. Consideration of operational activities to comply with regulatory requirements in support of permitting activities will also occur.

Budget

FY96 Spending profile for remainder of FY (\$K, OPEX)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	0	0	0	0	0	0	0

Total Element Costs to Date (thru 3/96): \$1K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, OPEX): \$0K
Total Procurements: None

FY98

Total Budget (\$K, OPEX): \$191K
Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
E122-1	Issue ETD Start-Up and Activation Plan	Mar 97
E122-2	Facility Safety Procedure Approved	Feb 97

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 OTPs including *Operational Readiness Reviews* (ORRs); (3) technical support for the preparation of *Operational Safety Requirements* (OSRs) and *Facility Safety Requirements* (FSRs), as well as 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 Expedited Technology Demonstration.

FY96 Plan

The scope/budget of this element has been reduced as a result of the reduced scope of the project. Activities will be focused on preparation of documentation for obtaining approvals for facility operation, equipment operation, and operations training.

Budget

FY96 Spending profile for remainder of FY (\$K, OPEX)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	0	0	0	0	0	0	0

Total Element Costs to Date (thru 3/96): \$0K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, OPEX): \$128K
Total Procurements: \$127.9K Building OFC

FY98

Total Budget (\$K, OPEX): \$513K
Total Procurements: \$219.3K Building OFC

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
E123-1	Operational Safety Procedure Approved	Apr 97
E123-2	Operational Test Procedure Approved.	Jul 97

WBS Element 1.3.1. Project Management

Task Description

Project Management provides top-level project planning, direction, and control of the MWMF Project 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.

FY96 Plan

This effort will encompass project management of the CENRTC phase of the MWMF Project. This is essentially a level-of-effort funded activity covering Project management personnel and clerical, administrative, and technical support. Support for key Project reviews is also included. The FY96 Plan calls for project management oversight of all capital-funded technical and administrative activities, placing personnel, response to DOE requests for information, project scope and budget reassessment, and other management controls to assure effective completion of the milestones and markers of the Project. These efforts will be maintained at a level appropriate for the downsized Project.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	51.9	67.7	54.1	40.3	41.4	39.5	294.9

Total Element Costs to Date (thru 3/96): \$1,071K.

Estimated Liens into FY97: None

Major FY96 Procurements

\$165.1K Office OFC

FY97

Total Budget (\$K, CENRTC): \$481K
Total Procurements: \$322.0K Office OFC

FY98

Total Budget (\$K, CENRTC): \$277K
Total Procurements: \$154.0K Office OFC

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
D131-1	DOE Issues KD-2 reduced scope	Complete
E131-1	Final Design Review complete	Oct 96

WBS Element 1.3.2. Project Control

Task Description

Project Control provides for the Project integration, configuration management, cost and schedule control, QA (see WBS 1.1.1), and administration of the CENRTC-funded systems. It develops and maintains the management systems used to monitor progress against the established baselines and to ensure configuration control (drawings, documents, etc.).

FY96 Plan

Essential cost, schedule, and technical baseline control using manual and automated interfaces will be provided at a level appropriate for the downsized Project. Activities will include preparation of the Project Baseline Revision 2.2, the FY96 Plan, monthly reports, and other documentation required by DOE. QA procedures that are necessary for the design phase of the Project will be prepared and implemented.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	33.1	-12.5	5.8	5.8	8.8	5.8	46.8

Total Element Costs to Date (thru 3/96): \$723K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, CENRTC): \$64K

Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$28K

Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
E132-2.1	Complete support of Project Final Design Review	Oct 96

WBS Element 1.3.3. Technical Systems Integration

Task Description

Technical Systems Integration provides the oversight 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 covers technical issues that affect all primary and support processes. It also includes the responsibility for assuring that the systems interfaces are addressed in the final design, including interfaces with LLNL Hazardous Waste Management and facility engineering. The element coordinates the Building 292 upgrade, the facility floor plan, and the Integrated Operating Plan.

FY96 Plan

Technical Systems Integration will continue to coordinate technical issues that affect all primary and support processes as well as facility interfaces, and the review of the Facility design to ensure the project needs are addressed in the most effective manner. Specifically in FY 96 this effort will be directed to provide facility utilities and equipment arrangements defined in support of the Building 292 upgrade. Work will also be directed to ensure equipment design of the primary and support processes proceed effectively within cost and schedule guidelines. The effort in FY 97 will be focused on the Building 292 upgrade, I&C software licenses, and the assembly of the process equipment.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	7.8	49.1	14.2	14.8	14.3	14.3	114.5

Total Element Costs to Date (thru 3/96): \$480K.

Estimated Liens into FY97: \$135K (SAIC at 75% for the year)

Major FY96 Procurements

None

FY97

Total Budget (\$K, CENRTC): \$195K
Total Procurements: \$183.2K SAIC

FY98

Total Budget (\$K, CENRTC): \$165K

Total Procurements: \$163.4K SAIC

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
E133-1	Complete GPP Application for B292	Complete
E133-2	Configuration Design Finalized	Aug 96
E133-3	Final Review of B292 design	Sep 96
E133-4	Final Design Review of equipment	Oct 96
E133-5	Begin B292 construction	Oct 96
E133-6	Complete B292 construction	Dec 96
E133-7	Begin assembly/staging in B292	Jan 97
E133-8	System Operations Review complete	Mar 97
E133-9	Checkout/Testing complete	Jul 97

WBS Element 1.4.1. Receiving and Shipping

Task Description

The principal objective of the Receiving and Shipping (RAS) 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. RAS provides the management, system analysis and support, design (Title I, II, III) engineering, procurement, installation of RAS equipment, Title III inspection, and acceptance test procedures (ATP). RAS includes both receiving and shipping equipment and systems integration.

FY96 Plan

This element is closed for the reduced scope project. Receiving and shipping will be an operational function with space allocated in the high bay area of B292 for temporary storage of materials. Effort for FY96 includes updating the Process & Instrumentation Diagram's, Process Flow Diagram, Block Flow Diagram, and Functional Requirements Document as documentation for close out.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	6.8	-2.3	0	0	0	0	4.5

Total Element Costs to Date (thru 3/96): \$123K.

Estimated Liens into FY97:

Major FY96 Procurements

None

FY97

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
None	No activity	

WBS Element 1.4.2. Feed Preparation

WBS Element 1.4.2 has been divided into Feed Preparation and Demonstration Feed Preparation (Telerobotic Sorting, TRS) activities. Although at the fourth level WBS TRS activities are reported separately under 1.4.2.2.

Task Description

The principal objective of the Feed Preparation (FP) system is to provide for the receipt and preparation for processing of homogeneous and heterogeneous solids and homogeneous liquids received from LLNL Hazardous Waste Management. This includes processing the incoming combustible solids waste/surrogate items and combustible liquid waste/surrogate into a form required by the MSO demonstration. The decontamination system provides necessary equipment to ensure materials/containers can be safely transferred out of the facility. FP provides the management, system analysis and support, design (Title II, III) engineering, procurement, installation of FP equipment, Title III inspection, and acceptance test procedures (ATP).

FY96 Plan

Final design of the FP system will be accomplished by September 1996 which includes the specifications for the sorting, shredding, pelletizing, centrifuging and radiation detection equipment and enclosures. The design of the local instrumentation and control system will also be completed in concert with the FFM system, as these two systems will share the same workstation. There are no long lead items identified and the only major equipment item is the solid/liquid centrifuge. For this effort, it is assumed that some of the original requirements for conventional feed preparation no longer exist. For example, there will be no drum washers or equipment decontamination enclosure, just an area where swipes can be taken and limited decontamination of the outside surface of the container is accomplished. Also, there will be no gas monitoring of drums either for explosives or tritium as it is assumed all incoming waste containers from HWM will be fully characterized as to container contents.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	6.5	6.1	9.2	9.2	21.2	140.7	192.9

Total Element Costs to Date (thru 3/96): \$160K.

Estimated Liens into FY97: \$140K (SAIC at 25% for next year and equipment)

Major FY96 Procurements

Item	Estimated Cost (\$K)	Estimated Order Date
Solid/liquid Centrifuge	45.0	6/30/96

FY97

Total Budget (\$K, CENRTC): \$91K
Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$220K
Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
E142-1	Complete floor plan layout for feed preparation	Complete
E142-2	Complete specification and order Solid/Liquid Centrifuge Complete	
E142-3	Final Design Review of Feed Preparation equipment	Oct 96
E142-4	Complete all other equipment specifications and orders	Nov 96
E142-5	Complete local control design	Dec 97
E142-6	Begin assembly/staging in B292	Jan 98
E142-7	Checkout/Testing Complete	Jul 98

WBS Element 1.4.2.2 Telerobotics Sorting

Task Description

The principal objective of the rebaselined Telerobotics Sorting (TRS) system within Solids Feed Prep is to demonstrate an engineering prototype telerobotic sorting and characterization system and evaluate its applicability to sites across the DOE complex. In a deployed system, TRS would interface with SFP container receiving and conventional size reduction and segregation equipment and replaces manual (hands-on) sorting and container handling operations in the potentially contaminated process room. TRS primary functions include drum movement; waste characterization; segregation of the incoming waste stream into bulk streams containing predominantly organic solids, heterogeneous solids, homogeneous inorganic solids and metals, and liquids not previously identified; and repackaging of reject materials. TRS provides the management, system analysis and support, design (Title I, II) engineering, procurement, installation of TRS prototype equipment. TRS includes both equipment and systems integration.

FY96 Plan

Complete the design and development of the engineering prototype telerobotic sorting system for evaluation by operators unfamiliar with the technology by the end of FY96. Functions that will be implemented include the telerobotic manipulation system with preplanned and automated path planning, force queuing, and the operator interface for waste characterization and sorting. Complete the design documentation for the prototype system including the functional requirements document and system design description. Document all outstanding technical issues and prepare recommendations for Title III design improvements. Perform demonstrations for potential users and sponsors.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	41.1	40.2	40.8	148.2	86.2	31.8	388.3

Total Element Costs to Date (thru 3/96): \$1,297 K.

Estimated Liens into FY97: None

Major FY96 Procurements

Item	Estimated Cost (\$K)	Estimated Order Date
Tool changer	90	7/96
Drum emptying tools	15	8/96
Drum dumper actuator and mounting hardware	30	8/96

FY97

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
E1422-1.1	Robust telerobotics operational w/o graphics interface	Jun 96
E1422-1.2	Collision-free path planning operational	Aug 96
E1422-1.3	Prototype sorting application operational	Aug 96
E1422-1	TRS Title II design documentation complete	Sep 96

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 received from storage and other processes in the facility. This includes segregating the incoming waste stream into aqueous with Trimsol, chlorinated organic liquids, oils, solvents, and scintillation cocktails. 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.

FY96 Plan

This element is closed for the reduced scope project and critical activities are included in WBS 1.4.2, Feed Preparation. Liquids Feed Preparation will consist of only the functions to remove contents from the drum, clean particulates from the liquid stream, and provide liquid batch to support operations of the MSO primary system. Effort for FY96 in this "closed element" includes updating the Process & Instrumentation Diagram's, Process Flow Diagram, Block Flow Diagram, and Functional Requirements Document as documentation for close out.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	0.4	0.2	0	0	0	0	0.6

Total Element Costs to Date (thru 3/96): \$433K.

Estimated Liens into FY97:

Major FY96 Procurements

None

FY97

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
None	No activity	

WBS Element 1.5.1. Mediated Electrochemical Oxidation

Task Description

The principal objective of Mediated Electrochemical Oxidation (MEO) system 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 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.

FY96 Plan

This task has been closed out per DOE guidance. No FY96/FY97 activities

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	4.0	2.4	0	0	0	0	6.4

Total Element Costs to Date (thru 3/96): \$1,441K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
None	No activity	

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 MSO equipment, Title III inspection, and acceptance test procedures (ATP) covering both equipment and system integration activities.

FY96 Plan

This plan provides for the design, construction and check out of a MSO system including offgas and salt recycle.

A configuration design will be generated followed by a review which will freeze and control the design. Final design will be completed. Long lead procurements will begin as soon as the design is to the point of defining them. Equipment and material will be staged until assembly begins. The system will be modular to allow for easy transport from the staging area to B-292 where final assembly and installation will take place. All components and systems will be checked out in anticipation of operation.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	108.9	120.0	137.2	403.4	776.1	339.5	1885.1

Total Element Costs to Date (thru 3/96): \$3,277K.

Estimated Liens into FY97: \$650K

Major FY96 Procurements

Item	Estimated Cost (\$K)	Estimated Order Date
Vessel	60	6/15/96
Heater elements	25	6/15/96
Frame	49	8/1/96
Salt clean up skid (s)	340	8/26/96
Filter system	30	8/12/96

Spray dryer	150	9/9/96
I&C hardware	25	9/9/96
Gas analyzers	25	6/15/96
Gas/solids filter	60	9/1/96
Catalytic converter	127	8/1/96
Piping, hangers, insulation	27	9/1/96

Minor procurements for FY96 total \$307K

FY97

Total Budget (\$K, CENRTC): \$936K

Total Procurements: \$129K

FY98

Total Budget (\$K, CENRTC): \$283K

Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
E152-1	Complete configuration design	Jun 96
E152-2	Vessel order placed	Jul 96
E152-3	Final design complete	Oct 96
E152-4	Start move to B-292	Jan 97
E152-5	Staging complete	Mar 97
E152-6	Operational review	May 97
E152-7	System ready for operation	Aug 97

WBS Element 1.5.3. Wet Oxidation

Task Description

The principal 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.

FY96 Plan

This task has been closed out per DOE guidance. No FY96/FY97 activities.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	0.4	0	0	0	0	0	0.4

Total Element Costs to Date (thru 3/96): \$99K.

Estimated Liens into FY97:

Major FY96 Procurements

None

FY97

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
None	No activity	

WBS Element 1.5.4. UV Photolysis

Task Description

The principal objective of UV 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.

FY96 Plan

This task has been closed out per DOE guidance. No FY96/FY97 activities.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	0	0	0	0	0	0	0

Total Element Costs to Date (thru 3/96): \$24K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
None	No activity	

WBS Element 1.5.5. Experimental Off-Gas

Task Description

The principal objective of the Experimental Off-Gas Treatment (XOGT) element 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, acidic urea DeNO_x scrubbing, and advanced metal filters. The second objective is to demonstrate feasibility and effectiveness of off-gas treatment at or near to the source of the gas where the treatment can be tailored to that specific source. 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 facility off-gas system.

FY96 Plan

This task has been closed out per DOE guidance. No FY96/FY97 activities.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	0	0	0	0	0	0	0

Total Element Costs to Date (thru 3/96): \$223K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$0K

Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
None	No activity	

WBS Element 1.6.1. Process Transport and Storage

Task Description

The principal objective of the Process Transport and Storage (PT&S) system is to collect, transfer, deposit, store and handle containers, discrete items, dry and wet bulk materials, slurries, and liquids. PT&S provides 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). PT&S includes both process transport and storage equipment and systems integration.

FY96 Plan

This task has been closed out per DOE guidance. No remaining FY96 or FY97 activities.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	6.2	0.3	0	0	0	0	6.5

Total Element Costs to Date (thru 3/96): \$108K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
None	No activity	

WBS Element 1.6.2. Process Diagnostic Services

Task Description

The principal objective of the Process Diagnostic Services element is to provide chemical analysis support for process control and characterization, material control, and regulatory requirements. Process Diagnostic Services provides the management, system analysis and support, and design (Title II, III) engineering.

FY96 Plan

The Process Diagnostic Services element will provide a level of effort support to the Expedited MSO Demonstration in the area of on-line and at-line instrumentation for analytical data.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	8.8	8.6	10.7	10.7	10.7	10.7	60.2

Total Element Costs to Date (thru 3/96): \$174K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, CENRTC): \$108

Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$0K

Total Procurements: None

ID No.	Milestone/Marker	Scheduled Date
None	Level of effort	

WBS Element 1.6.3. Water Treatment

Task Description

Water Treatment is an integral part of treatment train demonstrations, continuing treatment of aqueous byproducts as part of demonstration tests to produce solid residuals suitable for Final Forms and fully treated water that meets treatment standards and sewer limits. The Water Treatment element provides the management, system analysis and support, design and engineering (Title I, II, III), procurement, and installation of the Water Treatment equipment necessary to demonstrate treatment trains, Title III inspection, and acceptance test procedures (ATP) covering both equipment and system integration activities.

FY96 Plan

This task has been close out per DOE guidance. No remaining FY96 or FY97 activities.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	2.5	0.1	0	0	0	0	2.6

Total Element Costs to Date (thru 3/96): \$93K.

Estimated Liens into FY97: None

Major FY96 Procurements

None

FY97

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$0K
Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
None	No activity	

WBS Element 1.6.4. Final Forms

Task Description

The Final Forms task is to immobilize the solid residues from the treatment of the mixed waste input streams by the primary process (MSO), and solid wastes resulting from secondary support processes that are integral to the primary treatment processes. The main task is immobilization of mineral residues in ceramic waste forms. Minor tasks are the immobilization of volatile inorganic solid (VIS) residues by microencapsulation in sulfur-polymer cement (SPC), and a "paper" design for microencapsulation of salt residues in polyethylene.

FY96 Plan

Key elements of the task are the following: (1) Completion of ceramic material and process designs, including new requirements associated with sulfides from the Salt Recycle process; (2) completion of facility design, including special equipment such as the rotary calciner; (3) completion of the thermoplastic/salt and SPC/VIS designs; (4) procurement of all equipment, including ceramic, ancillary and LI&C; (5) installation and testing of facility components; and (6) documentation and training.

Approximately 90% of procurements will be placed in FY96. The rotary calciner will be installed as early as possible (Jan 97), so that the combined drying-calcining-granulation process can be developed. A primitive computer recipe-writer for ceramic formulations will be written in early FY97.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	24.6	23.3	82.1	30.5	44.9	301.3	506.7

Total Element Costs to Date (thru 3/96): \$961K.

Estimated Liens into FY97: ~\$250K

Major FY96 Procurements (>\$25K, w/taxes, w/o MR)

Item	Estimated Cost (\$K)	Estimated Order Date
Pellet press	88.0	7/1/96
Rotary calciner	99.0	8/1/96

FY97

Total Budget (\$K, CENRTC): \$165K

Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$267K

Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
E164-1	Transition from old to new MWMF concept complete	Jul 96
E164-2.1	Salt/thermoplastic waste form (paper) design complete	Sep 96
E164-2.2	SPC waste form design complete	Nov 96
E164-2.3	Ceramic material design complete	Nov 96
E164-2.4	Recipe-writer complete	Dec 96
E164-2.5	Ceramic process design complete	Mar 98
E164-2	Final Forms designs complete	Apr 98
E164-3.1	Rotary calciner specs complete	Aug 96
E164-3.2	FY96 procurements orders placed	Sep 96
E164-3	Most (~95%) of task equipment received	Dec 96
E164-4.1	Rotary calciner installed and operational for non-hazardous operations	Feb 97
E164-4	All equipment installed and operational	Jun 98
E164-5	Documentation complete	Sep 98

WBS Element 1.6.5. Supervisory Instrumentation and Control

Task Description

Supervisory Instrumentation and Control (I&C) systems will be provided and integrated to 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 Facility database management, safety control, process I&C standards, supervisory control, and ancillary systems and equipment including the instrumentation and equipment database, intercom communication, process and surveillance CCTV, cable and power distribution and grounding, and control room facilities.

FY96 Plan

This task has been closed out per DOE guidance. No FY96/FY97 activities

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan	34.2	23.2	0	0	0	0	57.4

Total Element Costs to Date (thru 3/96): \$1,205K.

Estimated Liens into FY97:

Major FY96 Procurements

None

FY97

Total Budget (\$K, CENRTC): \$0K

Total Procurements: None

FY98

Total Budget (\$K, CENRTC): \$0K

Total Procurements: None

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
None	No activity	

3.0 Cost Summary reports

Section	Description	Page
3.1	Revision 2.2 Cost Reconciliation	51
3.2	Project Cost Summary, Unescalated without MR	52
3.3	Project Cost Summary, Unescalated with MR	53
3.4	Project Cost Summary, Escalated with MR	54

Expedited Technology Demonstration Project Rebaseline 2.2

Unescalated Cost Reconciliation Summary at WBS Level 3

WBS Elements		Expended thru 3/96 (\$K)	Cost to Complete		TOTAL (\$K)	TOTAL Prior Rev 1.2 (\$K)	Cost Reconciliation & Comments
			Base (\$K)	Mngt Res (\$K)			
1.1.1	QA	127	33	0	159	255	Significant reduction in scope from Rev. 1.2
1.1.2	PSAR	367	19	2	387	361	PSAR revised for B292 during FY96
1.1.3	Envir. Documen.	385	23	1	410	776	Significant reduction in scope from Rev. 1.2
1.1.4	ES&H	388	87	0	475	803	Significant reduction in scope from Rev. 1.2
1.1.5	Prog. Support	2,294	75	0	2,369	3,662	Significant reduction in scope from Rev. 1.2
1.1.6	Public Part.	129	117	0	246	407	Significant reduction in scope from Rev. 1.2
1.2.1	Concept. Design	2,235	0	0	2,235	2,235	Activity completed in FY94
1.2.2	Start-Up Mgmt.	1	191	10	202	1,905	Significant reduction in scope from Rev. 1.2
1.2.3	Activation	0	641	20	661	4,729	Significant reduction in scope from Rev. 1.2
1.3.1	Proj. Mgmt.	1,071	1,052	93	2,216	3,577	Significant reduction in scope from Rev. 1.2
1.3.2	Proj. Control	723	139	0	862	2,336	Significant reduction in scope from Rev. 1.2
1.3.3	Tech. Integration	480	474	24	977	1,457	Significant reduction in scope from Rev. 1.2
1.4.1	Receiving & Ship.	123	5	0	128	415	Activity closed for reduced scope project
1.4.2	Solids Feed Prep.	1,457	892	25	2,374	5,926	Significant reduction in scope from Rev. 1.2
1.4.3	Liquids Feed Prep.	433	1	0	433	2,069	Activity closed for reduced scope project
1.5.1	MEO	1,441	6	0	1,448	6,707	Activity closed for reduced scope project
1.5.2	MSO	3,277	3,104	150	6,531	9,352	Significant reduction in scope from Rev. 1.2
1.5.3	Wet Oxidaton	99	0	0	99	99	Activity closed in Revision 1.2
1.5.4	UV Photolysis	24	0	0	24	24	Activity closed in Revision 1.2
1.5.5	Expt. Off-Gas	223	0	0	223	473	Activity closed for reduced scope project
1.6.1	Transp. & Storage	108	7	0	115	765	Activity closed for reduced scope project
1.6.2	Process Diag. Ser.	174	168	0	342	1,907	Significant reduction in scope from Rev. 1.2
1.6.3	Water Treatment	93	3	0	95	1,194	Activity closed for reduced scope project
1.6.4	Final Forms	961	939	30	1,930	2,471	Significant reduction in scope from Rev. 1.2
1.6.5	Supervisory I&C	1,205	57	0	1,262	3,293	Activity closed for reduced scope project
	Other: LDRD	342	0		342	342	No longer charged LDRD
	OPEX SUBTOTAL	5,777	1,143	30	6,950	14,562	
	CENRTC SUBTOTAL	12,382	6,889	325	19,596	42,980	
	PROJECT TOTAL	18,159	8,031	355	26,545	57,542	

Expedited Technology Demonstration Project Rebaseline 2.2

Cost Summary

Unescalated, without Management Reserve

WBS No.	Title		Actual FY93	Actual FY94	Actual FY95	FY96 Actual Oct -Mar	FY96 estimate Apr-Sep	FY97 estimate	FY98 estimate	Cost To Date	Cost To Complete	TOTAL = EAC \$K
1.1			0	2687.8	775.2	227.2	90.9	126.6	135.2	3690.2	352.7	4042.9
1.1.1	QA	O		105.2	15.9	5.5	0.0	1.3	31.3	126.6	32.6	159.2
1.1.2	PSAR		0	341.9	25	0.0	18.6	0.0	0.0	366.9	18.6	385.5
	PSAR/OE	O		341.9	9.9					351.8	0.0	351.8
	PSAR/CE	C			15.1	0.0	18.6	0.0	0.0	15.1	18.6	33.7
1.1.3	NEPA/CEQA		0	189.7	190.4	5.3	13.8	9.6	0.0	385.4	23.4	408.8
	NEPA(&permit<95)	O		189.7	61.4	0.0	0.0	0.0	0.0	251.1	0.0	251.1
	Permits	C			129	5.3	13.8	9.6	0.0	134.3	23.4	157.7
1.1.4	ES&H	O		135.9	142.7	109.4	13.9	17.5	55.5	388.0	86.9	474.9
1.1.5	Prog. Support	O		1903.7	309.8	80.6	21.2	24.4	28.9	2294.1	74.5	2368.6
	MR, CO, etc.	O								0.0	0.0	
1.1.6	Public Part.	O		11.4	91.4	26.4	23.4	73.8	19.5	129.2	116.7	245.9
1.2			483	1753.9	-1.6	0.9	0.0	127.9	704.2	2236.2	832.1	3068.3
1.2.1	Concept. Design	O	483	1753.9	-1.6	0.0	0.0	0.0	0.0	2235.3	0.0	2235.3
1.2.2	Start-up Mgmt	O			0	0.9	0.0	0.0	191.2	0.9	191.2	192.1
1.2.3	Activation	O			0	0.0	0.0	127.9	513.0	0.0	640.9	640.9
1.3			0	431.8	1225.4	616.1	456.2	739.6	469.3	2273.3	1665.1	3938.4
1.3.1	Proj. Mgmt	C		168.5	539.5	362.8	294.9	480.7	276.8	1070.8	1052.4	2123.2
	MR, CO, etc.	C								0.0	0.0	
1.3.2	Proj. Control	C		156.9	448.3	117.8	46.8	64.4	27.6	723.0	138.8	861.8
1.3.3	Tech. Integ.	C		106.4	237.6	135.5	114.5	194.5	164.9	479.5	473.9	953.4
1.4			0	331.7	1300.1	381.4	586.2	90.8	220.3	2013.2	897.3	2910.5
1.4.1	Rec. & Ship	C		30.4	81.6	11.4	4.5	0.0	0.0	123.4	4.5	127.9
1.4.2	SFP-Conv.	C		15.8	108.6	36.0	192.9	90.8	220.3	160.4	504.0	664.4
	SFP-TRS			142.6	867.1	287.0	388.3	0.0	0.0	1296.7	388.3	1685.0
1.4.3	UFP	C		142.9	242.8	47.0	0.6	0.0	0.0	432.7	0.6	433.3
1.5			0	1384.6	2827.5	851.7	1891.9	936.0	282.7	5063.8	3110.6	8174.4
1.5.1	MEO	C		716.8	721.1	3.3	6.4	0.0	0.0	1441.2	6.4	1447.6
1.5.2	MSO	C		438.0	1990.7	848.0	1885.1	936.0	282.7	3276.7	3103.8	6380.5
1.5.3	WOX	C		97.7	0.5	0.4	0.4	0.0	0.0	98.6	0.4	99.0
1.5.4	UVP	C		24.0	0.3	0.0	0.0	0.0	0.0	24.3	0.0	24.3
1.5.5	XOG	C		108.1	114.9	0.0	0.0	0.0	0.0	223.0	0.0	223.0
1.6			0	938.3	1104.9	496.9	633.4	272.8	267.3	2540.1	1173.5	3713.6
1.6.1	Transp. & Storage	C		26.3	70	11.7	6.5	0.0	0.0	108.0	6.5	114.5
1.6.2	Process Diag. Ser.	C		36.0	98.8	38.7	60.2	108.1	0.0	173.5	168.3	341.8
1.6.3	Water Treat.	C		32.0	22.7	38.0	2.6	0.0	0.0	92.7	2.6	95.3
1.6.4	Final Forms	C		367.0	391.8	202.1	506.8	164.7	267.3	960.9	938.8	1899.7
1.6.5	Supv. I&C	C		477.0	521.6	206.4	57.4	0.0	0.0	1205.0	57.4	1262.4
	LDRD/CE	C	0	342	0	0	0	0	0	342.0		342.0
	OPEX SUBTOTAL	O	483	4441.7	629.5	222.8	58.5	244.9	839.4	5777.0	1142.8	6919.8
	CENRTC SUBTOTAL	C	0.0	3428.4	6602.0	2351.4	3600.2	2048.8	1239.6	12381.8	6888.6	19270.4
	UNESC. PROJECT TOTAL		483	7870.1	7231.5	2574.2	3658.68	2293.71	2079	18159	8031	26190

Expedited Technology Demonstration Project Rebaseline 2.2

Cost Summary

Unescalated, with Management Reserve

WBS No.	Title		Actual FY93	Actual FY94	Actual FY95	FY96 Actual Oct-Mar	FY96 estimate Apr-Sep	FY97 estimate	FY98 estimate	Cost To Date	Cost To Complete	TOTAL = EAC \$K
1.1			0	2687.8	775.2	227.2	93.5	127.0	135.2	3690	356	4046
1.1.1	QA	O	0	105	16	6	0	1	31	127	33	159
1.1.2	PSAR		0	341.9	25	0.0	20.5	0.0	0.0	367	20	387
	PSAR/OE	O	0	342	10	0	0	0	0	352	0	352
	PSAR/CE	C	0	0	15	0	20	0	0	15	20	36
1.1.3	NEPA/CEQA		0	189.7	190.4	5.3	14.5	10.0	0.0	385	25	410
	NEPA (&CEQA<95)	O	0	190	61	0	0	0	0	251	0	251
	CEQA/Permits	C	0	0	129	5	14	10	0	134	25	159
1.1.4	ES&H	O	0	136	143	109	14	18	56	388	87	475
1.1.5	Prog. Support	O	0	1904	310	81	21	24	29	2294	75	2369
	MR, CO, etc.	O	0	0	0	0	0	0	0	0	0	0
1.1.6	Public Part.	O	0	11	91	26	23	74	20	129	117	246
										0	0	
1.2			483	1753.9	-1.6	0.9	0.0	157.9	704.2	2236	862	3098
1.2.1	Concept. Design	O	483	1754	-2	0	0	0	0	2235	0	2235
1.2.2	Start-up Mgmt	O	0	0	0	1	0	10	191	1	201	202
1.2.3	Activation	O	0	0	0	0	0	148	513	0	661	661
										0	0	
1.3			0	431.8	1225.4	616.1	487.0	792.6	502.7	2273	1782	4056
1.3.1	Proj. Mgmt	C	0	169	540	363	320	524	302	1071	1146	2216
	MR, CO, etc.	C	0	0	0	0	0	0	0	0	0	0
1.3.2	Proj. Control	C	0	157	448	118	47	64	28	723	139	862
1.3.3	Tech. Integ.	C	0	106	238	136	120	204	173	479	498	977
										0	0	
1.4			0	331.7	1300.1	381.4	586.2	105.8	230.3	2013	922	2936
1.4.1	Rec. & Ship	C	0	30	82	11	5	0	0	123	5	128
1.4.2	SFP-Conv.	C	0	16	109	36	193	106	230	160	529	689
	SFP-TRS		0	143	867	287	388	0	0	1297	388	1685
1.4.3	LFP	C	0	143	243	47	1	0	0	433	1	433
										0	0	
1.5			0	1384.6	2827.5	851.7	1891.9	986.0	382.7	5064	3261	8324
1.5.1	MEO	C	0	717	721	3	6	0	0	1441	6	1448
1.5.2	MSO	C	0	438	1991	848	1885	986	383	3277	3254	6531
1.5.3	WOX	C	0	98	1	0	0	0	0	99	0	99
1.5.4	UVP	C	0	24	0	0	0	0	0	24	0	24
1.5.5	XCG	C	0	108	115	0	0	0	0	223	0	223
										0	0	
1.6			0	938.3	1104.9	496.9	633.4	287.8	282.3	2540	1204	3744
1.6.1	Transp. & Storage	C	0	26	70	12	7	0	0	108	7	115
1.6.2	Process Diag. Ser.	C	0	36	99	39	60	108	0	174	168	342
1.6.3	Water Treat.	C	0	32	23	38	3	0	0	93	3	95
1.6.4	Final Forms	C	0	367	392	202	507	180	282	961	969	1930
1.6.5	Supv. I&C	C	0	477	522	206	57	0	0	1205	57	1262
										0	0	
	LDRD/CE	C	0	342	0	0	0	0	0	342	0	342
										0	0	
	OPEX SUBTOTAL		483	4442	630	223	59	275	839	5777	1173	6950
	CENRTC SUBTOTAL		0	3428	6602	2351	3633	2182	1398	12382	7214	19596
	UNESC. PROJECT TOTAL		483	7870	7231.5	2574.2	3691.97	2457.13	2237.407	18159	8387	26545

Expedited Technology Demonstration Project Rebaseline 2.2

Cost Summary Escalated with Management Reserve

WBS No.	Title		Actual FY93	Actual FY94	Actual FY95	FY96 Actual Oct -Mar	FY96 estimate Apr-Sep	FY97 estimate	FY98 estimate	Cost To Date	Cost To Complete	TOTAL = EAC \$K
1.1			0	2687.8	775.2	227.2	93.5	127.0	139.3	3690	360	4050
1.1.1	QA	O	0	105	16	6	0	1	32	127	34	160
1.1.2	PSAR		0	341.9	25	0.0	20.5	0.0	0.0	367	20	387
	PSAR/OE	O	0	342	10	0	0	0	0	352	0	352
	PSAR/CE	C	0	0	15	0	20	0	0	15	20	36
1.1.3	NEPA/CEQA		0	189.7	190.4	5.3	14.5	10.0	0.0	385	25	410
	NEPA (&CEQA<95)	O	0	190	61	0	0	0	0	251	0	251
	CEQA/Permits	C	0	0	129	5	14	10	0	134	25	159
1.1.4	ES&H	O	0	136	143	109	14	18	57	388	89	477
1.1.5	Prog. Support	O	0	1904	310	81	21	24	30	2294	75	2369
	MR, CO, etc.	O	0	0	0	0	0	0	0	0	0	0
1.1.6	Public Part.	O	0	11	91	26	23	74	20	129	117	246
1.2			483	1753.9	-1.6	0.9	0.0	157.9	725.3	2236	883	3119
1.2.1	Concept. Design	O	483	1754	-2	0	0	0	0	2235	0	2235
1.2.2	Start-up Mgmt	O	0	0	0	1	0	10	197	1	207	208
1.2.3	Activation	O	0	0	0	0	0	148	528	0	676	676
1.3			0	431.8	1225.4	616.1	487.0	792.6	517.8	2273	1797	4071
1.3.1	Proj. Mgmt	C	0	169	540	363	320	524	311	1071	1155	2225
	MR, CO, etc.	C	0	0	0	0	0	0	0	0	0	0
1.3.2	Proj. Control	C	0	157	448	118	47	64	28	723	140	863
1.3.3	Tech. Integ.	C	0	106	238	136	120	204	179	479	503	983
1.4			0	331.7	1300.1	381.4	586.2	105.8	237.2	2013	929	2942
1.4.1	Rec. & Ship	C	0	30	82	11	5	0	0	123	5	128
1.4.2	SFP-Conv.	C	0	16	109	36	193	106	237	160	536	696
	SFP-TRS		0	143	867	287	388	0	0	1297	388	1685
1.4.3	LFP	C	0	143	243	47	1	0	0	433	1	433
1.5			0	1384.6	2827.5	851.7	1891.9	986.0	394.2	5064	3272	8336
1.5.1	MEO	C	0	717	721	3	6	0	0	1441	6	1448
1.5.2	MSO	C	0	438	1991	848	1885	986	394	3277	3265	6542
1.5.3	WOX	C	0	98	1	0	0	0	0	99	0	99
1.5.4	UVP	C	0	24	0	0	0	0	0	24	0	24
1.5.5	XOG	C	0	108	115	0	0	0	0	223	0	223
1.6			0	938.3	1104.9	496.9	633.4	287.8	290.8	2540	1212	3752
1.6.1	Transp. & Storage	C	0	26	70	12	7	0	0	108	7	115
1.6.2	Anal. Lab.	C	0	36	99	39	60	108	0	174	168	342
1.6.3	Water Treat.	C	0	32	23	38	3	0	0	93	3	95
1.6.4	Final Forms	C	0	367	392	202	507	180	291	961	977	1938
1.6.5	Supv. I&C	C	0	477	522	206	57	0	0	1205	57	1262
	LRD/CE	C	0	342	0	0	0	0	0	342.0	0.0	342.0
	OPEX SUBTOTAL		483	4442	630	223	59	275	865	5777	1198	6975
	CENRTC SUBTOTAL		0	3428	6602	2351	3633	2182	1440	12382	7256	19637
	ESC. PROJECT TOTAL		483	7870.1	7231.5	2574.2	3691.97	2457.13	2304.53	18159	8454	26612

Appendix A

LLNL Proposal for Project Reconfiguration

(Letter to S. Cowan, dated May 3, 1996)

Lawrence Livermore National Laboratory

Mixed Waste Management Facility

May 3, 1996
MWMF96-024

Stephen P. Cowan
Deputy Assistant Secretary
U.S. Department of Energy
EM-30, TREV II, Rm 355
Washington, DC 20585-0002

Dear Mr. Cowan:

Enclosed is a copy of the "Cost-Benefit Analysis for the MWMF at LLNL." This report was completed at the request of EM-30 to assess the potential cost benefit of deploying a national testbed for evaluating technologies for the treatment of mixed waste, specifically, alternatives to incineration.

While the assessment reflects the analysis of the authors, we attempted to incorporate comments provided to us from the MWFA, the Options Analysis Team, and EM-50. Although there is still some debate over the cost of conducting integrated demonstrations and in the need for additional technologies and alternatives to incineration, this report provides a sound analytical basis for completing cost benefit studies. A number of approaches are taken covering a variety of possible deployment scenarios. This analysis can be extended to assess additional options as needed.

If you would like additional information on the analysis or cost basis, please call me at (510) 422-7045.

Sincerely,

Ron Streit
MWMF Project Manager

Enclosure

Recycled
7600-62365

Appendix B

Revision 2.2 Guidance

(Internal LLNL memo to MWMF Project, dated May 6, 1996)

Interdepartmental letterhead

Mail Station L - 276

Ext.: 2-7045

**MIXED WASTE MANAGEMENT FACILITY
EXPEDITED TECHNOLOGY DEMONSTRATION**

May 6, 1996
MWMF 96-025
L-22152-01

TO: Project Team

FROM: R. Streif

SUBJECT: Redirection Guidance for Expedited Technology Demonstration

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Introduction

As we are all aware, the DOE funding situation has required that they reevaluate all of their programs with a focus on reducing cost while meeting the near term waste handling and treatment requirements. It appears that, while in the long term, the MWMF will offer considerable benefit to the DOE and the country, in the near term, adequate capacity for treating the majority DOE's current inventory of mixed waste will be available with existing technologies or by the deployment of technologies from projects currently in place. As a result, the MWMF Project will redirect its efforts toward an expedited technology demonstration of an integrated molten salt oxidation system (MSO)—from feed preparation to final forms.

At the time that the MWMF was originally proposed, many of the mixed waste streams at DOE sites across the complex were ill-defined and available treatment capability—public or private—did not exist. However, the project has been significantly delayed due to non-technical issues associated with funding availability and the loss of proposed LLNL facilities (Bldg. 494). Further, DOE has issued a challenge to the private sector to take a lead position in the deployment of effective solutions to addressing mixed waste treatment needs, and this challenge largely has been met. DOE's major thrust is now to have the private sector lead in this area while providing supplemental efforts to address problematic waste streams and treatment limitations.

To address these problematic and niche wastes around the DOE complex and across the country, a compelling need remains for innovative technologies. Our effort indicates that MSO can effectively meet many of these needs. By building on our MSO R&D and the MWMF project work that we have already completed, we can very cost-efficiently accomplish an integrated system demonstration of MSO. This

University of California

**Lawrence Livermore
National Laboratory**

will provide an additional treatment technology to increase the robustness of DOE's group of technical options and will accomplish a key MWMF goal for the integrated demonstration of an alternative to incineration. It will also be beneficial to our efforts in the DOE DP and DoD programs at LLNL, which are developing high explosives, energetic materials, and hazardous waste treatment capabilities.

Toward this end, we are reconfiguring our effort, selecting a more modest set of tasks. The revised plan will focus on evaluating the engineering, regulatory and economic viability of an integrated MSO system, and in developing industrial capability to treat specific problematic wastes in the DOE complex. We will deploy and demonstrate all major system elements including: MSO primary unit with its secondary support components, e.g., salt recycle and off-gas, feed preparation, and final form stabilization of the process products. Since we will no longer be part of the DWTF complex, we have identified Bldg. 292 as the facility for the deployment of these systems.

The revised plan calls for completion of the initial phase of demonstrations in the latter months of FY97 and to continue demonstrations into FY98 with industrial support.

Because of the very tight time schedule and budget we will be under, it is critical that we move forward expeditiously and "together." I have asked Paul Densley to continue his role as the System Design Manager and oversee the Final Design and deployment effort. He will be coordinating the upgrades to Bldg. 292, and integrating all aspects of the hardware design.

The decision by DOE to redirect our efforts away from the national testbed was not an easy one. The long-term value of the MWMF Project has been recognized as the primary driver by DOE OAK and HQ. The effort that all of you have put into the project has been great. We have been redirected and rebaselined numerous times, and yet, we have been able to always produce a quality project. Staying focused on the job throughout all of the uncertainty has been exceptional. During the last two and a half years, we have turned this project into one of the best and most respected here at LLNL and the DOE. This has been a team effort that we can all be proud of.

Expedited Technology

- Demonstrate all major aspects of an MSO system, engineered for treatment facility operation (with exception of standard, off the shelf support systems)
- Deploy an integrated MSO system such that it can be transitioned to treatment of DOE mixed waste streams, and in particular, LLNL waste streams as required
- Coordinate demonstrations to support DOE's Defense Programs requirements (e.g., HE) and DoD (e.g., energetic materials and hazardous waste)
- Resolve conclusively the value of MSO as an integrated system for the treatment of mixed, radioactive and hazardous waste
  - Demonstrate preparation of solid and liquid surrogate and mixed waste streams for treatment by MSO
  - Demonstrate engineered features of molten salt system
  - Demonstrate organic destruction efficiency for both solid and liquid feeds
  - Demonstrate control and retention of toxic constituents
  - Demonstrate separation of mineral residues from spent salt
  - Demonstrate ability to clean and dry salt to meet LDR
  - Demonstrate preparation and effectiveness of ceramic final forms
  - Demonstrate encapsulation of salt residues for problematic salt streams
- Coordinate with industrial partners who will take MSO out of the lab and into the private sector

Planning Assumptions / Guidance

- Systems to be in operation in FY97 in Bldg. 292
- Facility 292 Upgrade to be conducted in first quarter FY97, and completed by January 1, 1997
- Schedule guidance is shown in Attachment 1 showing a high level overview of the major project elements. Key milestones include:

Input received for Revised Plan	5/24/96
Configuration in Bldg. 292 Finalized	6/1/96
Complete Revised Plan	6/1/96
Final design complete	10/1/96
Beneficial occupancy of Bldg. 292	1/1/97
Systems staged and ready for operation	7/15/97
- Significant reduction in project management, controls, and reporting. Monthly reporting will be streamlined to "memo" form, and budget accountability, controls, and reporting will be the direct responsibility of the PEs

- Attachment 2 delineates the budget guidance for completing this revised Project Plan. This is guidance, only, and should be used as such. It provides for a budget meeting the agreements with DOE and provides for key project design elements. To the extent possible, we are designing to cost, however, if there is concern that we cannot meet project demonstration goals or schedule, see me ASAP to discuss potential alternatives (e.g., reduced scope, shifting of funds, etc.)
- Environmental documentation will be completed so as to allow us to complete GPP upgrades and stage in Bldg. 292 by January 1997

Preparation of revised Plan Document

A revised Project Plan will be completed. This is important to clearly close off project elements which were part of the more global MWMF effort and to establish a budget starting point and scope for the remainder of the project. Using the format we have developed for the previous FY plans, we will develop a plan which encompasses 17 months—from May 1996 through September 1997. The activities for the five months in FY96 should be clearly delineated from those for FY97, as should the budget requirements. Laura will e-mail to the responsible individual the final FY96 Plan pages and the new revised plan template for updating. Attachment 3 is a copy of the new template. Your input MUST be returned to Laura by 5/24/96 for integration into the final document.

Specific Guidance

1.1.1 **Quality Assurance:** QA activities have been reprogrammed to CENRTC. Minimal support identified in operations at end of FY97.

1.1.2 **PSAR:** Activity complete in FY95. FSAR will be funded from DWTF budget. No additional funding has been identified.

1.1.3 **Environmental Documentation:** Complete documentation required for operation in Bldg. 292 with surrogate feeds and actual waste within treatability study limits.

1.1.4 **ES&H:** Effort will be on an as requested basis for reviews of design and documentation.

1.1.5 **Program Support:** Management functions covered under this element will be maintained at a minimum.

1.1.6 **Public Participation:** Public Participation will continue to support public interactions including National Review Panel, public meetings, and newsletters, however, at a significantly reduced funding level. This element will address interactions with DTSC for establishing California Certification Program.

1.2.1 **Conceptual Design:** This is a completed element. All cost accounts have been closed.

1.2.2 / 1.2.3 **Plant Start-up and Activation:** Scope/budget of these elements will be reduced as a result of the reduced scope of the project. These activities will be focused on approvals for operations (e.g., FSP and OSPs) and operations training.

1.3.1 / 1.3.2 / 1.3.3 **Project Management / Project Control / Technical Systems Integration:** Management functions covered under this element are largely level-of-effort and will be maintained at a minimum. A major component of this element is in the OFC charges for offices. This will be reduced by consolidating into one Trailer, T1877.

1.4.1 **Receiving and Shipping:** This element is closed for the reduced scope. Receiving and shipping will be an operational function with space allocated in the high-bay area of B292 for temporary storage of materials

1.4.2 / 1.4.3 **Feed Preparation:** A minimum conventional feed preparation will be deployed to support the demonstrations of MSO. The system must be capable of

preparing solid and liquid feeds of both surrogate and actual waste. Feeds will be prepared in a batch mode to support daily operations of the MSO primary system.

The demonstration feed preparation system elements is closed for the reduced scope. Funding will be included for close-out of activities or until effort is picked up by DWTF for incorporation into HWM future operations.

1.5.1 Mediated Electrochemical Oxidation: Deleted after Preliminary Design, System Design Description documentation complete.

1.5.2 Molten Salt Oxidation: This is a key element of the Expedited Technology Demonstration Project. A revised system design will be completed based on encompassing all elements of a treatment train including: feed distribution, primary reactor, offgas, and salt recycle systems. The system should demonstrate all key engineering and operation features required for final scale-up to plant size.

1.5.5 Experimental Offgas: This element is closed for the reduced scope.

1.6.1 Process Transport and Storage: This element is closed for the reduced scope.

1.6.2 Process Diagnostics Services: Effort will be on an as requested basis. Under the new scope, no new equipment will be procured for an analytical laboratory or LIMS system deployed.

1.6.3 Water Treatment: This element is closed for the reduced scope. Operations will employ use of HWM for disposition of all waste water from demonstrations.

1.6.4 Final Forms: This is a key element of the Expedited Technology Demonstration Project. The revised design effort should be directed to meeting the schedule/cost profile provided. The focus should be on ceramic final forms, however, back-up for salt polymer encapsulation should be included.

1.6.5 Supervisory Instrumentation and Control (SIC): This element is closed for the reduced scope.

Expedited Technology Demonstration Schedule

ATTACHMENT 1

REVISED PLAN Guidance
May 7, 1996

ATTACHMENT 2
Expedited Technology Demonstration Budget Guidance

REVISED PLAN Guidance
May 7, 1996

SHEET 3	TOTAL Estimate (Unsec, with MR)	(1)	Total cost thru Mar 96 \$K	FY96 estimate Apr-Sep \$K	FY97 estimate \$K
1.1.1	QA	O	127	0	31
1.1.2	PSAR		367	25	0
1.1.3	NEPA/CEQA		385	30	16
1.1.4	ES&H	O	388	29	56
1.1.5	Prog. Support	O	2294	11	53
1.1.6	Public Part.	O	129	34	74
1.2.1	Concept. Design	O	2235	0	0
1.2.2	Start-up Mgmt	O	1	0	201
1.2.3	Activation	O	0	0	390
1.3.1	Proj. Mgmt	C	1071	355	555
1.3.2	Proj. Control	C	723	50	60
1.3.3	Tech. Integ.	C	479	75	150
1.4.1	Rec. & Ship	C	123	5	0
1.4.2	SFP-Conv.	C	447	157	97
	SFP-TRS		1010	75	0
1.4.3	LFP	C	433	5	0
1.5.1	MEO	C	1441	0	0
1.5.2	MSO	C	3277	1817	1100
1.5.3	WOX	C	99	0	0
1.5.4	UVP	C	24	0	0
1.5.5	XOG	C	223	0	0
1.6.1	Transp. & Storage	C	108	3	0
1.6.2	Anal. Lab.	C	174	30	30
1.6.3	Water Treat.	C	93	5	0
1.6.4	Final Forms	C	961	480	330
1.6.5	Supv. I&C	C	1205	50	0
			0		
OPEX SUBTOTAL			5777	74	805
CENRTC SUBTOTAL			12382	3162	2338

ATTACHMENT 3

WBS Element x.x.x. Your Element

Task Description

This is the description for the WBS dictionary as modified, if necessary, to align with the revised project scope.

FY96/97 Plan

This paragraph should describe the elements to be completed in the last 5 months of FY96 and all of FY 97 to accomplish the task description described above, that is, how the work is to be performed.

Budget

FY96 Spending profile for remainder of FY (\$K, CENRTC)

	May	Jun	Jul	Aug	Sep	Total
Revised Plan						xxx

FY97 Spending profile (\$K, CENRTC)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Revised Plan													xxx

Total Element Costs to Date (thru 4/96): \$xxxK.

Estimated Liens into FY97: SAIC Contract \$23K.

Major FY96 Procurements

Item	Estimated Cost (\$K)	Estimated Order Date
Widget A	150.0	7/1/96
(add rows as required)		

Major FY97 Procurements

Item	Estimated Cost (\$K)	Estimated Order Date
Widget B	150.0	7/1/97
(add rows as required)		

Milestones and Markers

ID No.	Milestone/Marker	Scheduled Date
LXXX-X	Completed Wonderful Job update these to meet new plan...make them realistic, important, and attainable...this will be our contract to the DOE if not ourselves! Limit yourselves to milestones reasonably distributed and on the order of 5-8.	Jul 96

Appendix C

DOE Approval letter

(Letter to J. T. Davis, dated June 6, 1996)

10-207
200 87-201

United States Government

memorandum

DATE: JUN 6 1986

 REPLY TO
ATTN OF: EM-30

SUBJECT: Descope of the Mixed Waste Management Facility Project

Post-It™ brand fax transmittal memo 7871		# of pages: 3
To: FONS	From: GMB	
Co.	Co.	
Dept.	Phone #	
Fax #	Fax #	

ergy

TO: James T. Davis, Associate Manager for Environmental Management, Oakland Operations Office

The Office of Waste Management has received a memorandum from the Department of Energy Oakland Operations Office (DOE/OAK) outlining an option which would descope the Mixed Waste Management Facility (MWMF) project and to use the remaining uncosted funds to complete the development of Molten Salt Oxidation (MSO) as a mixed-waste treatment option and initiate other Return on Investment/Mortgage reduction projects. EM-30 has chosen this option as the most appropriate future course for the MWMF project. The purpose of this memorandum is to outline the steps to be taken to implement this option.

Ongoing changes in DOE's mixed-waste treatment strategy have required re-examination of the need for a facility to demonstrate the treatment of low-level organic mixed waste. MWMF was originally identified to be a national test bed which could provide the technical basis for the treatment of Lawrence Livermore National Laboratory (LLNL), DOE complex, and commercial low-level mixed organic waste without the use of incineration.

Since the inception of this project, the DOE's national mixed-waste treatment strategy has evolved in a new direction. The strategy has changed toward privately financed and operated treatment facilities with limited demonstrations of new technologies. Delays in the MWMF project and accelerated technology development schedules have meant that many of the new technologies necessary for treating the current backlog of wastes will be ready before the MWMF can be brought on line. DOE's current strategy is to have the private sector take the lead in addressing mixed-waste treatment needs.

We still believe that the MWMF is a worthwhile project. A centralized facility could be an effective and consistent way for the DOE to test new technologies. However, the changes in the treatment strategies now mean the project is no longer essential to meeting our treatment goals. With funding levels declining, we must give first priority to those projects that will be required for EM-30 to complete its mission, and therefore, funding to the MWMF project related to the integrated facility must be discontinued. This recommendation is consistent with the recommendation of the Mixed Waste Focus Area (MWFA). The MWFA reviewed the continued need for the MWMF project and concluded that the need for capability to demonstrate treatment alternatives to incineration will only be needed on a limited basis by the time the MWMF is operational. This limited applicability does not justify the capital expenditure required to design, construct, and permit the MWMF facility. Consequently, the MWFA recommended that the funding for the MWMF project should be discontinued.

We continue to have a high degree of interest in following through on our development work in MSO technology by completing a demonstration unit. DOE, Defense Programs (DP) and the Department of Defense (DOD) are both interested in MSO technology and are working on development efforts at LLNL that are unrelated to the MMF project. DP and DOD have expressed a willingness to share costs and development efforts for continued demonstration of MSO. The willingness of DOE DP and DOD to contribute funding for this activity demonstrates the potential of this technology (see Table I in the Attachment).

Accordingly, by this memorandum you are authorized to descope the MMF project by deleting all elements of the project except completing a demonstration of MSO as a mixed-waste treatment option. The effort should focus on off gas, salt recycle, and final forms treatment as part of an integrated demonstration using some LLNL mixed waste and/or waste from other sites. The work should be completed by the end of FY96 and managed as a demonstration project for applied technology. Two important goals of the demonstration should be to facilitate transition to a commercial entity, and to identify specific target DOE waste streams to be treated by MSO. Table I gives a breakdown of funding that is expected by source and by year. A detailed cost and schedule review should be performed as soon as possible to validate the new plans.

We support OAK's recommendation of redirecting the remaining FY96 MMF funds (approximately \$5M) to other OAK Environmental Management priority projects such as legacy waste disposal or other return on investment initiatives using a corporate approach. Funds that will not have valid work scope or be obligated this fiscal year should be returned to Headquarters in a timely manner to support other EM needs.

The LLNL Federal Facility Compliance Act Proposed Site Treatment Plan must be altered to reflect the project change. You will, of course, need to work with your regulator and other States and DOE Sites as appropriate to identify a new primary treatment option.

Given the interrelationship between the Decontamination and Waste Treatment Facility (DWTF) and the MMF, the descope of MMF will mean a rebaselining of the DWTF project. You are directed to begin the rebaselining at this time in order to be completed prior to the new project validation deadline of July 31, 1996.

If you have any questions, please call me or you may call John Neave of my staff at 301-903-7678.

Stephen P. Cowan
Deputy Assistant Secretary
for Waste Management
Environmental Management

Attachment

TABLE 1
 MSO Annual Funding Requirements

Funding Source	FY96 (\$M)	FY97 (\$M)	FY98 (\$M)	Total (\$M)
EM-30	3.5(1)	2.0(2)	2.0(3)	7.5
DOE OP	.63	0.6		1.23
DOO	.93	0.6		1.53
Commercial support (est.)	0.3	1.0	1.0	2.3
LLNL GPP		0.7		0.7
Total (\$M)	5.38	4.9	3.0	13.26

- (1) Funding required for remaining FY, not total year funds.
 Funds should be applied to:
- (2) One-time BCP should be initiated that reduces scope to MSO only,
 and converts to a demonstration project.
- (3) \$2.0M requirement not yet integrated into FY98 budget submission.

Appendix D

Project Baseline Revision Log

Record of Key Project Baseline Revisions

Revision Date: 6/1/96

Rev. No.	Rev. Date	Major Changes	Major Impacts	Comments	Total Project Cost (\$K)	Disposition
0.0	4/94	Basis for Conceptual Design and FY96 Validation	Basis for KD-1	Estimate reported by Automated Estimating System (AES).	62,761	Validated by DOE Independent Cost Validation. Approved, with directed scope & funding changes. (see Rev. 1.0)
1.0	9/95	DOE directed changes: - Delete WOX, UVP - Meet FY Funding profiles	- Phased completion - Schedule: MSO +4 mo., MEO +10 mo.	No bottom-up; revised CDR AES information	60,031	Approved by DOE/OAK.
1.1	11/94	Reflect DOE FY95 funding guidance, reduce outyear spending, merge DWTF/MWMP	Reduce FY95 work from prior baseline plan to reflect reduced outyear funding guidance	Internal Revision; schedule only, used as basis for planning FY95 work. >FY96 costs no accurate.	NA; FY95 only	Information reflected in FY95 Plan.
1.2	4/95	DOE directed changes: - Co-locate DWTF/MWMP (new construction for MWMP) - Reduce Total Project Cost - Meet FY profiles	+12 mo. delay in project completion - Modify MSO, MEO, other scope - No LDRD tax	- For FY97 Validation - Include new MSO multiple-vessel - Primavera rollup - New LLNL financial structure	59,938	Approved by DOE/OAK.
2.0	1/96	DOE directed changes: - Delete MEO - Reduce Total Project Cost - Meet flat FY profiles - New OFC charges - Single smaller MSO vessel with higher throughput.	Basis for KD-2	- New bottom-up estimate based on Title I design. - Estimate reported using Excel input spreadsheets uploaded to Primavera.	52,300	Information reflected in FY96 Plan. Submitted to DOE, however not approved resulting from significant EM funding cuts.
2.1	3/96	- Reduce scope not directed to initial demonstrations - Reduce cost	Signif. reduction in facility infrastructure.	Basis for continuing design activities in absence of DOE guidance	est. 32,681	Internal revision only
2.2	6/96	DOE directed changes: - Reduce cost - Separate from DWTF - Expedite MSO Demo.	Basis for Project close-out. Will require LLNL GPP funding for facility upgrade.	Major downscope of project to closeout while completing demonstration of MSO. Will require operating budget in outyears.	26,612	

Appendix E

Revision 2.2 Milestone Log

Expedited Technology Demonstration Project Milestones/Markers

Project Baseline Revision 2.2 - Sorted by Number

Number	Item	PTS	Orig. Date	Date	Status	Comments
Prefix "C" = California State Milestone/Marker						
Prefix "D" = DOE Milestone/Marker						
Prefix "E" = Expedited Technology Demonstration Project Milestone/Marker						
E112-1	Complete revised PSAR safety assessment for B292			Aug-96		
C113-1	Authorization to construct issued by BAAQMD			Oct-96		
E113-1	Submit air permit to BAAQMD			Aug-96		
E115-1	Submit FY96 Plan/Project Baseline Revision 2.2			Jul-96		
E116-1	NRP Meeting			Jun-96		
E116-1.1	Expedited Technology Demonstration Letter			Jul-96		
E116-2	NRP Meeting			Jan-97		
E116-2.1	Expedited Technology Demonstration Letter			Feb-97		
E122-1	Issue ETD Start-Up and Activation Plan			Mar-97		
E122-2	Facility Safety Procedure Approved			Feb-97		
E123-1	Operational Safety Procedure Approved			Apr-97		
E123-2	Operational Test Procedure Approved			Jul-97		
D131-1	DOE Issues KD-2 for Reduced Scope			Jun-96	Complete	
E131-1	Final Design Review complete			Oct-96		
E132-1.1	Complete support of Project Final Design Review			Oct-96		
E133-1	Complete GPP Application for B292			May-96	Complete	
E133-2	Configuration Design Finalized			Aug-96		
E133-3	Final Review of B292 design			Sep-96		
E133-4	Final Design Review of equipment	X		Oct-96		
E133-5	Begin B292 construction			Oct-96		
E133-6	Complete B292 construction			Dec-96		
E133-7	Begin assembly/staging in B292	X		Jan-97		
E133-8	System Operations Review complete			Mar-97		
E133-9	Checkout/Testing complete			Jul-97		
E142-1	Complete floor plan layout for feed preparation			Jun-96	Complete	
E142-2	Complete specification and order Solid/Liquid Centrifuge			Jun-96	Complete	
E142-3	Final Design Review of Feed Preparation equipment			Oct-96		
E142-4	Complete all other equipment specifications and orders			Nov-96		
E142-5	Complete local control design			Dec-97		
E142-6	Begin assembly/staging in B292			Jan-98		
E142-7	Checkout/Testing complete			Jul-98		
E1422-1	TRS Title II design documentation complete			Sep-96		
E1422-1.1	Robust telerobotics operational w/o graphics interface			Jun-96		
E1422-1.2	Collision-free path planning operational			Aug-96		
E1422-1.3	Prototype sorting application operational			Aug-96		
E152-1	Complete configuration design			Jun-96		
E152-2	Vessel order placed			Jul-96		
E152-3	Final design complete			Sep-96		
E152-4	Start move to B292			Jan-97		
E152-5	Staging complete			Mar-97		

Expedited Technology Demonstration Project Milestones/Markers

Project Baseline Revision 2.2 - Sorted by Number

Number	Item	PTS	Orig. Date	Date	Status	Comments
E152-6	Operational Review			May-97		
E152-7	System ready for operation	X		Aug-97		
E164-1	Transition from old to new MWMF concept complete			Jul-96		
E164-2	Final Forms designs complete			Apr-98		
E164-2.1	Salt/thermoplastic waste form (paper) design complete			Sep-96		
E164-2.2	SPC waste form design complete			Nov-96		
E164-2.3	Ceramic material design complete			Nov-96		
E164-2.4	Recipe-writer complete			Dec-96		
E164-2.5	Ceramic process design complete			Mar-98		
E164-3	Most (~95%) of task equipment received			Dec-96		
E164-3.1	Rotary calciner specifications complete			Aug-96		
E164-3.2	FY96 procurements orders placed			Sep-96		
E164-4	All equipment installed and operational			Jun-98		
E164-4.1	Rotary calciner installed and operational for non-hazardous operations			Feb-97		
E164-5	Documentation complete			Sep-98		
end						

Appendix F

MSO Process Demonstration Plan

MSO Process Demonstration Plan

1 Criteria for Determining Success/Failure

Waste treatment systems are tested in order to evaluate them relative to the Federal, State and local treatment standards, residual product requirements, and effluent requirements. Ideally, the MSO demonstration waste treatment system under evaluation will be shown to meet all LDR standards including the Universal Treatment Standards (UTS) for the chosen mixed waste streams. If successful, the treatment evaluation may result in the technology being designated by the EPA as a BDAT (or result in a Determination of Equivalent Treatment to the BDAT) for a specified mixed waste stream. A successful demonstration will result in a clear determination as to whether the MSO treatment process train meets the LDR requirements for the specific waste stream.

1.1 Regulatory Acceptability

Extensive test data are required to support a submission to EPA in support of categorical determination of BDAT or a Determination of Equivalent Technology for a one or more mixed waste streams. Less demanding demonstrations of LDR compliance may also be made as appropriate, such as treatment to produce residuals that meet the UTS; or partial treatment of a waste that, when combined with a specified secondary treatment of known capability, results in effective treatment of all constituents of concern; or preliminary evaluation of a promising technology deserving of additional or larger scale demonstrations. In general, requirements for designating a treatment system as a BDAT or as meeting Universal Treatment Standards are specific to both the treatment system used and the waste stream treated. The requirements for a successful determination may include showing that the treatment products and residuals have contaminant concentrations less than applicable UTS, the organic destruction and removal efficiency is equivalent to that obtainable by the currently prescribed BDAT [e.g., 0.9999 destruction and removal efficiency (DRE) for incineration], or a combination of these or other specifications.

Deployment of a waste treatment system in a treatment facility will require permits from the local as well as state and Federal regulators. A significant part of the charter of local regulators is to focus on the specific circumstances and environment in which the proposed treatment facility will operate such as the need to meet local requirements for air quality and waste water pretreatment. Demonstration of treatment systems will help to provide this data. Further, the demonstrations must comply with standards established by the San Francisco

Bay Area Air Quality Management District and the City of Livermore's Water Reclamation Plant pretreatment standards.

2 Evaluation Strategy

This Section describes the general strategy and outline of operations for evaluating the MSO system to be demonstrated.

2.1 General Objective

MSO is an emerging thermal technology for the processing and treatment of low-level mixed wastes and their by-products. Testing will provide, in an integrated pilot-plant scale treatment environment, the additional engineering test data, formal evaluation, and operating experience on a wide range of feed materials, to demonstrate that MSO can meet LDR requirements for a variety of mixed waste streams and to facilitate the deployment of MSO treatment systems in future waste treatment facilities.

2.2 Demonstration Configuration

Tests will focus on the demonstration of a single, integrated treatment train that includes all systems available within the facility needed to prepare and treat waste from its point of entry into the facility to the point at which all products, residuals, and secondary streams leave the facility having acceptable waste characteristics.

2.3 Technical Evaluation

Testing of an MSO integrated treatment train will provide baseline technical evaluation engineering data and operating experience to waste treatment facility designers. These data will allow facility designers to specify systems for their appropriate waste streams, design for the appropriate facility scale, obtain permits from regulators, and construct and operate future facilities. The engineering data will include feed handling/preparation and process performance (rates and compositions of input and output streams) over a wide range of waste compositions and operating parameters.

Operating experience and information includes ease of operation, stability to upsets, and reliability, availability and maintainability (RAM) data. To accomplish this evaluation, specific measurements must be made which are categorized as follows:

- Those measurements necessary to determine process treatability/performance. They include:
  - residual compositions (determined for emissions to each medium),
  - destruction/removal efficiencies for specific waste constituents,
  - material balances (input and output concentrations, rates of product accumulations, etc.),

- leachability of constituents from final waste forms.
- Measurements necessary to obtain specific process knowledge such as bubble sizes and temperature gradients in the MSO reactor.

For specific feed materials, tests are performed to determine:

- material balances/DREs for treatability under nominal conditions.
- system response parameters under off-normal conditions such as temporary loss or reduction in flow, power, etc.
- the optimum testing duration for specific system configurations and test objectives.
- an envelope of effective operating parameters for challenging material compositions that define the waste envelope.
- reliability/maintenance performance over long, continuous operation (up to 100 hr).

DOE and EPA standards and methods shall be applied to data gathering activities. For example, analytical data that are intended for use in supporting applications for equivalency is obtained using the waste handling protocols (including chain-of-custody procedures) and analytical procedures outlined by EPA in their compendium commonly referred to as SW-846. Further, these analyses will be accomplished by an analytical laboratory certified by California to perform the specific procedures as needed.

DOE QA/QC procedures cited in DOE/MWIP-15, January, 1994 will be applied as appropriate to the collection and handling of measurement/analytical data. Other quality procedures, good scientific practices, and good engineering practices will also be applied.

The duration of each test will be sufficient to accomplish the specific MSO demonstration objectives. Test durations are expected to run from one hour (e.g. parametric tests of destruction efficiency versus excess oxygen in the MSO reactor) to five 8-hour shifts (e.g. full treatment train test on a campaign of feed under nominal conditions), to 100-hour operability tests of the complete system.

2.4 Waste Feed Requirements

Demonstrations of an MSO treatment system will target a wide spectrum of organic-containing waste compositions. It is important that test feeds cover a wide range of compositions and characteristics to ensure that demonstration data are useful to many users (e.g., facility designers as well as system operators),

each with specific waste treatment and information needs. Both surrogates and wastes will be used to conduct system tests. Surrogate materials will be chosen to emulate key chemical and physical properties of the actual waste streams of interest. Using surrogates provides flexible and efficient coverage of a wide range of feed characteristics and compositions thereby allowing the investigators to carefully study and optimize processes for eventual testing with mixed wastes. Surrogates can also be prepared and characterized with more precision than waste, making analyses and data interpretation easier. Testing with actual mixed waste streams will substantiate the surrogate results and also demonstrate that the treatment processes are robust enough to accommodate the compositional variety found in actual waste streams. Surrogates will be prepared from entirely fresh materials with no waste content. They may contain nonhazardous and hazardous organics and metals, radionuclides, combustible and non-combustible solids, and water. Ideally, the chemical constituents of surrogates should not react with one another in unforeseen ways, they and their reaction products should be conveniently detectable, and they should not alter key operating conditions from those expected under actual treatment conditions. Surrogate batches must be consistent in composition so that results from test series are easily comparable. Surrogate formulations will be selected based on DOE guidance (DOE/MWIP-15 through 18, January, 1994), EPA guidance, and engineering test objectives. Actual wastes will be prepared by the Feed Preparation functions using LLNL's Hazardous Waste Management division inventory of organic-containing low-level mixed waste. These wastes may be spiked with species or materials including hazardous metals, hazardous organics, radionuclides, or other materials.

The following DOE representative waste types were selected for initial MSO demonstration testing (also shown are the nominal feed rates):

Waste Category (WMIS Code #)	Nominal Feed Rate kg/h
Aqueous organics/Trimsol oil (2110,2120) Note 1	1.5
Halogenated organic liquids (2210) Note 2	5.5
Non-halogenated organic liquids (2220) Note 2	1.4
Predominantly combustible solids (5440, 5490) Note 3	2.3
Scintillation cocktails (6140) Note 2	1.4