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**Function Analysis
for
Waste Information Systems**

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April 1996

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Energy Systems Waste Management Organization

Function Analysis for Waste Information and Tracking

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April 1996

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EXECUTIVE SUMMARY

Functional Analysis for Waste Information Systems has a two-fold purpose. It seeks to identify the functional requirements for waste tracking information and to find feasible alternatives for meeting requirements on the Oak Ridge Reservation (ORR) and the Portsmouth and Paducah Gaseous Diffusion Plant facilities; to identify options that offer potential cost savings to the U.S. Government and show opportunities for improved efficiency and effectiveness in managing waste information; and, finally, to recommend a practical course of action which can be immediately initiated. It also identifies existing requirements that are not being met at the present time. Participants in this study conducted preliminary benchmarking activities with representative companies to compare and contrast their strategic directions in waste information.

In the latter part of 1995, the U.S. Department of Energy (DOE) requested the Waste Management Organization of Lockheed Martin Energy Systems (LMES), the contractor of its facilities in Oak Ridge, Tennessee; Paducah, Kentucky; and Piketon, Ohio, to conduct function analyses of various waste management operations and facilities to identify areas in which savings could be achieved through the elimination of non-value-added activities. Twenty-four topics were identified and six were selected for a pilot program, after which the efficacy of the approach will undergo evaluation. The subject matter of this report was one of the selected topics. It was initially titled "Waste Tracking" but was expanded to its present form after a DOE request that a more general approach would treat broader information needs.

The methodologies used in this evaluation fall into two closely related categories. The first, Functional Analysis, involves using facilitated sessions and a structured approach to identifying necessary functions and associated requirements while eliminating functions that do not add sufficient value to justify their cost. The second approach, a technique known as Functional Analysis System Technique, involves using bi-directional logic to identify critical functions and requirements. The other methodology used is a life cycle benefit cost analysis used to compare alternatives. The methodology incorporates the time value of money and appropriate discounting for multi-year analyses and produces a variety of figures for decision makers to use in recommending alternatives. Because this study emphasized strategic direction, rather than a specific technical alternative, the life cycle benefit cost analysis occupied a more diminished role than it normally holds in such studies.

Structured sessions were held with personnel from the following groups: LMES Waste Type Program Managers; DOE-Oak Ridge Operations Waste Management Technology Division; LMES Waste Operations; and personnel from the Toxic Substance Control Act (TSCA) Incinerator, the LMES Waste Generators Program, the Portsmouth and Paducah Waste Operations and Environmental Restoration Waste Generators, the LMES Environmental Compliance Program, and the LMES Pollution Prevention Program. More informal sessions were held to discuss the implications of the Tennessee Department of Environment and Conservation (TDEC) Commissioner's Order and the Energy Systems Waste Management Organization (ESWMO) Enterprise Model.

Each of the function analysis sessions with major stakeholders identified significant shortcomings in the current waste tracking and information system. Although several disparate groups were involved in the process, the shortcomings with the present system cut across each separate site. Significant results from the sessions included the items which follow:

- Current information systems involved in Waste Tracking do not easily provide information by waste type. The needed information can usually be obtained but requires complex queries that leave doubt as to whether all of the sought after information was obtained. In addition, due to site differences, consolidated data by waste type usually requires some manipulation ,which is not always reproducible.
- Data quality from the existing tracking systems was judged to be insufficient to ensure fully compliant reporting.
- A significant portion of the jobs of many waste type program managers involve planning for the disposition of legacy waste. In addition to data quality problems, the existing tracking systems contain incomplete data concerning some legacy and other waste streams.
- Waste inventory and other waste information from existing central tracking systems is not of sufficient timeliness; it is often six or more months out of date.
- The essential job functions of waste type program managers revolve around planning for disposition of waste and monitoring performance against those plans. Significant information requirements and functionality to support these job functions are not being met. Some of these information requirements might better be characterized as “decision support” than waste tracking.
- Of necessity, program planning by major waste type involves grouping wastes in various ways to facilitate treatment and disposal. It is difficult to accomplish effective waste grouping using data from existing tracking systems.
- Significant differences in business rules and business practices, reflected in the data content and functionality of the existing site-oriented systems, exist among the sites at present. Waste type program managers must deal with information across the sites and these differences preclude effective consolidation of the data.
- Significant differences in terminology also exist among the sites.
- Additional costs and time delays are incurred to reconcile data terminology and business practice differences when preparing reports involving consolidated data sets.
- Additional waste program costs are incurred to build waste type specific databases to overcome the lack of integrated and readily available data from existing systems.

- Budget and cost accounting data are not readily integrated with data related to waste operations, thus leaving the waste type program manager with difficulty in determining expenditures, as well as appropriate unit costs.
- Data validation and corrections entered into the program-specific databases do not get incorporated back into the site systems, further widening the credibility gap between site data and that reported through the waste type program.

The shortcomings in the current situation with regard to waste information statements were also identified during the session; the list follows below. The list was generated during this effort and is an addition to those shortcomings identified by the stakeholders. Each of the function analysis sessions with major stakeholders identified significant shortcomings. Many of these can be traced to a lack of adequate support for significant functional areas of Waste Management (WM) business. In addition, the roles and responsibilities of key players in WM are not met with any combination of organizational infrastructure, existing systems, and databases because the needed data are simply not readily available in any of the accessed databases and systems.

- The ability to determine the unit cost of waste operations processing steps will be of critical importance to ESWMO's future success; however, it is not easily obtained with the existing systems.
- It is difficult to account for waste shipped from one Oak Ridge Reservation site to another in an independent system because of the differences in captured shipment data. There is no direct electronic transfer of shipment data; the ending site must prepare the receiving site's paper forms.
- Any strategic planning for waste disposition is difficult due to a lack of centralized waste inventory and a lack of unit cost information. It is thus difficult to estimate the cost of WM throughout the waste life cycle.
- Waste Operations needs ready access to accurate and approved waste certification procedures.
- There needs to be better tracking of the waste leaving and entering the ORR.
- Off-site Certificates of Treatment and/or Disposal need to be recorded in connection with specific waste item level accounting. The need also exists for better access to manifest and radiation contamination data for invoicing.
- The waste received from off-site sources needs validation of waste certifications.
- Invoice and shipping costs need to be associated with the related manifest and with the specific waste items.

- Integrated (multi-site) waste item life cycle data for Resource Conservation and Recovery Act, TSCA, and Department of Transportation requirements is much needed. The data includes manifests, shipping dates, receiving dates, treatment results, and volume reduction.
- Forecasts of waste generation rates are needed for planning purposes.
- At the present, there exists no mechanism to project future (e.g., 5 year) storage requirements, types of facilities, capacities, limits, or acceptance/evaluation criteria.
- Waste treatment and repackaging transformations are different among the sites, are poorly understood, and do not support consistent and traceable accounting of waste.
- A lack of flexibility, and poor integration of systems makes it generally difficult to respond readily to new reporting requirements because of shortcomings in the availability of data.

The following shortcomings relate to the inadequate availability of accurate waste information:

- There is no common data model in use across ESWMO.
- There are no concise data definitions uniformly available to aid in the correct creation, entry, and usage of data.
- Standard naming conventions, policies, and procedures governing data management are not uniformly available or followed.
- There is no central, uniformly obtainable repository of data definitions that indicates what data is available, its location and prescribed format, content, and appropriate usage.
- Different groups within ESWMO define the same data in differing ways.
- There are currently 11 different Electronic Data Deliverables.
- Some important data is not captured electronically and therefore is not readily accessible or available.
- There is a general lack of access to historic waste item characterization, analytical data, and historic waste stream data.
- There is a lack of accurate mass/volume data.
- There is a general lack of cost information for activities such as waste handling, sampling, analysis, treatment, storage, and disposal.

- Sampling plans are not captured electronically.
- Sampling populations are not identified.
- Conditions on the day of are sampling are not captured.
- Sampling status and analytical results are not readily available.
- Existing and available data lacks any indication of its quality.
- Central and site waste inventories do not contain entries for all waste items and not all entries contain all attributes needed about waste items.
- Some needed information for regulatory reports is not captured.
- There is a lack of clear data ownership, responsibility, and accountability for data capture, data definition, data quality, and correct data usage.
- The infrastructure to adequately manage data is lacking.
- Information is generally regarded as a by-product of other activities and thus is not managed as an essential resource for the organization.
- There is a lack of recognition that data created as a work product by one individual or group will probably be an essential resource for other individuals or groups.
- Some data is not validated upon entry; it therefore is inconsistent and/or incorrect.
- Data validation rules for the same data element differ among the existing systems, thus leading to data that is captured but cannot effectively be exchanged.
- Improvement to ensure consistent validation and integrity of data at the time it is captured and entered is needed.
- The timeliness of information is not always adequate.
- Varying levels of detail are collected.
- Data precision and accuracy requirements are not always met.
- Significant issues exist on data completeness.
- Many data elements are missing (e.g., weights and volumes).

- There is a lack of accurate inventory data.
- There is a lack of verification/validation of laboratory data.
- Many weights and volumes are estimated.
- Estimates are used inconsistently. Some sites put in an estimate while others put in a zero amount unless the waste has actually been weighed.
- Tare weights are not always captured (or estimated) on containers.
- At times, weights and volumes do not distinguish between gross and net values.
- Additional costs are incurred to deal with poor data quality to overcome the problems of completeness, accuracy, timeliness, and correctness.
- There is a proliferation of disparate waste tracking and information systems; redundant functionality, databases, and data elements exist that perform essentially the same function with no mechanism to manage the redundancy.
- The sites are at different levels of automation.
- Some systems are manual and preclude integration and widespread availability.
- Data is not well integrated in central systems or site tracking systems. For example, an inability to view three-site consolidated inventory data is an issue.
- Numerous instances exist where derived data are updated but changes made to the derived data are neither automatically or manually updated in the source data.
- There is a duplication of data capture systems. For example, the waste storage report has its own system for capturing waste inventory information; duplication generally exists because untrained personnel have access to the systems, and some trained personnel have concerns about data quality, accuracy and the timeliness of data obtained from others.
- Consolidation of business rules and ensuring consistency of waste identification schemes, operational practices, and data collection methods is needed.
- A consolidation of budget responsibility can aid in resolving business needs and issues.
- Electronic analytical results data are produced regularly (e.g., site sampling crews, off-site sampling) but very little is captured and tied to specific waste items or populations. If the data is captured, it is generally not available for wide distribution and some sampling data is available but is not captured by generators.

- The wide variety of hardware and software platforms, inconsistent business practices, and corresponding data limits the ability to share data easily and effectively.
- Data is perceived as difficult and/or too expensive to obtain, access, and use.
- All personnel are not cross-trained on the variety of tools and computing platforms available, thus reducing both employee effectiveness and the effectiveness of tool deployment.

Since this study began, ESWMO senior management have initiated activities to replace the current contractual arrangement for WM activities on the Oak Ridge Reservation (ORR) with a series of incentive task order contracts along the lines of the major waste types. This shift will have the effect of dramatically and urgently strengthening the trend to management by major waste type rather than by site. In addition, it will bring opportunities for improved consistency in business practices across the sites and institute significant additional information systems requirements which must be met. The goal for completing this change in contract vehicles is October 1, 1996, thus leaving only a brief window for innovation and development.

Each of the function analysis sessions with major stakeholders identified significant shortcomings. Many of these can be traced to a lack of adequate support for significant functional areas of the WM business and that the roles and that responsibilities of key players are not met with any combination of organizational infrastructure, existing systems, and databases because the needed data are simply not readily available in any of the accessed databases and systems.

This lack of consistent business practices across the sites is the central issue facing ESWMO in regard to the effective deployment, development and use of information systems technology. It will be impossible to obtain the full benefits of automation without consistency of business practices. A recent white paper, *Differences in Site Operations and Their Negative Impact Upon the WM Business*, prepared by the new ESWMO Information Services Organization, outlined the following "Top 10" differences in site operations.

These differences include the following items:

- Differing thresholds for polychlorinated biphenyl waste;
- application of bar code labels;
- use of bar code identifiers;
- use of forms in the 2109 form set;
- specific identifiers in use for the 2109 forms and items;
- use of the site waste tracking systems by operations;
- data error, completeness, and detection/correction procedures;
- waste weight;
- waste operations forms and capture of handling information; and
- waste sampling.

This function analysis study also identified global requirements deemed essential no matter what strategic alternatives are pursued in the future. Improved data quality is greatly needed and it should be pursued even with the existing systems. Almost all the remainder of the list of global requirements relate primarily to logical definition and only secondarily to physical design and development.

A listing of the requirements include:

- Improved data quality;
- consistent business strategies and practices;
- a better alignment of Information Systems with business strategies;
- common data model;
- defined data ownership - data management plan;
- consolidation to fewer system designs; and
- integration of all WM information systems and practices as required.

An outline of the summary conclusions drawn from this analysis follows:

- The lack of consistency in business practices across the sites is the central issue which must be faced by ESWMO regarding the effective development, deployment, and use of information systems technology. Obtaining the full benefit of automation will not be possible without this consistency.
- This consistency in business practices must be achieved prior to effective consolidation and integration of waste information systems.
- Significant functional issues critical to the efficient discharge of the WM mission lack effective support (for example, management by waste type and forecasting). There has been much effort historically expended on waste tracking systems to meet waste operations needs, but not enough effort on meeting requirements for other critical business functions.
- ESWMO lacks a common data model and uniform data specifications that are readily available.
- ESWMO lacks a unified data management plan that clearly establishes responsibility and accountability for the capture, accuracy, dissemination, and proper use of waste information.
- Existing waste information suffers from the lack of adequate data quality in terms of completeness, accuracy, timeliness, and level of detail.

- There is a general lack of data integration existing (e.g., sampling data should be connected to specific waste item or population data, budget and cost accounting data should be integrated with waste operations information).
- Waste information is not regarded or managed as a corporate resource.
- There exists a proliferation of systems for waste tracking that are comprised of major multi-user site-oriented systems and smaller, perhaps single-user, databases and systems meant to achieve essentially the same purpose.
- The existing systems are site-specific because they were each developed by their respective sites and were primarily developed to support WM operations at the specific sites. They thus incorporate site differences in WM business practices. A contributing factor has been the organizational and contractual evolution over the past several years.
- The existing systems are not integrated. As an example, waste moving from one site to another requires that data be manually re-entered
- The TDEC Commissioner's Order mandates that accurate waste inventory information be maintained at all times. This Order carries the possibility of levies of fines and penalties for non-compliance.
- The recently renegotiated Tennessee Oversight Agreement between DOE-ORO-Waste Management Technology Development and TDEC reaffirmed the right of state regulators to continued access to a consolidated waste information system, although not necessarily the one that currently exists.
- There is a growing need to track compliance-related milestones such as reporting and permit renewal. However, no unified system exists for this purpose.
- Recent developments such as shifting contract responsibilities and management by major waste type bring additional information systems requirements (for example, the need to calculate accurate unit costs) that are critical to the success of the WM mission.
- Significant opportunities exist for both backward and forward integration of waste information systems, including backward integration to include pre-generation (e.g., Environmental Restoration projects), waste generators, and forward integration to include internal treatment systems (e.g., TSCA), external treatment, and disposal vendors.
- The fact that both the PORTS and PGDP sites want to replace their existing systems constitutes an opportunity to halt the trend towards additional proliferation of major waste tracking information systems.

WM activities on the ORR have been strongly site-oriented. In addition, each of the WM Divisions at each of the three sites was created at a different point in time. The ORNL site WM division is the oldest of the three and the K-25 site WM division is the newest, although the WM function's existence predated creation of the division by several years. At their inception, the site-oriented WM division heads reported to the senior site manager. In April 1993, a combined organization known as the ESWMO was created, including a fourth division, known as Energy Systems Waste Management Central. Reporting lines were changed so that the heads of the site WM divisions began to report directly to the Director of ESWMO.

The creation of the ESWMO combined organization produced a trend toward centralized management of waste management activities. In addition, both DOE Headquarters and DOE-ORO have begun making the organizational changes to support management by each of six major waste types rather than by site. Both trends are seen as producing the possibility for significant cost savings by elimination of duplicate activities and roles. The creation of ESWMO also supported a movement to increased consistency and standardization of business rules, operational practices, and overall management.

To support these initiatives, ESWMO senior management has appointed a single manager for the Information Services Organization (ISO) and changed the reporting lines so that individual site information systems managers report to the manager of information services rather than to the individual site division directors. Budgetary responsibility and authority for the consolidated information services budget is now placed with the manager. These changes are viewed as key to future possibilities for the consolidation and integration of waste tracking and for more information efforts across the sites.

There should be an implementation of the following recommendations in the immediate future:

- ESWMO senior management must move immediately to address the central issue of inconsistent business practices across the sites. A multi-site team, sufficiently empowered, should immediately begin to resolve the known consistency issues involving, among other issues, terminology, procedures, practices, and forms. The team should be empowered to make necessary decisions and be charged with the responsibility of achieving consistency. A clear path for resolution by senior management of issues on which the team cannot agree should be provided to the team in advance. In addition, an extensive effort to publicize and solicit input from ESWMO and all other stakeholder personal to identify additional inconsistency issues for resolution should be implemented.
- The manager of the ESWMO Information Services Organization (ISO) should, with the exceptions noted below, immediately halt all development and enhancement of individual site systems.
- The ISO manager and his staff will develop and publish a strategic plan and specific timetable of major future milestones by July 31, 1996. The report should be along the lines of the recommendations outlined in this study.

- The ISO manager should immediately focus his resources on taking whatever interim measures are required to ensure compliance with the Commissioner's Order and to support the upcoming implementation of ITO contracts. These interim measures (to the extent that it is possible) should be carefully chosen or designed to facilitate the transition to the desired end state for ESWMO information systems.
- As the quality of the data in the existing systems is a compliance issue, ESWMO senior management, current system operators, and the ISO manager and his staff should move immediately to address it. Among other factors, this issue will involve changes in how data is collected and how the data entry function is managed. If it is carried out in concert with any needed changes to data validation for inclusion in the Central Waste Tracking System (CWTS), the CWTS can possibly continue to meet requirements for access by state regulators for some time into the future.
- Much of the information needed throughout the organization is available in electronic form; read-only access is often sufficient. The ISO organization should begin to immediately identify and exploit opportunities to employ Internet and World Wide Web (WWW) technology for the dissemination of the information.
- The Common Lookup Environment (CLUE) contains a great deal of information of interest to many in the organization but it is not readily accessible by staff members. CLUE data should also be made available via the WWW.
- The tables and standard values in CLUE should be expanded as an area in which incremental information consistency can be obtained with minimal impact to existing operational practice.
- The ISO organization should continue its present efforts to standardize desktop hardware and software environments.
- The ISO organization should develop a matrix of needed information management skills (including data management as a corporate resource) and a training plan to ensure that adequate training is made available throughout the ESWMO organization.
- The ISO organization and waste information stakeholders should continue to employ network and processor hardware and software oriented towards the open systems concept.

The following recommendations will require more time to implement but the successful completion of these measures constitutes the foundation for future success and milestones for these items should be established in the ISO strategic plan:

- The ISO organization should develop a common data model that encompasses all data requirements for WM, an area in which much work has already been done.
- The ISO organization should, in conjunction with ESWMO senior management, develop a data management plan identifying ownership, responsibilities, accountability, and privileges associated with each element of the common data model.
- After the common data model and data management plan have been developed, needed functionality that is not currently being met should be identified and software modules designed, developed, and implemented to do so.
- Whenever possible, the ISO organization should move existing systems toward more conformity with the common data model as it evolves.
- Whenever possible, the ISO organization should reduce the proliferation of systems by eliminating at least one of them. This elimination will require some time to accomplish, but is imperative that it be done and a migration plan should be presented as part of the ISO strategic plan.
- Existing systems and/or data components should be identified and integrated to the fullest extent possible.
- All site WM organizations as well as the five-site Environmental Restoration organization have expressed some level of interest in implementing the draft global model. Consequently, it is thus recommended that the ISO manager and his staff assess the possibility of migration to the global model at all WM sites.

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ACRONYMS, ABBREVIATIONS, AND INITIALISMS

CLUE	Common Lookup Environment
CWTS	Central Waste Tracking System
DOE	U.S. Department of Energy
DOE-ORO	U.S. Department of Energy, Oak Ridge Operations
DSTP	draft site treatment plan
EM	Environmental Management
EM-30	Waste Management [DOE]
EM-40	Environmental Restoration [DOE]
ER	Environmental Restoration
ERWM	Environmental Restoration/Waste Management
ES-WISE	Energy Systems Waste Information Services Environment
ESWMO	Energy Systems Waste Management Organization
FAST	Functional Analysis System Technique
FFCAct	Federal Facilities Compliance Act of 1992
GOCO	government owned, contractor operated
ISO	Information Services Organization
LLW	low-level waste
LMES	Lockheed Martin Energy Systems, Inc.
M&O	Management and Operating [contractor]
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
PCBs	polychlorinated biphenyls
PGDP	Paducah Gaseous Diffusion Plant
PIP	Performance Improvement Process
PORTS	Portsmouth Gaseous Diffusion Plant
PSTP	Proposed Site Treatment Plan
RCRA	Resource Conservation and Recovery Act
SDM	System Development Methodology
SVIP	Strategic Vision Implementation Plan
TDEC	Tennessee Department of Environment and Conservation
TOA	Tennessee Oversight Agreement
TRU	Transuranic [waste]
TSCA	Toxic Substances Control Act
USEC	United States Enrichment Corporation
WM	Waste Management
WMTD	Waste Management Technology Division
WWW	World Wide Web

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1. INTRODUCTION

1.1 OBJECTIVES

This study has a two-fold purpose. It seeks to identify the functional requirements of a waste tracking information system and to find feasible alternatives for meeting those requirements on the Oak Ridge Reservation (ORR) and the Portsmouth (PORTS) and Paducah (PGDP) facilities; identify options that offer potential cost savings to the U. S. Government and also show opportunities for improved efficiency and effectiveness in managing waste information; and, finally, to recommend a practical course of action that can be immediately initiated. In addition to identifying relevant requirements, it also identifies any existing requirements that are currently not being completely met.

Another aim of this study is to carry out preliminary benchmarking by contacting representative companies about their strategic directions in waste information. The information obtained from representatives of these organizations is contained in an appendix to the document; a full benchmarking effort, however, is beyond the intended scope of this study.

1.2 BACKGROUND

For over 50 years, the U S Department of Energy (DOE) and its predecessor agencies have conducted research, development, and production activities to meet the nation's goals in military and nonmilitary applications of nuclear energy. DOE's role has steadily expanded to include research and development in related fields, including materials science, and its activities have left a legacy of commonplace and exotic wastes as well as contaminated sites and facilities all across the United States.

The last years of the 20th Century witnessed the end of the Cold War, a dramatic event which brought about significant reductions in the projected needs of the United States for the development and production of nuclear weapons. In response to this changing world, the mission of the DOE has significantly altered over the past 10 years. Arms control treaties have mandated reduced weapons stockpile requirements and increased weapons dismantlement and materials storage activities. In addition, clean-up of the environment and a growing Environmental Management (EM) Program have become a significant part of the DOE mission. DOE budgetary and personnel resources have been reallocated in increasing amounts from research, development, and production programs into components of the EM program, including Waste Management, (WM) Environmental Restoration (ER), and Technology Development.

Along with these developments, hosts to DOE facilities around the country began to express increased concern about possible health and safety impacts on their communities and to demand an increased oversight role similar to their regulatory authority over private sector industrial facilities and activities. DOE responded to stakeholder concerns by granting the public increased access to what had previously been a closed process. One result was a commitment to fully compliant operation and significant self-assessment activities on the part of DOE and its contractors. State and local regulatory authorities were provided access to DOE facilities and, in some cases, DOE even provided funding to enable states to expand their regulatory organizations.

In addition, public stakeholders were given opportunities to acquire information about the facilities and operations and to express their views in DOE-sponsored forums. A second action which was a result of public concern was the passage of the Federal Facilities Compliance Act (FFCA) in October 1992. The objective of the FFCA is to bring all federal facilities into compliance with all applicable state and federal hazardous waste laws, to waive federal sovereign immunity under those laws, and to allow the imposition of fines and penalties. The FFCA mandated that each DOE site negotiate with state regulatory agencies binding schedules for treatment and disposal of various waste streams. In addition, the significant pressure to reduce government, decrease the federal budget, and balance it as soon as possible are contributing forces to the political climate. DOE budgets in general, and the EM budget in particular, have not been exempt from these pressures. Consequently, EM is caught between public and regulatory agency demand to do more and declining federal budgets that provide fewer resources with which to do it.

In the latter part of 1995, DOE-Oak Ridge Operations (DOE-ORO)-Waste Management Technology Division (WMTD) asked the Waste Management Organization (ESWMO) of Lockheed Martin Energy Systems (LMES) to conduct function analyses of various WM operations and facilities to identify areas in which savings could be achieved through eliminating non-value-added activities. Correspondence on this effort is contained in Appendix B. Two dozen topics have since been identified and six have been selected for a pilot program, after which the approach will be evaluated. The subject of this report is one of these topics. Initially titled "Waste Tracking", it was later (following a DOE request) expanded to "Waste Tracking and Information," considered to be a more general approach which would treat broader information needs.

1.3 METHODOLOGY

The methodologies used in this evaluation fall into two closely-related categories. The first, Function Analysis, involves the use of facilitated sessions and a structured approach to identifying necessary functions and associated requirements while eliminating functions that do not add sufficient value to justify their cost. This approach was first developed and used in manufacturing operations to cope with wartime shortages of critical materials. Since World War II, applications of Function Analysis have expanded to include other areas of industrial and federal government operations. Function Analysis is a key component of Value Engineering, or

Value Management as it is sometimes called. Closely connected with function analysis is a technique known as FAST diagramming or Function Analysis System Technique. FAST involves using bi-directional logic (How? and Why?) to identify critical functions and requirements. Appendix C contains a full description of FAST diagramming. The FAST methodology focuses on the “functions” of each of the participating groups. Functions represent at a high level those things that the groups must achieve to be successful. From functions flow other requirements and/or activities. Focusing on function and using the FAST logic forces the groups to concentrate on their objectives and how they can achieve them. The result is tested by applying group logic and getting group consensus. After reaching agreement on the required functions, the group identifies all the data/information needed to accomplish each function. This process helps assure that all necessary functions are identified and any unnecessary ones are discarded. This is important because all requirements flow from performing functions, and requirements (or data) cost money. If applied consistently and properly, one important benefit to the process is the increased communication and agreement among group members.

The other methodology used in this evaluation is a life cycle benefit cost analysis methodology used in the comparison of alternatives. This methodology also relies at times on Function Analysis to identify key requirements that must be met. The methodology ensures that comparison of alternatives on an economic basis is done with full validity. It incorporates the time value of money and appropriate discounting for multi-year analyses and produces a variety of figures of merit for use by decision makers. Due to the particular focus of this study and the emphasis on strategic direction rather than a specific technical alternative, the life cycle benefit-cost analysis methodology played a more diminished role than is usually the case.

An overview of the analytical process used in this study is shown in Figure 1.1.

Figure 1.1

2. FUNCTION ANALYSIS STAKEHOLDER SESSION SUMMARIES

A comprehensive list of stakeholder participants is contained in Appendix N.

2.1 SUMMARY OF SESSIONS WITH LOCKHEED MARTIN ENERGY SYSTEMS, INC., WASTE TYPE PROGRAM MANAGERS

A full report of the session is included in Appendix C.

2.1.1 Background

Major waste types include Sanitary, Hazardous, Low Level Waste (LLW), Mixed, Transuranic (TRU), and Spent Nuclear Fuel. Both DOE-ORO and LMES have appointed a program manager for each of these six major waste types. Historically, WM activities on the ORR have had a distinct site orientation. The ORR is a multi-program DOE site which includes three major government-owned, contractor-operated (GOCO) facilities. The Oak Ridge National Laboratory (ORNL) is associated strongly with DOE's Energy Research Program, the Y-12 Plant with DOE's Defense Programs, and the Oak Ridge K-25 Site with DOE's EM program, although for many years the latter was affiliated with DOE's Uranium Enrichment Program and only recently transferred to EM. However, over the past two years or so, an on-going transition to manage the WM activities by major waste type rather than by site has been in effect. This effort parallels similar developments both in DOE Headquarters and ORO organizations.

2.1.2 Process

Two sessions were held to focus on the waste information needs of the LMES waste type program managers. Those who attended included several waste type program managers, waste tracking systems administrators, and staff involved in the development of systems for waste tracking and waste information. A complete list of session attendees is in Appendix C. The first session was used to develop a FAST diagram depicting the essential functions of waste type program managers (see Figure 2.1). The second session was used to develop a table depicting high level information requirements of waste type program managers by essential job function (see Table 2.1).

WASTE INFORMATION/TRACKING - LMES WASTE PROGRAM MANAGERS FUNCTIONS

FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- Revised 1-12-96

Figure 2.1

MATRIX OF FUNCTIONS AND REQUIREMENTS - WASTE PROGRAM MANAGERS

Requirements/Actions	Implement Plan	Plan Disposition	Select Path	Determine Criteria	Identify Path(s)	Identify "Groups" (Waste)	Establish Criteria (Grouping)	Evaluate Data	Establish Criteria (Evaluation)	Obtain Data	Identify Data Requirements
Rad Characteristic						✓		✓	✓	✓	✓
Hazardous/Chemical Characteristic						✓		✓	✓	✓	✓
Physical Characteristic						✓		✓	✓	✓	✓
Inventory	✓	✓	✓	✓	✓			✓	✓	✓	✓
Generation Rates - Actual	✓	✓	✓	✓	✓			✓	✓	✓	✓
Generation Rates - Projected		✓	✓	✓	✓			✓	✓	✓	✓
TSD Capacity		✓	✓	✓	✓			✓	✓	✓	✓
TSD Cost	✓	✓	✓	✓	✓			✓	✓	✓	✓
Waste Treated	✓							✓	✓	✓	✓
Waste Disposed	✓							✓	✓	✓	✓
Waste Grouping		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tech. Dev. Needs		✓	✓	✓	✓			✓	✓	✓	✓
Generator ID								✓	✓	✓	✓
Generator Process						✓		✓	✓	✓	✓

Table 2.1

2.1.3 Results

Significant results from the sessions with LMES Waste Type Program Managers included the following items:

- Current information systems involved in Waste Tracking do not easily provide information by waste type. The needed information can usually be obtained but requires complex queries that leave doubt as to whether all of the sought after information was obtained. Further, due to site differences, consolidated data by waste type usually requires some manipulation, which is not always reproducible.
- Data quality from the existing tracking systems was judged to be insufficient to ensure fully compliant reporting.
- A significant portion of the jobs of many waste type program managers involve planning for the disposition of legacy waste. In addition to data quality problems, the existing tracking systems contain incomplete data concerning some legacy and other waste streams.
- Waste inventory and other waste information from existing central tracking systems is not of sufficient timeliness; it is often six (or more) months out of date.
- The essential job functions of waste type program managers revolve around planning for disposition of waste and monitoring performance against those plans. Significant information requirements and functionality to support these job functions are not being met. Some of these information requirements might better be characterized as “decision support” than as waste tracking.
- Of necessity, program planning by major waste type involves grouping wastes in various ways to facilitate treatment and disposal. Accomplishing effective waste grouping using data from existing tracking systems is difficult.
- Significant differences in business rules and business practices, reflected in the data content and functionality of the existing site-oriented systems, exist among the sites at present. Waste type program managers must deal with information across the sites and these differences preclude effective consolidation of the data.
- Significant differences in terminology also exist among the sites, thus leading to the same difficulties with consolidated data sets as outlined above.
- Additional costs and time delays are incurred to reconcile data terminology and business practice differences when preparing reports involving consolidated data sets.
- Additional waste program costs are incurred to build waste-type specific databases to overcome the lack of integrated and readily available data from existing systems.

- Budget and cost accounting data are not readily integrated with data related to waste operations, thus leaving the waste type program manager with difficulty in determining expenditures, appropriate unit costs, etc.
- Data validation and corrections entered into the program-specific databases do not get incorporated back into the site systems, further widening the credibility gap between site data and that reported through the waste type program.

2.2 SUMMARY OF SESSIONS WITH LMES AND TSCA WASTE OPERATIONS

A full report of the session and a list of those attending is included in Appendix D.

2.2.1 Background

ORO WM activities have had a distinct site orientation. Due to the multiple DOE programs present in Oak Ridge over the past 50 years, each site has developed distinct differences and preferences because of the particular programs housed at each facility. Each site also has unique environmental remediation and WM problems for the same reason. For example, the K-25 Site has historically been involved with uranium enrichment, the Y-12 Plant with defense program operations involving enriched uranium and other materials, while ORNL has been the site of most TRU production waste in Oak Ridge. The contrasting methods in waste stream characteristics and program management have led to procedural, terminology, waste handling, and significant operational differences among the sites. Despite these differences, there are notable examples of collaboration across program lines. For example, the sanitary landfill serving all three Oak Ridge sites is at the Y-12 Plant and the Toxic Substances Control Act (TSCA) Incinerator is used by all three for incineration of mixed waste and polychlorinated biphenyls (PCBs)-contaminated waste. Approximately three years ago, waste management operations and waste tracking systems were defined and a standard container bar code was implemented in 1993 while in 1995, a reservation-wide waste certification program was put into place to enable greater cooperation among the sites in waste treatment, storage, and disposal. All WM organizations now use the same agreed-on method for bar code labeling, which has made interstate shipping of waste more efficient.

2.2.2 Process

Operations managers and staff members from each of the three Oak Ridge sites attended the sessions. Representatives from ESWMO Central in the areas of Off-Site Shipments and Waste Storage were present as was the TSCA Incinerator organization. The first session was used to develop a FAST diagram that depicted the essential functions of waste operations managers (see Figure 2.2). The second session was used to develop a table showing high level information requirements of waste operations managers by essential job function (see Table 2.2).

WASTE INFORMATION & TRACKING - LMES WASTE OPERATIONS & TSCA MANAGERS FUNCTIONS

FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM-1-29-96

Figure 2.2

MATRIX OF FUNCTIONS AND REQUIREMENTS OPERATIONS MANAGERS

Requirements/Actions	TSD Waste	Transport Waste	Package Waste	Certify Waste	Evaluate Data & WAC	Develop WAC/ WEC	Identify Disposition	Characterize Waste	Input Character Data	Identify Group	Sample Waste	Receive Notification	Meet Regulations	Minimize Waste	QA/QC Data Input	Generate Reports	Track Waste	Maintain Facility
RAD Characteristic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Chemical Characteristics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Physical Characteristics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Generation Rate*	✓			✓			✓							✓		✓		✓
EPA Codes (Waste)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Facility Capacities	✓		✓		✓	✓	✓						✓			✓	✓	✓
Inventory (Qty/Loc)	✓	✓					✓				✓			✓		✓	✓	✓
TSD Unit Cost	✓						✓							✓		✓		✓
Cert . Of Disposal	✓												✓			✓	✓	
TSD Date(s)/Generation	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Packaging Information	✓	✓	✓	✓	✓	✓	✓			✓	✓		✓	✓		✓	✓	✓
"Manifest" Information	✓	✓	✓	✓									✓		✓	✓	✓	✓
Confirmation To Ship	✓	✓	✓		✓											✓	✓	✓
Destination WAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Package Pedigree	✓	✓	✓	✓									✓					✓
HP Survey Data	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓			✓	✓	✓
Generation Process				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Approved Certifier				✓								✓						
LMES TSD Approval	✓	✓		✓														

*Short term - projected & actual

Table 2.2

2.2.3 Results

Significant results from the sessions include the following:

- There are significant differences in operating practices, preferences, and procedures at the sites, including naming conventions, operations codes, data collection forms, and waste item identifiers.
- These differences in operating practices and procedures are reflected in the existing tracking systems at the sites.
- Moving to a single reservation-wide tracking system would require consistent operating procedures and practices across the sites.
- Because the existing tracking systems were developed mostly for use by operations, more of the typical operations manager requirements are being met by the existing systems than perhaps other groups (e.g., waste type program managers).
- More integration is needed between the waste tracking system(s) and facility information such as facility capacities, facility permit information, and facility waste acceptance criteria to adequately support the needs of waste operations.
- Not all waste is feasible to track in the existing waste tracking systems that are oriented to discrete waste containers. Examples include continuous feed waste or waste moved via pipeline.
- From the waste operations managers' perspective, more data is collected than is necessary to manage waste operations. The managers also noted that funding for data collection and data entry typically comes from the operations portion of the budget.
- Data about off-site shipments is not perceived as well integrated into tracking systems. There is often a lag in data entry for off-site shipments. There are delays in obtaining invoice data from commercial treatment facilities. The off-site shipments program must manually collect manifests and invoices and enter information into a stand-alone off-site shipments database.
- Site waste tracking systems are not updated with the waste grouping assignments made by the waste type program managers and others involved. Consequently, it is often difficult for waste operations to track waste in a way that correlates with waste type program plans.
- Because of a lack of integration, effective tracking through treatment at treatment facilities is not feasible. Waste is typically delivered to a treatment facility but may stay in working storage for considerable time awaiting, for example, feed preparation. The prevalent assumption of the existing tracking systems is that delivery to the treatment facility is equivalent to completion of the requested treatment.

2.3 SUMMARY OF SESSIONS WITH DOE-ORO-WMTD

A full report of the session is included in Appendix E.

2.3.1 Background

DOE-ORO's WMTD was organized to manage activities funded by EM-30 (Waste Management) and EM-50 programs. Recently, however, program changes have resulted in EM-60 and EM-70 funding as well.

There are three principal branches within WMTD: Operations, Integration, and Technology Development. The Operations Branch contains the DOE waste type program managers for each of the six major waste types as well as the site program manager for each Oak Ridge site. The Integration Branch is primarily involved in activities that cross EM organizational lines and the Technology Development Branch is focused primarily on EM-50 development activities. In addition, the WMTD division contains facility representatives for the ORR facilities placed in the EM program over the past few years.

The WMTD division is responsible for the approval and administration of WM program plans on the ORR. In this role, the division approves plans and associated funding, monitors contractor performance, and administers the WM portion of the ORR Management & Operating (M&O) contract as well as those of other contractors who provide services.

2.3.2 Process

A complete listing of those attending the session is contained in Appendix E. Those who attended included DOE waste type program managers as well as their LMES counterparts. In addition, DOE facility representatives and site program managers and other WMTD staff members attended one or both of the sessions. The first session was used to develop a FAST diagram depicting the essential functions of the DOE-WMTD (see Figure 2.3). The second session was used to develop a table that showed high level information requirements of DOE-WMTD staff (see Table 2.3).

2.3.3 Results

Significant results from the sessions with DOE-ORO-WMTD included the following:

- Waste type program costs are not readily available and difficult to monitor.
- Unit costs for waste operations are not readily available.

WASTE TRACKING/INFORMATION - DOE WASTE MANAGERS FUNCTIONS

FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- 2-14-96

Figure 2.3

**MATRIX OF FUNCTIONS AND REQUIREMENTS
DOE MANAGERS**

Requirement/ Information Needs	Manage Waste	Fund Programs	Allocate Funds	Inform Regulators	Inform HQ	Request Funding	Award Contracts	Communi- cate with M&O	Consult with Stake- holders	Formulate Plans	Define Work Scope	Approve Work Scope
Current Inventory by Waste Type (Q)	✓		✓	✓	✓			✓	✓	✓	✓	
Future Generation Rates (Q)	✓			✓		✓				✓		
TSD Capacities BWT	✓									✓		
Planned Thru-put	✓									✓		
Permit Information by FAC	✓									✓		
Storage Information	✓									✓		
TSD Costs by Facility*	✓					✓				✓		
Character Information	✓									✓		
Currency of Information	✓									✓		
Info Needs On/Off Site												
TSD Service Providers												
Match WG to Potential TSD Providers												
WAC												
\$/Unit Quantity												
M&O Contr. Waste Groups												

*Needed at Activity Level
(Q) Quarterly

Table 2.3

MATRIX OF FUNCTIONS AND REQUIREMENTS DOE MANAGERS

Requirements/ Information Needs	Develop Strategy	Negotiate with Regulators	Evaluate Information	Trend Waste Inventory	Approve /Disapprove Cost Savings	Evaluate Contractor Performance	Gather Informa- tion	Track Inventory	Comply with Require- ments	Monitor Spending	Monitor Progress	Monitor Waste Move- ment
Current Inventory by Waste Type (Q)	✓			✓		✓	✓	✓	✓		✓	✓
Future Generation Rates (Q)	✓		✓				✓					
TSD Capacities BWT	✓		✓				✓					
Planned Thru-put	✓		✓									
Permit Information by FAC	✓											
Storage Information	✓											
TSD Costs by Facility*	✓											
Character Information	✓		✓				✓					
Currency of Information	✓		✓									
Info Needs On/Off Site												
TSD Service Providers												
Match WG to Potential TSD Providers												
WAC												
\$/Unit Quantity												
M&O Contr. Waste Groups												

*Needed at Activity Level

Table 2.3 continued

- Facility related information is not readily available.
- Current inventory by major waste type is not readily available.
- Forecasts of future generation rates for many waste streams are not readily available.
- Waste grouping information to match M&O contractor program plans is not readily available.

2.4 SUMMARY OF SESSIONS WITH LMES WASTE GENERATORS

A full report of the session and a complete list of those attending is contained in Appendix F.

2.4.1 Background

Almost every site, facility, and every individual employed on the ORR is a waste generator. Sanitary and industrial waste is generated in activities that range from cafeteria operations to office activities. Hazardous wastes include items in routine use such as batteries and aerosol cans while manufacturing and other operations produce sizable streams of ongoing generation of all types of wastes. Due to the cutting-edge nature of their program goals, research and development activities often generate quantities of exotic wastes while WM activities treat and dispose of large quantities of all types of waste, typically generating additional waste streams during the waste treatment.

Most operating organizations on the ORR have designated individuals to be responsible for maintaining compliant operations. These persons have typically received training in the reservation-wide waste certification program instituted by ESWMO and are normally responsible for maintaining collection points and collection areas within their organization, preparing the necessary paperwork to certify waste by type and quantity in accordance with the waste certification program requirements, and initiating pickup of the waste by the site WM personnel. Many of these individuals participate in other areas related to WM as well, including the Pollution Prevention Program and assess planned processes for waste generation forecasts.

2.4.2 Process

Session attendees included organizational waste coordinators from divisions at each of the three Oak Ridge sites, with ORNL attendance significantly larger than for the other two facilities. The first session was used to develop a FAST diagram depicting the essential functions of waste generators with regard to waste information (see Figure 2.4). The second session was used to develop a table depicting high level information requirements of waste generators by essential function (see Table 2.4).

WASTE INFORMATION/TRACKING - LMES WASTE GENERATORS FUNCTIONS
FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- REVISED 2-16-96

Figure 2.4

**MATRIX OF FUNCTIONS AND REQUIREMENTS
LMES Waste Generators**

Requirements/Info Needs	Request Pick-up	Prepare /Submit Forms	Complete Document	Certify Waste	Verify Data	Characterize Waste	Interpret Analytical Results	Document Process Knowledge	Sample Waste	Survey Waste (RAD)
Pick-up Location	✓	✓	✓		✓					
Priority	✓	✓	✓		✓				✓	
Requester	✓	✓	✓		✓					
2109 Data		✓	✓	✓	✓					
PK Form		✓	✓	✓	✓	✓				
S & A Data		✓	✓	✓	✓	✓	✓	✓		
Variance Form		✓	✓	✓	✓	✓				
RAD Characteristic		✓	✓	✓	✓	✓	✓	✓	✓	✓
MSDS		✓	✓	✓	✓	✓			✓	
CFR's			✓	✓	✓	✓				
Time Limits			✓		✓	✓				
Special Forms		✓	✓	✓	✓	✓				
When to Sample Criteria				✓		✓		✓	✓	
Results Assessment Criteria				✓	✓	✓	✓	✓		
Forms Receiver	✓	✓								
Origin Location								✓	✓	✓
Originator								✓	✓	✓
Origin Process								✓	✓	✓
Operating Procedure										
NMC&A									✓	
Fissile Limits										
Current Fac. Inventory										
Permits										

Table 2.4

MATRIX OF FUNCTIONS AND REQUIREMENTS LMES Waste Generators

Requirements/Info Needs	Analyze Waste	Identify Waste	Identify Regulatory Requirement	Review Criteria	Write Procedures	Perform Audits	Get Trained	Generate Document	Receive Waste	Prioritize Waste	Handle Waste
Pick-up Location								✓			
Priority	✓							✓			✓
Requester								✓			
2109 Data								✓	✓		
PK Form	✓							✓			
S & A Data	✓							✓			✓
Variance Form				✓				✓			
RAD Characteristic	✓							✓	✓		✓
MSDS	✓							✓			✓
CFR's				✓				✓			✓
Time Limits	✓					✓	✓	✓	✓		✓
Special Forms	✓							✓			✓
When to Sample Criteria	✓							✓			
Results Assess. Criteria	✓				✓			✓			
Forms Receiver								✓			
Origin Location	✓	✓						✓	✓		
Originator	✓	✓						✓	✓		✓
Origin Process	✓	✓						✓	✓		✓
Operating Procedure								✓	✓		✓
NMC&A								✓	✓		✓
Flexile Limits								✓	✓		✓
Current Fac. Inventory								✓	✓		✓
Permits									✓		✓

Table 2.4 continued

2.4.3 Results

Significant results from the sessions with LMES Waste generators included the following items:

- There is considerable overlap in the essential job functions of waste generator coordinators and waste operations personnel and in the types of data needed. Waste generators need to plan, manage, characterize, and track their waste until they are picked up by site waste management personnel.
- Waste generator personnel do not have access to on-line data entry, query, and reporting from waste tracking systems.
- Many waste generator organizations are forced to maintain their own waste tracking database(s) to support division reporting since those requirements are not met by the existing waste tracking systems operated by the WM organizations.
- Waste characterization requirements are complex and, other than a training course and some reference materials, little assistance is available in this area. Some "expert system" type of software or other automated tools should be developed that would simplify and assist in proper waste characterization.
- Waste generator personnel involved in interfacing with the WM organizations noted the lack of a uniform set of procedures, instructions, and forms to request waste pickup, across the ORR.
- It is difficult to secure interaction with WM personnel on a particular waste in advance of submission of a request for pickup because of paperwork requirements and communication practices. Many generators would like assistance with characterization and other issues from WM in advance of requesting pickup.

2.5 SUMMARY OF SESSIONS WITH PORTS AND PDGP WASTE OPERATIONS

A full report of the session and a listing of those attending is included in Appendix G.

2.5.1 Background

WM operations and responsibilities at PORTS and PGDP are similar in many ways to those on the ORR. However, some significant differences include:

- Although LMES is the M&O contractor for the five site DOE-ORO, including the ORR as well as the PORTS and PGDP sites, the United States Enrichment Corporation (USEC) leases buildings from DOE for on-going uranium enrichment activities for the private sector. USEC is responsible for managing its own waste.

- In Oak Ridge, the WM program (EM-30) is funded and managed separately from the Environmental Restoration program (EM-40), while at PORTS and PGDP the WM program is funded in conjunction with EM-40 which manages all DOE activities at PORTS and PGDP. WM activities differ from those WM activities on the ORR in that direct interaction between waste generator and waste operations begins during project planning and continues through final disposition of the waste.
- The PORTS and PGDP WM program has a much stronger focus on managing waste generated by ER remediation projects than does the ORR WM program. This orientation gives the PORTS and PGDP WM program a stronger project orientation.

2.5.2 Process

Managers from both the PORTS and PGDP WM organizations attended the session and the ORR ER program was also represented. The first session was used to develop a FAST diagram depicting the essential functions of PORTS and PGDP WM operations (see Figure 2.5). The second session was used to develop a table depicting high level information requirements of PORTS and PGDP WM operations (see Table 2.5).

2.5.3 Results

Significant results from the sessions with PORTS and PGDP Waste Operations included the following:

- Waste operations at PORTS and PGDP interface with waste generators from a project perspective much more than the ORR because of the focus on waste management as an integrated function within project management activities at those sites.
- The interface between waste generators and waste operations at PORTS and PGDP involves much more planning for waste minimization, treatment, and disposal than on the ORR where the interface is often a request for waste pickup.
- Waste operations staff at PORTS and PGDP do not feel well-integrated into the ORR WM program, practices, and systems, but would like to become an integral part of the program.
- The waste tracking systems in use at PORTS and PGDP are soon due for replacement. There is interest from PORTS and PGDP in moving in a direction similar to ORR if it is feasible, and if possible leveraging any ORR investment in information systems.
- Waste Operations does more interfacing with generator projects in up-front planning than on the ORR.

WASTE INFORMATION & TRACKING
LMES PORTSMOUTH/PADUCAH WASTE OPERATIONS FUNCTIONS
FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- 2-19-96

Figure 2.5

**MATRIX OF FUNCTIONS (Emphasis on Waste Operations)
Portsmouth & Paducah Waste Operations**

Requirement/ Information Needs	Eliminate /Dispose Waste	Manage Waste	Store USEC Waste	Certify Waste Disposal Treatment	Inspect Waste	Transport Waste	Arrange Off-Site Transport	Arrange Off-Site TSD	Sample Waste	Accept Waste	Group Waste	Certify Waste Storage	Process RFD	Interface with Project
Analytical Data	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	
Waste Regulations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Waste Volumes	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓
BDAT's	✓	✓		✓				✓	✓		✓			
FACWAC	✓	✓		✓				✓	✓	✓	✓	✓	✓	✓
Waste Type	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
DOT	✓	✓				✓	✓		✓					
Unit Translators	✓	✓											✓	
Project Description	✓	✓							✓		✓			✓
Risk Factors	✓	✓												✓
Project Schedules	✓	✓												✓
Waste Destination	✓	✓		✓						✓	✓		✓	
Project Prioritization	✓	✓												✓
Costs	✓	✓												✓
Commitments	✓	✓												✓
Accruals	✓	✓												
Originator	✓	✓												
Current Location	✓	✓	✓						✓				✓	
Packaging Requirements	✓	✓			✓	✓	✓	✓			✓		✓	
TSD Facility Capacity	✓	✓	✓		✓				✓			✓	✓	
Off-Site TSD Capacity (Facility)	✓	✓				✓	✓	✓		✓				

Table 2.5

MATRIX OF FUNCTIONS
Portsmouth & Paducah Waste Operations

Requirement/ Information Needs	Develop WM Plans	Review Project Waste Plan	Define WAC	Review Project PZ Potential	Waste Forecast	Manage Baseline	Minimize Waste	Recycle Waste	Source- Reduce Waste	Track Waste	Track Casks	Train Generator	Forecast Spending	Manage Contracts	Report Waste Info
Analytical Data	✓						✓	✓	✓	✓				✓	✓
Waste Regulations	✓		✓				✓	✓	✓	✓		✓		✓	✓
Waste Volumes	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
BDAT's										✓					✓
FACWAC	✓											✓	✓	✓	
Waste Type	✓					✓	✓	✓	✓	✓			✓	✓	✓
DOT													✓		
Unit Translators										✓					✓
Project Description	✓					✓									
Risk Factors															
Project Schedules	✓					✓							✓	✓	
Waste Destination	✓									✓			✓	✓	✓
Project Prioritization													✓	✓	
Costs						✓							✓		✓
Commitments						✓							✓		
Accruals						✓							✓		
Originator													✓		✓
Current Location										✓					✓
Packaging Requirements											✓				
TSD Facility Capacity	✓						✓	✓				✓			✓
Off-Site TSD Capacity (Facility)															

Table 2.5 continued

2.6 SUMMARY OF SESSIONS WITH PORTS, PGDP, AND ER WASTE GENERATORS

A full report of the session and a complete list of those attending is included in Appendix H.

2.6.1 Background

The DOE ER Program is managed as a five-site program, including the three Oak Ridge sites and PGDP and PORTS. The primary focus of the ER program is site remediation. Projects range from characterization, removal, treatment, and disposal of a small amount of contaminated soil all the way to full demolition of a major process building or facility and restoration of the site to "green field" condition. EM-40 activities at PORTS and PGDP will produce waste from landlord and contaminated site remediation activities. Typical ER projects include the remediation of contaminated soil and groundwater and the demolition of large process buildings. These projects have the potential to generate large volumes of troublesome wastes for which cradle-to-grave waste tracking and information management is imperative. The wastes may be categorized as hazardous, PCB-contaminated, low-level or TRU radioactive contaminated, or any combination. No high-level radioactive waste is managed by EM-40 at either PGDP or PORTS

The ER program also funds WM activities at the PORTS and PGDP sites. While much of the WM focus there is on treatment and disposal of wastes generated by ER projects, the PORTS and PGDP sites are still actively-operating uranium enrichment processes. Plant operations generate significant waste streams that can be classified as sanitary, hazardous, radioactive-contaminated, PCB-contaminated, or some combination.

2.6.2 Process

Representatives from PORTS and PGDP who are involved in both waste management operations and waste generator activities attended the session. Waste generators from environmental projects at each Oak Ridge sites also participated as did the Environmental Restoration/Waste Management (ERWM) Program. The first session was used to develop a FAST diagram depicting the essential functions of these types of waste generators (see Figure 2.6). The second session was used to develop a table that shows high level information requirements of these types of waste generators by essential job function (see Table 2.6).

WASTE INFORMATION & TRACKING
LMES PORTSMOUTH/PADUCAH WASTE GENERATOR FUNCTIONS
FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- 2-20-96

Figure 2.6

MATRIX OF FUNCTIONS & INFORMATION NEEDS
Portsmouth/Paducah Waste Generators

Requirement/ Information Needs	Provide Waste Characteri- zation	Segregate Waste Types	Provide Interim Storage	Minimize Waste Gener.	Package Waste	Assess Risk	Negotiate Closure Plans	Determine Clean-up Levels	Optimize Project vs.W.M.\$	Forecast Waste (Gene- rate)	Train Contract. Personnel	Charac- terize Site	Remediate Site	Develop Waste Mgmt. Plan
Site History Background	✓	✓		✓			✓	✓		✓		✓	✓	✓
Waste Analytical Data	✓	✓	✓	✓	✓			✓	✓	✓		✓	✓	✓
Waste Sampling Plan	✓			✓				✓				✓	✓	✓
Regulations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Waste Qty (Estimate)	✓	✓	✓	✓	✓			✓	✓	✓		✓	✓	✓
Waste Types/Cat	✓	✓	✓	✓	✓			✓	✓	✓		✓	✓	✓
Matrix (Material Info)	✓	✓	✓	✓	✓				✓	✓		✓	✓	✓
Schedule Info (GPM/Storage)		✓							✓	✓		✓	✓	✓
Other ER Projects Info		✓	✓		✓									
Available Minimization Technologies				✓					✓			✓	✓	✓
Storage Facility WAC		✓	✓		✓				✓	✓	✓	✓	✓	✓
Background Levels						✓		✓						
Pathways Analysis						✓	✓	✓						
Site Charac. Data						✓	✓	✓					✓	✓
Risk Assess. Results							✓	✓						
Future Site Intended Use						✓	✓	✓		✓				
Future Surv/Maint. Reqt's							✓							
Available Remediation Technologies							✓	✓	✓				✓	✓
ARAR's							✓	✓	✓				✓	✓
Waste Disposition Options		✓	✓		✓				✓				✓	✓
Waste Disposition Costs		✓	✓		✓				✓				✓	✓
Clean-up Level(s)									✓					

Table 2.6

2.6.3 Results

Significant results from the sessions with PORTS and PGDP waste generators included the following:

- The key difference between typical LMES waste generators on the ORR and the ER waste generators, as shown in the respective FAST diagrams of their essential job functions, is in their basic function. LMES waste generators on the ORR perceive their basic function as requesting pickup, while ER waste generators see their basic function as one of site remediation.
- ER Program waste generators, as well as waste generators at PORTS and PGDP, both employ a strong project perspective.
- The interface between waste generators and waste operations for ER projects involves significant up-front planning for waste forecasting, minimization, treatment, and disposal.
- Because of potentially large volumes of waste streams originating from ER projects, forecasting and waste tracking is a necessity prior to engaging in actual remediation activities.
- The requirements for waste tracking have been included in a recently developed working draft global data model for which a prototype system has been successfully demonstrated.
- The ER Program could potentially leverage ESWMO investment in information systems in the future.
- Because of its specific role, the ER Program is acutely aware of the site-specific nature of procedures, instructions, and forms within WM.

2.7 SUMMARY OF SESSIONS WITH LMES POLLUTION PREVENTION PROGRAM

A full report of the session is included in Appendix I.

2.7.1 Background

Pollution prevention, formerly termed waste minimization, has been a significant focal point for the U. S. Government and private industry, for many years. As environmental concerns have risen to top issues of significant public concern, there has been an increasing focus in favor of reducing or preventing the generation of waste rather than merely conducting treatment and disposal operations. Industry pollution prevention initiatives can take many forms, including elimination of certain unnecessary process steps that generate waste; modification of a process to reduce the quantity or change the type of waste generated; substitution of one type of material for another to decrease either the quantity or characteristics of waste generated; replacement of key equipment items with improved models that generate less waste; or modifications or substitutions that generate by-products that can be recycled or used in other processes rather than waste for which disposal will be required.

The ORR has an active Pollution Prevention Program at each site. While it was formerly funded by EM-30, the program has recently been moved to the EM-70 portion of DOE. While an active Pollution Prevention program is mandated by DOE Orders and other applicable regulations, many of the disposal sites also require that generators take an active role in waste minimization before agreeing to accept waste for disposal. The Pollution Prevention program recognizes that waste minimization can be carried out to an extreme which does not enable effective cost recovery. Consequently, protocols and software programs have been developed and propagated which aid the waste generator in evaluating proposed pollution prevention projects through traditional economic analysis measures such as return on investment and payback period.

The Pollution Prevention Program also maintains a ranked list of projects judged to offer sufficient return to justify being funded and generates proposals on behalf of these projects whenever funding possibilities are identified. There is significant coordination across all of the DOE sites by staff from DOE Headquarters and, through publications and Internet sites, valuable sharing of techniques and approaches across the sites can be realized.

2.7.2 Process

While the results are similar (i.e., a FAST diagram), the Pollution Prevention Program sessions were not conducted as traditional facilitated function analysis sessions. An initial meeting with Mr. Sam Suffern, LMES Program Manager for the Oak Ridge Pollution Prevention Program, exchanged information on the need for his input to the function analysis effort for waste information. A FAST diagram (see Figure 2.7) depicting the essential functions of the pollution prevention program was developed during a subsequent meeting held in Mr. Suffern's office to provide ready access to documents related to the Pollution Prevention Program.

2.7.3 Results

The meetings with the LMES Pollution Prevention Program manager included the following significant results:

- The Pollution Prevention Program appears to be well-defined and well-standardized across the sites.
- The recent move of the Pollution Prevention Program from EM-30 to EM-70 is likely to sponsor an expansion of the ORR effort to include both PORTS and PGDP.
- The pollution prevention program has recently sponsored, and funded, a custom-developed information system for use by the program.
- The pollution prevention information system has experienced some initial difficulties, but is still in development at this time.
- The pollution prevention information system is a stand-alone system with no integration with other ESWMO information systems.
- Reliable waste generation forecast data is needed by the Pollution Prevention Program to the same degree that it is needed by the waste type program managers and by others involved in planning but it is not readily available.
- Waste generation process data by specific generating process is not available from existing waste tracking systems, but is also needed by the Pollution Prevention Program.
- Existing waste management tracking systems either do not require entry of generator account or work order information and/or do not validate account or work order information to ensure validity. This makes it much more costly and troublesome for the Pollution Prevention Program to implement the waste generator set-aside program.

WASTE INFORMATION & TRACKING - LMES POLLUTION PREVENTION FUNCTIONS
FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- March 1996

Figure 2.7

MATRIX OF FUNCTIONS AND REQUIREMENTS
Waste Program Managers

Requirements/Actions	Interpret Regulations	Provide Regulatory Guidance	Assist Implementation	Maintain Compliance Program
40 CFRs	✓	✓	✓	✓
OSWER Directives	✓	✓	✓	✓
Relevant Case Law	✓	✓	✓	✓
Regulatory Policies	✓	✓	✓	✓
Site Data (90 Day & RCRA Areas)	✓	✓	✓	✓
Waste Data	✓	✓	✓	✓
Project Data	✓	✓	✓	✓
Organization Highlights	✓	✓	✓	✓
State Regulations	✓	✓	✓	✓
DOE Orders	✓	✓	✓	✓
Organization Data (who needs guidance)		✓	✓	✓
Regulator Information		✓	✓	✓
Site Procedure Data			✓	✓
Permit Data			✓	✓
Data Report/Milestone Tracking			✓	✓
Permit Requirements			✓	✓
Internal Procedures				✓
Internal Oversight Data				✓
Non-Compliance Data				✓

Table 2.7

2.8 SUMMARY OF SESSIONS WITH LMES ENVIRONMENTAL COMPLIANCE PROGRAM

A full report of the session is included in Appendix J.

2.8.1 Background

LMES maintains an active environmental compliance program to assist with the myriad issues that are associated with maintaining fully compliant operations on the ORR. Compliance activities involve staff in the central ESWMO, the site-oriented WM divisions, certain of the generator organizations, and a combined central and site environmental compliance group.

The combination of these efforts ensures successful compliance. Tracking regulatory changes and interpreting regulations is a sizable responsibility which must be followed by determining the applicability of regulations to various ORR operations and providing the necessary guidance to operations managers in conforming with the regulations.

Another critical area for environmental compliance activities is in maintaining required permits for operations, treatment, storage, and disposal facilities. Each permitted facility requires at least one permit while separate permits are often required from state regulators and the U.S. Environmental Protection Agency. For example, separate permits may be required for storage, air discharge, and water discharge.

The reporting required by both state and federal regulators and DOE at local and Headquarters level is yet another critical area for environmental compliance activities. In addition, corporate reporting requirements must also be met.

LMES operations are subject to audits from any of the regulatory and oversight organizations mentioned above. Each audit has a particular focus and may result in findings that, in the worst case, would preclude further operation and which, in any case, must be ameliorated and tracked until corrective actions are completed.

2.8.2 Process

Session attendees included representatives from all of the ESWMO organizations as well as the central and site-oriented Environmental Compliance organizations. All ORR sites were represented. A session was held at which a FAST diagram depicting the essential environmental compliance functions was developed (see Figure 2.8). During the same session, high level information requirements for the essential environmental compliance functions was formulated.

WASTE INFORMATION/TRACKING - LMES ENVIRONMENTAL COMPLIANCE FUNCTIONS
FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- 3-29-96

Figure 2.8

2.8.3 Results

Significant results from the sessions with the LMES Environmental Compliance Program included the following items:

- Waste inventory data necessary for compliance reporting are often not fully complete and contain both errors and omissions.
- Data quality is critical to successful compliance reporting.
- There is a possibility of incorrect data entry.
- There is a significant lag at times in the availability of critical compliance reporting data.
- A wait of three to four months for end-of-period inventory data entry to be completed is not uncommon.
- While the central and site Environmental Compliance groups will assist in report preparation, interpret of reporting requirements, and interface with the regulators as required, they essentially regard data ownership, responsibility for data accuracy, responsibility for report preparation, and responsibility for reporting accuracy as belonging to the ESWMO organizations.
- Reporting milestones to ensure compliance such as Resource Conservation and Recovery Act (RCRA) accumulation, exception reports, satellite areas, and PCB reports must be tracked.
- Permit-related milestones must be tracked to ensure that facilities remain in compliance
- Other compliance-related milestones such as receipt of manifest and invoice data from off-site disposal sites and receipt of certificates of disposal must be tracked.

2.9 SUMMARY OF MEETING WITH MR. ANGEL RIVERA ON TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION COMMISSIONER'S ORDER

Materials from this session are included in Appendix K.

2.9.1 Background

Since the passage of the FFCAct in 1992, DOE and LMES program managers have been preparing plans and negotiating with Tennessee regulators to ensure compliance with the provisions of the Act.

A draft site treatment plan (DSTP) was developed which contained specific descriptions of waste streams governed by the Act, including chemical, hazardous, and radioactive constituents, and quantities. The DSTP also identified intended treatment and disposal options by waste stream and provided a draft schedule for accomplishment.

Negotiation differences involved differing perspectives on the relative risk of various waste streams and the efficacy and relative cost of various treatment methods, among other items. DOE budgets began to be reduced during the negotiating process, thus lengthening schedules for accomplishment to durations unacceptable to state regulators.

Up to approximately that point, DOE-ORO-WMTD had been pursuing a dual strategy of planning for construction of a mixed waste treatment facility on the ORR and simultaneously exploring the possibilities for commercial waste treatment by the private sector. This two-pronged approach was more expensive but less risky than reliance on a single alternative. Budget realities forced the agency to abandon plans for construction of a GOCO facility and to place full reliance on the private sector for waste treatment.

All the above changes were factored into a document that became known as the Proposed Site Treatment Plan (PSTP) which formed the basis for a Tennessee Department of Environment and Conservation (TDEC) Commissioner's Order for Mixed Waste Treatment that took effect on October 6, 1995. The Order mandates a 3-year rolling set of treatment and disposal milestones, bi-annual reporting, and 5-year forecasts of the quantities of waste in storage. The first report and forecast was due to the State of Tennessee on April 30, 1996.

2.9.2 Process

Mr. Angel Rivera was closely involved in the preparation of both the DSTP and PSTP plans as well as in the negotiations with state regulators and now works to ensure compliance with the Commissioner's Order. The meeting with Mr. Rivera was not conducted as a traditional function analysis session because the focus was on waste tracking requirements to ensure compliance with the Commissioner's Order. Consequently, the meeting was held in Mr. Rivera's office to facilitate access to relevant documents.

2.9.3 Results

Key points from the discussion with Mr. Rivera included the following:

- The Commissioner's Order only applies to waste streams for which there is a determination of non-compliance. As soon as compliance is achieved for a particular waste stream, there will be no further establishment of milestones related to that waste stream.

- Compliance results when a state is reached where material is only being accumulated or stored until sufficient quantity is achieved to enable disposal in an economic manner (i.e., no legacy waste in storage).
- The intent of the Commissioner's Order is to produce measurable progress toward compliance (i.e., a reduction in legacy waste in storage).
- Milestones in the Commissioner's Order are specified for a 3 year period. At the end of each year, the remaining 2 years of milestones are revisited and a new third year set of milestones is negotiated. These milestones specify very specific quantities of specific waste streams that must be treated and disposed.
- Because the intent of the Order is to cause a reduction in stored wastes, the milestones actually specify targets for inventory reduction (i.e., beginning inventory less ending inventory = target).
- Because the milestones specified in the Order use the difference between beginning and ending inventories, anything which adds to the ending inventory must be considered. This would include, obviously, current generation of waste. However, it also would include the impact of any corrections or adjustments made to the inventory information during the period.
- From the foregoing, it can be seen that a current and accurate inventory must be maintained. This inventory requires an accurate beginning inventory that is current and prompt posting of all accurate transaction data during the period to produce an accurate ending one.
- Some waste currently considered "mixed" can be reclassified from time to time as "hazardous." Under RCRA requirements, the clock starts ticking at this point on the maximum holding period within which the hazardous waste must be disposed. An effective waste tracking system must recognize this reclassification to enable effective disposal to be managed properly.

Progress reports are required by the Commissioner's Order every 6 months. The requirement includes the beginning inventory and new inventory projections for each of the next 5 consecutive fiscal years.

Effective waste tracking must distinguish between the basic types of waste streams—that is, waste which includes a RCRA (hazardous) component and low-level radioactive contamination; waste which includes a RCRA (hazardous) component, low-level radioactive contamination, and a TSCA (PCB) component; waste which includes a TSCA (PCB) component and low-level radioactive contamination; waste which includes a RCRA (hazardous) component and a TSCA (PCB) component; waste which includes only a TSCA (PCB) component; waste which includes

only a RCRA component; and LLW which only includes low-level radioactive contamination. Sanitary waste is not considered under the FFCAct but it still must be tracked and forecasted to ensure effective landfill management and planning.

2.10 SUMMARY OF INPUT FROM MR. ROLF MIGUN ON THE ESWMO ENTERPRISE MODEL

Additional materials are included in Appendix L.

2.10.1 Background

A number of recent ESWMO strategic planning initiatives have noted that the organization must become more efficient and effective in managing ORR waste. As noted previously in this document, WM operations have historically been conducted by site-oriented organizations. There is, however, a growing recognition that ESWMO must begin to function effectively as a single organization to eliminate duplication and redundancy to achieve the desired degree of additional efficiency. Rolf Migun and other ESWMO staff have been working on a draft planning document, the ESWMO Enterprise Model, which is oriented to a single organizational perspective.

2.10.2 Process

A number of meetings and discussions have recently been held with Mr. Migun to discuss the ESWMO Enterprise Model. These meetings were not conducted as traditional function analysis sessions because of the focus on the Enterprise Model and its related requirements.

2.10.3 Results

Points from the meetings, along with material supplied by Mr. Migun, included the following key items:

- Adequate forecasting of future waste generation is essentially nonexistent within ESWMO.
- Process flow sheets for principal waste streams depicting the necessary treatment, storage, and disposal steps by facility are in many cases nonexistent within ESWMO. Where they do exist, they are not well-integrated with facility information and/or with waste-related information stored in existing tracking systems.
- Existing waste tracking systems do not contain or reflect standard waste operations processing steps or events to enable physical identification and tracking of specific wastes through the processing life cycle.
- There currently is no recognized set of standard operations steps that are defined, maintained, and used across ERWM waste operations.

- Existing waste tracking systems lack the capability to reflect the schedule results of program planning and thus cannot be relied upon for process schedule monitoring.
- Standard unit costs and standard rates by process step are not well-defined and are not integrated into waste tracking systems to enable accurate unit cost accounting and reporting.
- Appropriate linkage between existing waste tracking systems and the financial systems used by ESWMO do not exist, therefore prohibiting effective and accurate reflection of unit costs.

3. ANALYSIS

3.1 EVOLUTION TO CURRENT SITUATION

3.1.1 Organizational Evolution

WM activities on the ORR have been strongly site-oriented. In addition, each of the WM Divisions at each of the three sites was created at a different point in time. The ORNL site WM division is the oldest and the K-25 site WM division is the newest, although the WM function's existence predated creation of the division by several years. At their inception, the site-oriented WM division heads reported to the senior site manager.

In April 1993, a combined organization, ESWMO was created, including a fourth division, known as Energy Systems Waste Management Central. Reporting lines were changed so that the heads of the site WM divisions at the sites began to report directly to the Director of ESWMO.

The creation of the ESWMO combined organization produced a trend toward centralized management of waste management activities. In addition, both DOE Headquarters and DOE-ORO have begun to make the organizational changes to support management by each of six major waste types rather than by site. Both trends are seen as producing the possibility for significant cost savings by elimination of duplicate activities and roles. The creation of ESWMO also supported a movement to increased consistency and standardization of business rules, operational practices, and overall management.

To support these initiatives, ESWMO senior management has appointed a single manager for the Information Services Organization (ISO) and changed the reporting lines so that individual site information systems managers report to the manager of information services rather than to the individual site division directors. Budgetary responsibility and authority for the consolidated information services budget is now placed with the manager. These changes are viewed as key to future possibilities for the consolidation and integration of waste tracking and for more information efforts across the sites.

3.1.2 Information Systems Evolution

An effort to establish waste tracking systems at each site closely mirrors the establishment of the site WM divisions. The circa-1982 ORNL site waste tracking systems was followed by development of a waste tracking system at the Y-12 Plant in December 1991. A waste tracking system for the K-25 Site, which has the largest inventory, was established in April 1992. A number of analysis and development efforts have been mounted in the past to explore possibilities for consolidation and integration of waste tracking data. A Performance Improvement Process Team, which was chartered in 1991, provided a report in August 1992 identifying both opportunities and barriers to consolidation of waste tracking systems. This effort

led to the development and deployment of the "central" waste tracking system outlined below. The report also contained a recommendation to evaluate the feasibility of replacing the site-oriented systems with a common waste tracking system after initial deployment of the "central" system was accomplished.

The effort to evaluate the feasibility of replacing the site-oriented systems with a common waste tracking system became known as the Energy Systems Waste Information Services Environment (ES-WISE) project. The effort produced valuable conclusions concerning site-related differences and developed a strategic vision for these differences in the future. A Strategic Vision Implementation Plan (SVIP) also provided a roadmap for accomplishing goals.

The ES-WISE and SVIP initiatives resulted in tasks to define and implement a Common Lookup Environment (CLUE). The CLUE effort is an attempt to centrally establish and maintain tables of data values needed for reference by the various waste tracking systems in use and is a necessary first step towards the consolidation and integration of waste tracking systems. Related to CLUE is an ORR-wide Waste Certification Program permitted the development of a standard Request for Disposal form in March 1995. Now known as the "Common 2109," an electronic version should be implemented shortly.

The Waste Management Architectures Project (WMAP) was initiated in May 1995 to more closely integrate WM information management with WM business strategy in the future by defining the As-Is and To-Be baselines for software applications and technology and a migration roadmap from one to the other. The effort was subsequently placed on hold in deference to the Function Analysis effort.

In addition, an attempt to define a global data model for waste management has been initiated with each of the three ORR sites, ESWMO Central, and the ER Program at the K-25 Site, PORTS, and PGDP providing input. A prototype implementation of the global model is being carried out by ESWMO and Data Systems Research and Development staff with plans for implementation by both the Y-12 WM Organization and the five-site ER organization. This global data model is seen to be the most comprehensive of the existing data models in encompassing overall WM requirements. However, the model focus is primarily waste tracking and it needs expansion for the rest of WM information.

Each ORR site presently operates its own waste tracking system. These systems have much in common but also differ significantly in data content, functionality, and their technology base. Developed with primarily operational requirements as their focus, the systems only track waste during a segment of the total waste life cycle and provide only a small fraction of the functionality needed to support WM operations across the board.

The PORTS and PGDP sites have their own waste tracking systems, although in need of replacement; PORTS is currently working on implementing and modifying for its use the system developed and currently used by the K-25 Site.

A "central" waste tracking system was developed and deployed over the past few years, primarily to provide TDEC with interactive access to waste tracking data, as required by the Tennessee Oversight Agreement (TOA) between TDEC and DOE. The system accepts data from each of the three ORR site waste tracking systems and makes it available in a consistent data structure format. By design, the functionality for data manipulation using this system is relatively limited.

In parallel with many of the activities outlined above, the TSCA Incinerator operating organization has developed a highly effective customized process support system. It tracks waste feed received from each of the sites through feed preparation, blending, incineration, and residue management. As a stand-alone system though, it is not integrated with any of the other tracking systems operating on the ORR.

The current expenditures for development, maintenance, and operation, including data entry, of waste tracking systems on the ORR (including the analysis and development efforts outlined below but excluding any PORTS and PGDP waste tracking efforts) are in excess of \$6 million annually.

3.1.3 Contractual Evolution

The past 15 years have seen several changes in M&O contracting. Originally the M&O contract for the ORR and PGDP was a cost-plus-fixed-fee arrangement with Union Carbide Corporation; the M&O contract for the PORTS site was held by Goodyear Atomic Corporation. In 1984, an aggressive cost-plus-award-fee contract with Martin Marietta Energy Systems, Inc., (now LMES) replaced the fixed fee contract. The transfer of the PORTS site to the Martin Marietta contract followed.

In the latter part of 1992, the U.S. Congress created USEC, a quasi-government corporation and management of the operating contractor activities at the PORTS and PGDP sites from the government perspective was transferred to it. Martin Marietta established a separate subsidiary and signed an operating contract with the USEC to operate the PORTS and PGDP sites. At the beginning of 1996, Lockheed Martin established yet another separate subsidiary to manage ORNL and Lockheed Martin Energy Research Corporation, as the new subsidiary is known, signed a separate fixed fee operating contract with DOE to operate the national laboratory.

Since this study began, ESWMO senior management have initiated activities to replace the current contractual arrangement for WM activities on the ORR (currently performed under the blanket M&O contract) with a series of incentive task order contracts along the lines of the major waste types. Should this shift become reality, it will have the effect of dramatically and urgently strengthening the trend to management by major waste type rather than by site. In addition, it will also bring opportunities for improved consistency in business practices across the sites and institute significant additional information systems requirements which must be met. The goal for completing this change in contract vehicles is October 1, 1996, thus leaving only a brief window for innovation and development.

3.2 PROBLEMS WITH THE CURRENT SITUATION

Each of the function analysis sessions with major stakeholders identified the significant shortcomings summarized in the “Results” portions of Section 2.0. Many of these can be traced to a lack of adequate support for significant functional areas of the WM business and the roles and responsibilities of key players in the WM business that not met with any combination of organizational infrastructure, existing systems, and databases because needed data are simply not readily available in any of the accessed databases and systems.

A list of shortcomings in the current situation with regard to waste information statements follows. This list was captured or generated during this effort and is an addition to those shortcomings identified by the stakeholders in portions of Section 2.0.

- The ability to determine the unit cost of waste operations processing steps will be of critical importance to ESWMO’s future success; however, it is not easily obtained with the existing systems.
- It is difficult to account for waste shipped from one ORR site to another in an independent system because of the differences in captured shipment data. There is no direct electronic transfer of shipment data; the ending site must prepare the receiving site’s paper forms.
- Any strategic planning for waste disposition is difficult due to a lack of centralized waste inventory and a lack of unit cost information. It is thus difficult to estimate the cost of WM throughout the waste life cycle.
- Waste Operations needs ready access to accurate and approved waste certification procedures.
- There needs to be better tracking of the waste leaving and entering the ORR.
- Off-site Certificates of Treatment and/or Disposal need to be recorded in connection with specific waste item level accounting. The need also exists for better access to manifest and radiation contamination data for invoicing.
- The waste received from off-site sources needs validation of waste certifications.
- Invoice and shipping costs need to be associated with the related manifest and with the specific waste items.
- Integrated (multi-site) waste item life cycle data for RCRA, TSCA, and Department of Transportation requirements is much needed. The data includes manifests, shipping dates, receiving dates, treatment results, and volume reduction.

- Forecasts of waste generation rates are needed for planning purposes.
- At the present, there exists no mechanism to project future (e.g., 5 year) storage requirements, types of facilities, capacities, limits, or acceptance/evaluation criteria.
- Waste treatment and repackaging transformations are different among the sites, are poorly understood, and do not support consistent and traceable accounting of waste.
- A lack of flexibility, and poor integration of systems makes it generally difficult to respond readily to new reporting requirements because of shortcomings in the availability of data.

The following shortcomings are related to the inadequate availability of accurate waste information:

- There is no common data model in use across ESWMO.
- There are no concise data definitions uniformly available to aid in the correct creation, entry, and usage of data.
- Standard naming conventions, policies, and procedures governing data management are not uniformly available or followed.
- There is no central uniformly obtainable repository of data definitions that indicates what data is available, its location and prescribed format, content, and appropriate usage.
- Different groups within ESWMO define the same data in differing ways.
- There are currently 11 different Electronic Data Deliverables.
- Some important data is not captured electronically and therefore is not readily accessible or available.
- There is a general lack of access to historic waste item characterization, analytical data, and historic waste stream data.
- There is a lack of accurate mass/volume data.
- There is a general lack of cost information for activities such as waste handling, sampling, analysis, treatment, storage, and disposal.

- Sampling plans are not captured electronically.
- Sampling populations are not identified.
- Conditions on the day of are sampling are not captured.
- Sampling status and analytical results are not readily available.
- Existing and available data lacks any indication of its quality.
- Central and site waste inventories do not contain entries for all waste items and not all entries contain all attributes needed about waste items.
- Some needed information for regulatory reports is not captured.
- There is a lack of clear data ownership, responsibility, and accountability for data capture, data definition, data quality, and correct data usage.
- The infrastructure to adequately manage data is lacking.
- Information is generally regarded as a by-product of other activities and thus is not managed as an essential resource for the organization.
- A lack of recognition exists that data created as a work product by one individual or group will probably be an essential resource for other individuals or groups.
- Some data is not validated upon entry; it therefore is inconsistent and/or incorrect.
- Data validation rules for the same data element differ among the existing systems, thus leading to data that is captured but cannot effectively be exchanged.
- Improvement to ensure consistent validation and integrity of data at the time it is captured and entered is needed.
- The timeliness of information is not always adequate.
- Varying levels of detail are collected.
- Data precision and accuracy requirements are not always met.
- Significant issues exist on data completeness.
- Many data elements are missing (e.g., weights and volumes).

- There is a lack of accurate inventory data.
- There is a lack of verification/validation of laboratory data.
- Many weights and volumes are estimated.
- Estimates are used inconsistently. Some sites put in an estimate while others put in a zero amount unless the waste has actually been weighed.
- Tare weights are not always captured (or estimated) on containers.
- At times, weights and volumes do not distinguish between gross and net values.
- Additional costs are incurred to deal with poor data quality to overcome the problems of completeness, accuracy, timeliness, and correctness.
- There is a proliferation of disparate waste tracking and information systems; redundant functionality, databases, and data elements exist that perform essentially the same function with no mechanism to manage the redundancy.
- The sites are at different levels of automation.
- Some systems are manual and preclude integration and widespread availability.
- Data is not well integrated in central systems or site tracking systems. For example, an inability to view three-site consolidated inventory data is an issue.
- Numerous instances exist where derived data are updated, but changes made to the derived data are neither automatically nor manually updated in the source data.
- There is a duplication of data capture systems. For example, the waste storage report has its own system for capturing waste inventory information; duplication generally exists because untrained personnel have access to the systems, and some trained personnel have concerns about data quality, accuracy and the timeliness of data obtained from others.
- Consolidation of business rules and ensuring consistency of waste identification schemes, operational practices, and data collection methods is needed.
- A consolidation of budget responsibility can aid in resolving business needs and issues.
- Electronic analytical results data are produced regularly (e.g., site sampling crews, off-site sampling) but very little is captured and tied to specific waste items or populations. If the data is captured, it is generally not available for wide distribution and some sampling data is available but is not captured by generators.

- The wide variety of hardware and software platforms, inconsistent business practices, and corresponding data limits the ability to share data easily and effectively.
- Data is perceived as difficult and/or too expensive to obtain, access, and use.
- All personnel are not cross-trained on the variety of tools and computing platforms available, thus reducing both employee effectiveness and the effectiveness of tool deployment.

This lack of consistency of business practices across the sites is the central issue facing ESWMO with the effective deployment, development and use of information systems technology. It will be impossible to obtain the full benefits of automation without consistency of business practices. A recent white paper, *Differences in Site Operations and Their Negative Impact Upon the WM Business*, prepared by the new ESWMO Information Services Organization, outlined the following "Top 10" differences in site operations. These differences include the following:

- Differing thresholds for PCB waste;
- application of bar code labels;
- use of bar code identifiers;
- use of forms in the 2109 form set;
- specific identifiers in use for the 2109 forms and items;
- use of the site waste tracking systems by operations;
- data error, completeness, and detection/correction procedures;
- waste weight;
- waste operations forms and capture of handling information; and
- waste sampling.

3.3 GLOBAL REQUIREMENTS

Most system development methodologies (SDMs) in common use today distinguish between logical or functional design of systems and databases and physical design and development. These SDMs typically call for business strategies to be in place and business practices defined in advance of logical design.

Logical design encompasses development of a common data model which includes, among other facets, a single definition of each data element and accompanying data validation rules. Logical design also usually encompasses development of functional specifications for the various modules of software functionality that will be required. Note, however, that both the common data model and the software functional specifications are initially developed without any regard for physical implementation.

The logical design steps are then followed by a physical design step in which computing hardware, operating system, network, and database management system choices are made and physical design of the system is completed. The physical design usually includes specifically designed database tables, menus, object properties, and/or other physical elements necessary for implementation. Prototyping may be carried out in this step to refine user requirements or to verify adequate performance in the chosen environment. Physical development, testing, user training, and deployment of the resulting "system" follows. The system development process is concluded with the necessary steps to secure user feedback and to maintain or enhance the system as required for future use. This particular function analysis study identified global requirements deemed essential no matter what future strategic alternatives are pursued.

A listing of the requirements include:

- Improved data quality;
- consistent business strategies and practices;
- a better alignment of Information Systems with business strategies;
- common data model;
- defined data ownership - data management plan;
- consolidation to fewer system designs; and
- integration of all WM information systems and practices as required.

Improved data quality should be pursued even with the existing systems. Almost all the remainder of the list of global requirements relate primarily to logical definition and only secondarily to physical design and development.

3.4 ALTERNATIVES

Brainstorming is used in traditional function and benefit-cost analysis studies to identify all possible alternatives for meeting the functional requirements. The list of possible alternatives would then be screened down to only those which were feasible and then subjected to benefit-cost and other analyses that result in selection of the most effective alternative. For this study however, much of the effort needed to address the shortcomings must focus first on the logical definition and design steps and on determining that the requirements in these areas are global in nature and thus apply equally to any feasible alternative. Consequently, most of the so-called alternatives for a waste tracking system would be related to physical development, deployment, and operation.

Some examples of physical development involve choices made in the areas of hardware platform; operating system; network architecture; database management system; software development environment; and desktop user environment.

Some of these choices are not critical as long as the chosen components adhere to the open systems concept. Others, such as the choice of database management system, may have a significant impact on the functionality and capability of the resulting system. Still others, such as the choice of desktop user environment, are often specified by company standards and thus

offer little latitude for selection. It is not feasible to specify major elements of the physical computing environment in advance of the completion of the logical definition of the system.

Some examples of deployment involve single design and development with deployment of multiple copies and multiple databases at the sites; single design and development with deployment of multiple copies of the software but a single central database; single design with central deployment of a single copy of both the software and the database; and a single design of modules that support site operations with multiple copies of the software and multiple databases at the sites to be accompanied by central establishment of a data warehouse and associated functionality to carry out central functions such as reporting, forecasting, planning and associated activities.

The deployment option chosen will have major impacts on system performance and must be done within the context of the existing and planned computing infrastructure. Some of the options require very robust networks while others require considerable central computing resources, among other factors. Thus, it is not feasible to specify deployment alternatives in advance of the completion of the logical definition of the system.

Examples of operation include centralized data entry; distributed data entry; centralized reporting; and distributed reporting. These options do not constitute an exhaustive list and specific operations options can be impacted by physical design and deployment choices as well as existing organizational constraints. Consequently, it is not thus feasible to select operation alternatives in advance of the logical and physical definition of the system.

4.0 CONCLUSIONS/RECOMMENDATIONS

4.1 CONCLUSIONS

- An outline of summary conclusions drawn from this analysis follows:
- The lack of consistency in business practices across the sites is the central issue which must be faced by ESWMO regarding the effective development, deployment, and use of information systems technology. Obtaining the full benefit of automation will not be possible without this consistency.
- This consistency in business practices must be achieved prior to effective consolidation and integration of waste information systems.
- There are significant functional issues that are critical to the efficient discharge of the WM mission that lack effective support (for example, management by waste type and forecasting.) There has been much effort historically expended on waste tracking systems to meet waste operations needs, but not enough effort on meeting requirements for other critical business functions.
- ESWMO lacks a common data model and uniform data specifications that are readily available.
- ESWMO lacks a unified data management plan that clearly establishes responsibility and accountability for the capture, accuracy, dissemination, and proper use of waste information.
- Existing waste information suffers from the lack of adequate data quality in terms of completeness, accuracy, timeliness, and level of detail.
- There is a general lack of data integration existing (e.g., sampling data should be connected to specific waste item or population data, budget and cost accounting data should be integrated with waste operations information).
- Waste information is not regarded or managed as a corporate resource.
- There exists a proliferation of systems for waste tracking comprised of major multi-user, site-oriented systems and smaller, perhaps single-user, databases and systems meant to achieve essentially the same purpose.

- The existing systems are site-specific because they were each developed by their respective sites and were primarily developed to support WM operations at the specific sites. They thus incorporate site differences in WM business practices. A contributing factor has been the organizational and contractual evolution over the past several years.
- The existing systems are not integrated. As an example, waste moving from one site to another requires that data be manually re-entered
- The TDEC Commissioner's Order mandates that accurate waste inventory information be maintained at all times. This Order carries the possibility of levies of fines and penalties for non-compliance.
- The recently renegotiated TOA, between DOE-ORO-WMTD and TDEC reaffirmed the right of state regulators to continued access to a consolidated waste information system, although not necessarily the one that currently exists.
- There is a growing need to track compliance-related milestones such as reporting and permit renewal. However, no unified system exists for this purpose.
- Recent developments such as shifting contract responsibilities and management by major waste type bring additional information systems requirements (for example, the need to calculate accurate unit costs) that are critical to the success of the WM mission.
- There exist significant opportunities for both backward and forward integration of waste information systems, including backward integration to include pre-generation (e.g., ER projects), waste generators, and forward integration to include internal treatment systems (e.g., TSCA), external treatment, and disposal vendors.
- The fact that both the PORTS and PGDP sites want to replace their existing systems constitutes an opportunity to halt the trend towards additional proliferation of major waste tracking information systems.

4.2 RECOMMENDATIONS

There should be an immediate implementation of the following recommendations.

- ESWMO senior management must move immediately to address the central issue of inconsistent business practices across the sites. A multi-site team, sufficiently empowered, should immediately begin to resolve the known consistency issues involving, among other issues, terminology, procedures, practices, and forms. The team should be empowered to make necessary decisions and be charged with the responsibility of achieving consistency. A clear path for resolution by senior management of issues on which the team cannot agree

should be provided to the team in advance. In addition, an extensive effort to publicize and solicit input from ESWMO and all other stakeholder personal to identify additional inconsistency issues for resolution should be implemented.

- The manager of the ESWMO Information Services Organization (ISO) should, with the exceptions noted below, immediately halt all development and enhancement of individual site systems.
- The ISO manager and his staff will develop and publish a strategic plan and specific timetable of major future milestones by July 31, 1996. The report should be along the lines of the recommendations outlined in this study.
- The ISO manager should immediately refocus his resources to take whatever interim measures are required to ensure compliance with the Commissioner's Order and to support the upcoming implementation of ITO contracts. These interim measures (to the extent that it is possible) should be carefully chosen or designed to facilitate the transition to the desired end state for ESWMO information systems.
- As the quality of the data in the existing systems is a compliance issue, ESWMO senior management, current system operators, and the ISO manager and his staff should move immediately to address it. Among other factors, this issue will involve changes in how data is collected and how the data entry function is managed. If it is carried out in concert with any needed changes to data validation for inclusion in the Central Waste Tracking System (CWTS), the CWTS can possibly continue to meet requirements for access by state regulators for some time into the future.
- Much of the information needed throughout the organization is available in electronic form; read-only access is often sufficient. The ISO organization should begin to immediately identify and exploit opportunities to employ Internet and World Wide Web (WWW) technology for the dissemination of the information.
- CLUE contains a great deal of information of interest to many in the organization but it is not readily accessible by staff members. CLUE data should also be made available via the WWW.
- The tables and standard values in CLUE should be expanded as an area in which incremental information consistency can be obtained with minimal impact to existing operational practice.
- The ISO organization should continue present efforts to standardize desktop hardware and software environments.

- The ISO organization should develop a matrix of needed information management skills (including data management as a corporate resource) and a training plan to ensure that adequate training is made available throughout the ESWMO organization.
- The ISO organization and waste information stakeholders should continue to employ network and processor hardware and software oriented towards the open systems concept.

The following recommendations will require a greater length of time to implement than those in the preceding section but completion of these measures constitutes the foundation for future success. Milestones for these items should be established in the ISO strategic plan:

- The ISO organization should develop a common data model that encompasses all data requirements for WM, an area in which much work has already been done.
- The ISO organization should, in conjunction with ESWMO senior management, develop a data management plan identifying ownership, responsibilities, accountability, and privileges associated with each element of the common data model.
- After the common data model and data management plan have been developed, needed functionality that is not currently being met should be identified and software modules designed, developed, and implemented to do so.
- Whenever possible, the ISO organization should move existing systems toward more conformity with the common data model as it evolves.
- Whenever possible, the ISO organization should reduce the proliferation of systems by eliminating at least one of them. This elimination will require some time to accomplish, but is imperative that it be done and a migration plan should be presented as part of the ISO strategic plan.
- Existing systems and/or data components should be identified and integrated to the fullest extent possible.
- All site WM organizations as well as the five-site Environmental Restoration organization have expressed some level of interest in implementing the draft global model. Consequently, it is thus recommended that the ISO manager and his staff assess the possibility of migration to the global model at all WM sites.

APPENDICES

Appendix A

REFERENCES (Reference Documents not included)

1. ESWMO WM Assessment Team Report - Common Waste Tracking System Across the Oak Ridge Reservation, August, 1992.
2. ESWMO WM Architectures Project (WMAP) - DRAFT Report, June, 1995.
3. Independent Technical Review of Three Waste Minimization and Management Programs, August, 1995.
4. Description of EM-30 Core Data Set, WORKING DRAFT, February 28, 1996.
5. ESWMO Information Services Organization - Summary of Top Ten Operational Differences, March, 1996.
6. ES-WISE Strategic Vision Summary.
7. ES-WISE Strategic Vision Implementation Plan, K/DSRD-1655, April, 1996.
8. Applied Technology Program Strategy Assessment Report.
9. Integrated Mixed Waste Program: DRAFT Data Management Plan.
10. ESWMO Common-2109 Generator Entry System Development - List of Open Issues, Draft Comments, Validation Matrices.

Appendix B

Relevant DOE-ORO/LMES Correspondence

Department of Energy

Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831— 8620

April 7, 1995

Mr. Charles E. Frye, Director
Energy Systems Waste Management Organization
Martin Marietta Energy Systems, Inc.
Post Office Box 2003
Oak Ridge, Tennessee 37831-7357

Dear Mr. Frye:

EVALUATION OF WASTE MANAGEMENT OPERATIONS

The Fiscal Year (FY) 1996 President's Budget pledges to reduce total Environmental Management expenditures by \$4.4 billion over the next five years. In conjunction with these reductions, target funding for the Oak Ridge Operations Office (ORO) Waste Management (WM) program is projected to be reduced to \$183 million by FY 1998 versus a current FY 1995 budget of \$251 million. Given that our FY 1994 operating expenses totaled almost \$180 million (i.e., not including capital equipment, general plant projects, or line items), it is apparent that fundamental changes must be made in the way we satisfy our basic treatment, storage, and disposal (TSD) obligations.

In order to meet this challenge, we must increase the efficiency of our operations by:

- Establishing cost/output performance measures,
- Identifying and eliminating non-value-added activities, and
- Simplifying, consolidating, and/or streamlining value-added activities.

I realize that this is a goal that will not be achieved overnight, but I see several initial activities that will provide the foundation for continuing improvements:

1. We must enhance our ability to track and trend costs for individual WM operations/facilities and relate these costs to the operations' output. We must also be able to identify the components of these "unit costs" (eg., operating labor, maintenance labor, specialized support labor, materials, internal and external overhead, etc.) and determine the split between truly "fixed" costs and "variable" costs. As stated in my letter to you of January 25, 1995, "Wastewater Treatment Operations Evaluation," the WM cost accounting/reporting structure should be reviewed, modified, and standardized as necessary to facilitate this activity across the program. Data reporting systems to measure output should also be established, enhanced, and/or modified as necessary.
2. We must conduct a basic functional analysis of all our TSD operations/facilities to gain a better understanding of the role each fulfills in the performance of the overall ORO WM mission.

April 7, 1995

3. Based on the results of 1 and 2 above, we must identify the functional areas with the greatest potential for efficiency/cost improvements and conduct more detailed economic evaluations of possible alternatives.

As the first step in accomplishing 1 above, "unit costs" should be developed for each WM operation/facility by July 15, 1995. This submittal should subdivide the costs into individual cost elements as feasible; however, it may not be possible to further subdivide these elements into "fixed" or "variable" components as part of this initial effort. In addition, it may not be feasible to allocate all WM operating costs to a specific output; however, any costs excluded should be identified and tracked separately such that the total WM operating budget is accounted for. It is also recognized that it may be difficult to develop precise (i.e., not misleading) "unit costs" initially, but just going through the process should provide valuable insights and help identify any required changes to the WM cost accounting/reporting structure and/or output reporting data systems, etc., that will facilitate future improvements. Any required accounting or data reporting changes should be implemented by the beginning of FY 1996, and a continuing cost/output tracking and trending effort established to measure progress and guide additional efforts to increase the efficiency of the WM program.

With respect to 2, the functional analysis should not only look at the operations'/facility's current function, but should also consider additional functions the facility could satisfy in the future with (or without) operating and/or capital modifications. In addition, facilities that are performing or have the potential to perform similar functions should be identified, even if current constraints preclude near-term consolidation. For these instances, please identify these constraints.

With respect to 3 above, a plan to conduct more detailed evaluations of "high potential" areas should be developed by September 1, 1995, with implementation of specific improvements beginning in FY 1996.

This initiative was initially discussed with Paul Franco and other members of your staff on March 22, 1995. Subsequently, it was agreed that the Energy Systems Waste Management Organization would develop an overall action plan incorporating the above interim milestones by April 12, 1995. If you have any questions, please contact Jim Bird at 576-0826.

Sincerely,

Larry L. Radcliffe, Director
Waste Management and Technology
Development Division

(cc's on page 3)

File 50126

Mr. Charles E. Frye

-3-

April 7, 1995

cc:

W. Albaugh, EW-921
B. Brower, EW-921
D. Brown, EW-922
N. Frolio, EW-921
B. Gilbert, EW-922
B. McMillan, EW-922
H. Rice, EW-922
G. Riner, EW-922
M. Roddye, EW-922
J. Sager, EW-922
R. Skinner, EW-922
T. Tison, EW-96
D. Underwood, EW-922
B. Walker, EW-90
C. Wright, EW-921
P. Franco, K-1037, MS-7357

bcc. See Series

MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX 2003
OAK RIDGE, TENNESSEE 37831 -7357

August 31, 1995

Mr. Larry L. Radcliffe, Director
Waste Management and Technology Development Division
Department of Energy
Oak Ridge Operations Office
Post Office Box 2001
Oak Ridge, Tennessee 37831-8620

Dear Mr. Radcliffe:

Performance Measurement Team Milestone III.D.12 (Program Manager: Jim Bird)

This letter and its attachment are submitted as completion of Performance Measurement Team Milestone II.D.12, "conduct a functional analysis of all ORR WM treatment, storage, and disposal operation/facilities to identify the role each fulfills in the overall WM mission, and by September 1, 1995, submit a plan to conduct more detailed evaluations of functional areas with the greatest potential for efficiency/cost improvements."

Evaluation of operations has been intensive this summer with the highly reduced budget forecast for FY 1996. The attached lists immediate areas that we intend to study. The date by which the position papers will be complete is also provided. Each study will document options evaluated and recommendations for future actions.

If you have any questions, please contact Paul Franco at 576-0146 or Karen Balo at 574-9014.

Sincerely,

Charles E. Frye, Director
Energy Systems Waste Management Organization

CEF:KAB:dja

Attachment: Waste Management Functional Analysis

L. L. Radcliffe
Page 2
August 31, 1995

c/att: J. S. Baldwin
K. A. Balo
L. H. Brady
J. F. Clayton
K. D. Delius
P. J. Franco
H. E. Harper
J. E. Heiskell
F. J. Homan
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M. A. Kane
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R. C. Mason
L. J. Mezga
F. Perez
T. O. Rogers
T. F. Scanlan
J. Sexton
M. W. Tull
H. D. Whitehead, Jr.
ESWMO Document Management Center—RC
File—CEF

ATTACHMENT

WASTE MANAGEMENT FUNCTIONAL ANALYSIS

ISSUE	DATE
1. Support Function analysis and optimization (Franco) <ul style="list-style-type: none">- Capital Project Management- Waste Tracking- CONOPS, including Facility Excellence- Training- Business Management Level of Support- Certification Level-of-Support Consistency- Review of Nondestructive Assay Capability- Reports - Redundancy and Elimination- Total Quality Management/Mission Success- Procedures- Information Systems- Document/Records Control- Environmental, Safety and Health- Self-assessments- Standards and Requirements Identification Documents	5/30/96
2. Value-added Review of Overhead (Franco)	10/31/95
3. Value-added of Chargeout Groups (Business Team)	10/31/95
4. Full Cost Recovery For All Services Provided (Homan) <ul style="list-style-type: none">- Spill Response	11/1/95
5. Waste Analysis and Sampling Coordination (Rogers)	10/1/95
6. Simplify 2109 Process (Operations, Waste Tracking, & Waste Characterization Work Teams) (Scanlan)	12/30/95
7. Make/Buy Analysis for Services (Sexton)	12/31/95
8. Bottoms Up Cost Evaluation of Pollution Prevention Program (Kane)	10/1/95
9. Storage Consolidation (Jones) <ul style="list-style-type: none">- Mixed- Low-level Waste (LLW)- Hazardous	10/1/95 11/1/95 11/17/95

ATTACHMENT (Cont.)

WASTE MANAGEMENT FUNCTIONAL ANALYSIS

ISSUE	DATE
10. Long-term Viability of ^{INTERIM} Industrial Waste Management Facility (Tull)	10/1/95
11. Chargeout of Sanitary Baler Operation (Delius)	10/1/95
12. Life-cycle Cost Analysis of LLW ^{VOLUME REDUCTION} Compaction - should we do it? (Sexton)	10/31/95

Appendix C

Report - Sessions with LMES Waste Type Program Managers

Report on Waste Information/Tracking

Function Analysis

Session # 1

LMES Waste Program Managers

January 9 & 12, 1996

**REPORT ON WASTE INFORMATION/TRACKING FUNCTION ANALYSIS
SESSION # 1 WITH LMES WASTE PROGRAM MANAGERS
JANUARY 9 & 12, 1996**

A. INTRODUCTION

This first of a series of meetings planned on waste information/tracking was conducted on January 9, 1996, at 701 Scarboro, room 381. The meeting was held primarily with waste program managers to explore the functions that they perform in order to determine their data needs.

It is intended to meet separately with each group of stake holders that are affected by information and/or data regarding waste at all sites. After those meetings are held, it is intended to have a meeting with one or two representatives from each group and have a consolidated approach to assure that all needs are met and that the best approach is chosen for providing the needed functionality. This last meeting is currently expected to take place about the end of January or early February. Shortly after that meeting a recommended approach will be furnished to DOE.

B. ATTENDEES (TEAM)

Attendees at this first meeting are shown in Attachment # 1. Joe Sexton started the meeting by having all attendees (team) introduce themselves and then he gave an overview of why we are having this meeting and why we will be having similar meetings with others who need information regarding waste. An agenda that was followed, in general, is included as attachment # 2.

C. PURPOSE AND GOAL

Charlie Neal introduced the "purpose" and the "goal" of the meeting as follows:

Purpose: Assess Waste Tracking to identify opportunities for decreased cost, improved efficiency, and improved waste and information management for ESWMO, LMES and DOE.

Goal: Provide a recommended direction for Waste Tracking across ESWMO

The team decided, in accordance with a suggestion by DOE, to expand the scope of discussions to include all information necessary for the waste program and not limit it to "tracking" information.

D. FUNCTION ANALYSIS (F/A) OVERVIEW

Carl Starling gave an overview of the function analysis process which is a part of the Value Engineering (VE) methodology. VE has been utilized by Central Engineering Services to improve projects and reduce cost since 1988. A copy of that presentation is included as Appendix A.

E. DISCUSSION OF PROBLEMS

Prior to developing the functions for Program Managers (PM's), considerable discussion took place concerning problems regarding information on waste. The major problems identified were:

1. Lack of information	4. Terminology differences
2. Too many systems	5. Different interpretation of terminology among sites
3. Too costly	6. Timeliness of information

F. FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST) DIAGRAM

After an explanation of the F/A technique and discussion of the problems listed above, the team identified the following functions as potential functions of the PM's.

*Disposition waste
Characterize waste

Generate media
Declare waste

Identify waste
Receive 2109
Certify waste
Develop plans
Transport waste
*Plan disposition
*Evaluate Data
Receive data
Identify source
*Obtain data
*Sort data

Issue program plan
Collect information
*Select path
*Determine total cost
*Determine unit cost
*Identify path (s)
*Identify "groups" (Waste)
*Establish criteria (grouping)
*Establish criteria (evaluation)
*Identify data requirements

After a thorough discussion of the subject, the team developed the FAST Diagram shown in Attachment # 3, and only those functions identified with an * were deemed necessary; other functions were discarded as not being applicable.

It was intended to proceed to identify the requirements (i.e., data, activities, etc.) necessary to accomplish the functions on the FAST Diagram. However, due to other commitments of some key team members the meeting had to be discontinued.

G. FOLLOW UP MEETING ON JANUARY 12, 1996

A follow up meeting was held on January 12, and was attended by those listed in Attachment # 1-A. The FAST diagram Attachment # 3 was reviewed and the team made some changes by deleting "Sort Data," "Determine Unit Cost," and "Determine Total Cost." The team added a new basic function "Implement Plan" and a new supporting function, "Determine Criteria" under "Plan Disposition." These changes are shown on Attachment # 3-A.

When the team was satisfied that the FAST diagram reflected the functions of the program managers, a matrix was developed to show the requirements necessary for those functions. This matrix is included as Attachment # 4.

That effort concludes this first phase of the function analysis activities of the program managers. After similar sessions are held with other managers involved in the waste information/tracking activities, a wrap up session will be held with representatives of each group. That session is expected to utilize brainstorming to identify various alternatives for solving this problem, and also an analysis of the alternatives to identify the preferred one or two. At that time a life cycle cost analysis will probably be necessary in order to choose the best solution.

It is anticipated that this brainstorming and analysis session will be held in February, 1996.

ATTACHMENTS:

Attachment # 1 - Attendees of meeting on Jan. 9, 1996
Attachment # 1-A - Attendees of meeting on Jan. 12, 1996
Attachment # 2 - Agenda for meeting on Jan. 9, 1996
Attachment # 3 - FAST Diagram from meeting on Jan. 9, 1996
Attachment # 3-A - FAST Diagram from meeting on Jan. 12, 1996
Attachment # 4 - Matrix of Functions & Requirements from
meeting on Jan. 12, 1996
Appendix A - Overview of Function Analysis

ATTENDEES -WASTE INFORMATION/TRACKING - FUNCTION ANALYSIS SESSION
WASTE PROGRAM MANAGERS
January 9, 1996

<u>Name</u>	<u>Organization</u>	<u>Specialty</u>	<u>Phone</u>	<u>Building</u>	<u>Mail Stop</u>
Sladjana Crosley	CWM	Work Technologies	4-1666	9204-1	8050
K. D. Delius	Y-12 ESWMO	WM WTLC	6-4965	9704-1	8060
Dan Fetzer	ITS/MTS/ORA	Computing/Data Adm	6-4133	9103	8160
Tina Heath	DSRD	Waste Mgt Systems	4-3251	9103	8141
Robert Higginbotham	K-25 ESWMO	Waste Tracking/Info Serv	4-0027	K1423	7467
Bob Hydzik	ESWMO	Waste Acceptance Prog.	1-2109	K1037	7357
I. W. Jeter	Y-12 ESWMO	WM Engineering	6-5453	9624	8222
Billy Matthews	DSRD	Computing	4-8703	9119	8235
Brad McClelland	ORNL-ESWMO	Rad Waste Ops	4-4126	3001	6029
Lance Mezga	ESWMO	Waste Management	4-7258	K1037	7357
Charlie Neal	ESWMO	Waste Mgt Info Services	1-2111	K1037	7357
J. C. Nix	ORNL- ESWMO	Computing	4-9368	3001	6029
Tom Scanlan	ORNL- ESWMO	Waste Management	4-4562	3047	6023
Joe Sexton	ESWMO	Economic Analysis	1-5950	# 3 Main	7603
Carl Starling, CVS	CES	Value Engineering	6-7557	1000	6337
Martin Tull	ESWMO - Central	Low Level Waste	6-0133	K1037	7357
Doug Turner	ORNL- ESWMO	Spent Nuclear Fuel	6-2017	3047	6023

Attachment # 1

ATTENDEES -WASTE INFORMATION/TRACKING - FUNCTION ANALYSIS SESSION
WASTE PROGRAM MANAGERS
January 12, 1996

<u>Name</u>	<u>Organization</u>	<u>Specialty</u>	<u>Phone</u>	<u>Building</u>	<u>Mail Stop</u>
Tina Heath	DSRD	Waste Mgt Systems	4-3251	9103	8141
Bob Hightower	ESWMO	Mixed Waste Program	4-6777	K-1037	7348
Robert Higginbotham	K-25 ESWMO	Waste Tracking/Info Serv	4-0027	K1423	7467
Bob Hydzik	ESWMO	Waste Acceptance Prog.	1-2109	K1037	7357
Billy Matthews	DSRD	Computing	4-8703	9119	8235
Brad McClelland	ORNL-ESWMO	Rad Waste Ops	4-4126	3001	6029
Lance Mezga	ESWMO	Waste Management	4-7258	K1037	7357
Charlie Neal	ESWMO	Waste Mgt Info Services	1-2111	K1037	7357
Joe Sexton	ESWMO	Economic Analysis	1-5950	# 3 Main	7603
Carl Starling, CVS	CES	Value Engineering	6-7557	1000	6337
Martin Tull	ESWMO - Central	Low Level Waste	6-0133	K1037	7357

Attachment # 1-A

Attachment # 2
AGENDA FOR PHASE I OF FUNCTION ANALYSIS EXERCISE
FOR
WASTE INFORMATION/TRACKING
January 9, 1996

DAY # 1	ACTION	
8:30AM	Introduction of Participants & Statement of Purpose	Joe Sexton/Charlie Neal
8:45	Presentation of facts related to problem	Joe Sexton/Charlie Neal
9:45	BREAK	
10:00	Overview of F/A Process &	C. Starling
	Confirm Understanding of Meeting Objective	C. Starling
10:30	Identify functions for Problem & Draw FAST Diagram	Team
12:00	LUNCH	
1:00PM	Continue Drawing FAST Diagram	Team
2:00	Complete FAST Diagram & Adjourn	

AGENDA FOR PHASE II OF FUNCTION ANALYSIS EXERCISE FOR WASTE /INFORMATIONTRACKING

<u>DAY # 2</u>	<u>ACTION</u>	
8:30AM	Review Functions & Identify Targets of Opportunity	Team
9:45	BREAK	
10:00	Preparation for Brainstorming	C. Starling
10:30	Conduct Brainstorming & List Ideas	Team
12:00 NOON	LUNCH	
1:00PM	Analyze/Evaluate Ideas & Select Ideas that have potential for improvement	Team
2:00	Choose key criterion & rank ideas	Team
3:00	BREAK	
3:15	Select best ideas & assign leaders for developing ideas, i.e., documenting key aspects	Team
4:00	Start developing ideas	Team
5:00	Adjourn	

WASTE INFORMATION/TRACKING - LMES WASTE PROGRAM MANAGERS FUNCTIONS

FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- JANUARY 9, 1996

WASTE INFORMATION/TRACKING - LMES WASTE PROGRAM MANAGERS FUNCTIONS
FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- Revised 1-12-96

MATRIX OF FUNCTIONS AND REQUIREMENTS - WASTE PROGRAM MANAGERS

Requirements/Actions	Implement Plan	Plan Disposition	Select Path	Determine Criteria	Identify Path(s)	Identify "Groups" (Waste)	Establish Criteria (Grouping)	Evaluate Data	Establish Criteria (Evaluation)	Obtain Data	Identify Data Requirements
Rad Characteristic						✓		✓	✓	✓	✓
Hazardous/Chemical Characteristic						✓		✓	✓	✓	✓
Physical Characteristic						✓		✓	✓	✓	✓
Inventory	✓	✓	✓	✓	✓			✓	✓	✓	✓
Generation Rates - Actual	✓	✓	✓	✓	✓			✓	✓	✓	✓
Generation Rates - Projected		✓	✓	✓	✓			✓	✓	✓	✓
TSD Capacity		✓	✓	✓	✓			✓	✓	✓	✓
TSD Cost	✓	✓	✓	✓	✓			✓	✓	✓	✓
Waste Treated	✓							✓	✓	✓	✓
Waste Disposed	✓							✓	✓	✓	✓
Waste Grouping		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tech. Dev. Needs		✓	✓	✓	✓			✓	✓	✓	✓
Generator ID								✓	✓	✓	✓
Generator Process						✓		✓	✓	✓	✓

What is Function?

**The Action or Purpose for Which a Thing is
Specifically Made or Used!**

**C. D. Starling, CVS
Bldg. 1000, MS-6337
Ph. 576-7557
September, 1995**

Appendix A

FUNCTION ANALYSIS SYSTEM TECHNIQUE **(FAST)¹**

A method of analyzing, organizing, and recording
the functions of systems, products, plans, etc., to
stimulate thinking

¹ CREDIT TO CHARLES W. BYTHEWAY FOR DEVELOPING THIS TECHNIQUE.

The Language of **Function**

There are two types of functions:

1. Work Functions
2. Sell Functions

Work Functions

Active Verb

Write
Award
Program
Schedule
Write
Process
Transmit
Support
Conduct
Monitor
Illuminate
Record
Attract
Copy
Appraise

Measurable Noun

Requisition
Contract
Computer
Work
Program
Order
Torque
Weight
Current
Pressure
Area
Document
Buyer
Document
Performance

Sell Functions

Active Verb

Improve
Prove
Display
Increase
Enhance
Please
Create

Noun (Hard to measure)

Appearance
Devotion
Affection
Beauty
Prestige
Customer
Style

Functions are Classified as:

Basic Functions:

“Required” Performance Characteristics

And Secondary Functions:

These usually result from the method
chosen to satisfy the basic function

Examples of Functions

Item	Function	
	Basic	Secondary
Pencil	Make Marks	Erase Marks
Automobile	Enhance Mobility	Display Status
Overhead Projector	Project Image	Cool Bulb
Airplane	Save Time	Entertain Passengers

Function Analysis System Technique (FAST)

FAST DIAGRAM

FLIGHT SIMULATOR BUILDING MANNHEIM, GERMANY

FUNCTION LOGIC (E.A.S.T.) DIAGRAM - ORNL IMPOUNDMENTS

FUNCTION LOGIC (F.A.S.T.) DIAGRAM-UPPER EAST FORK POPLAR CREEK

Appendix D

Report - Sessions with LMES Waste Operations and TSCA

Report on Waste Information & Tracking

Function Analysis

Session # 2

LMES Waste Operations

&

TSCA Managers

January 29 & 31, 1996

**REPORT ON WASTE INFORMATION/TRACKING FUNCTION ANALYSIS
SESSION # 2 - LMES WASTE OPERATIONS & TSCA MANAGERS
JANUARY 29 & 31, 1996**

A. INTRODUCTION- MEETING ON JANUARY 29, 1996

This second of a series of sessions planned on waste information & tracking was conducted on January 29, 1996, at 701 Scarboro, lobby conference room. The meeting was held primarily with waste operations and TSCA managers to explore the functions that they perform in order to determine their information needs.

It is intended to meet separately with each group of stake holders that are affected by information and/or data regarding waste at all sites. After those meetings are held, it is intended to have a meeting with one or two representatives from each group for a consolidated approach to assure that all needs are met and that the best solution is identified for providing the needed functionality. This last meeting is currently expected to take place about the latter part of February. Shortly after that meeting a recommended approach will be furnished to DOE.

B. ATTENDEES (TEAM)

Attendees at this first meeting with Waste Operations & TSCA Managers (WO&TM's) are shown in Attachment # 1. Joe Sexton started the meeting by having all attendees (team) introduce themselves and then he gave an overview of why we are having this meeting and why we will be having similar meetings with others who need information regarding waste. An agenda that was followed, in general, is included as attachment # 2.

C. PURPOSE AND GOAL

Charlie Neai introduced the "purpose" and the "goal" of the meeting as follows:

Purpose: Assess Waste Tracking to identify opportunities for decreased cost, improved efficiency, and improved waste and information management for ESWMO, LMES and DOE.

Goal: Provide a recommended direction for Waste Tracking across ESWMO

In accordance with a suggestion by DOE, the scope of discussions was expanded to include all information necessary for the waste program and was not limited to "tracking" information.

D. FUNCTION ANALYSIS (F/A) OVERVIEW

Carl Starling gave an overview of the function analysis process which is a part of the Value Engineering (VE) methodology. VE has been utilized by Central Engineering Services to improve projects and reduce cost since 1988. A copy of that presentation was included as Appendix A to the minutes of the first session which was held with the LMES Waste Program Managers, and will not be duplicated in this report.

E. FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST) DIAGRAM

After an explanation of the F/A technique and discussion of the problems listed above, the team identified the following functions as potential functions of the WO&TM's.

Certify Waste	QA/QC Data Input (DO)
Identify Stream	Bulk Waste
Disposition Waste	Manage Waste
Review Forms	Store Waste
Operate Facilities	Dispose Waste*
Input Characterization Data*	Help Generator
Comply With Regulations (DO)	Ship Off-Site

Produce Reports	Dispose On-Site
Write WEC	Dispose Off-Site
Sample Waste*	Waste Minimization (DO)
Evaluate Data & WAC*	Receive 2109
Transport Waste*	TSD Waste*
Write Procedures	Identify Group*
Characterize Waste*	Receive Notification*
Treat Waste	Identify Disposition*
Package Waste*	Generate Reports (AT)
Maintain Facility (AT)	Track Waste (AT)
Develop WAC/WEC	
Transport Waste Between OR sites	
Track Regulatory Status	

After a thorough discussion of the subject, the team developed the FAST Diagram shown in Attachment # 3. Basic and secondary functions are identified with an * ; design objectives are identified by DO; and functions that are operative all the time are identified by AT. All other functions listed were discarded as not being applicable to the responsibilities of this group of managers..

After completing the FAST Diagram, the team started to identify the requirements (i.e., data, activities, etc.) necessary to accomplish the functions on the FAST Diagram. Considerable progress was made on this activity, but the day ended before it could be completed.

E. FOLLOW UP MEETING ON JANUARY 31, 1996

A follow up meeting was held on January 31, and was attended by those listed in Attachment # 1-A. The FAST diagram Attachment # 3 was reviewed and the team confirmed that it was satisfactory without making any changes.

When the team was satisfied that the FAST diagram reflected the functions of the WO&TM's, the team completed developing the matrix which was started during the first meeting on January 29. This matrix is included as Attachment # 4.

That effort concludes this first phase of the function analysis activities of the WO&TM's. After similar sessions are held with other managers involved in the waste information & tracking activities, a wrap up session will be held with representatives of each group. That session is expected to utilize brainstorming to identify various alternatives for solving this problem, and also an analysis of the alternatives to identify the preferred one or two. At that time a life cycle cost analysis will probably be necessary in order to choose the best solution.

It is anticipated that brainstorming and analysis session will be held late this month (February).

ATTACHMENTS:

Attachment # 1 - Attendees of meeting on Jan. 29, 1996
 Attachment # 1-A - Attendees of meeting on Jan. 31, 1996
 Attachment # 2 - Agenda for meeting on Jan. 29, 1996
 Attachment # 3 - FAST Diagram from meeting on Jan. 29, 1996
 Attachment # 4 - Matrix of Functions & Requirements from
 meeting on Jan. 31, 1996

**VE ACTIVITY FOR WASTE INFORMATION & TRACKING
OPERATIONS & TSCA - FUNCTION ANALYSIS SESSION**

January 29, 1996

Attendees

<u>Name</u>	<u>Organization</u>	<u>Specialty</u>	<u>Phone</u>	<u>Building</u>	<u>Mail Stop</u>
Jim Bailey	ESWMO	Off-Site Waste Shipments	6-4489	K1037	7357
Phil Butler	ESWMO	Waste Trans./Storage	6-8952	K1423	7467
Dan Fetzer	ITS/DRA	Waste Tracking	6-4133	9103	8160
Tina Heath	DSRD	Waste Info Systems	4-3251	1099 Commerce	
Robert Higginbotham	ESWMO	Information Services	4-0027	K1423	7467
Larry Jones	ESWMO	Storage/Disp.	4-6019	K1037	7357
J. J. Maddox	ESWMO	LGWOD	4-4786	X3130	6058
Billy Mathews	DSRD	Computing	4-8703	9119	8235
B. C. McClelland	ESWMO	RAD Waste Ops.	4-4126	X3001	6029
Charlie Neal	ESWMO	Waste Info Systems	1-2111	K1037	7357
J. C. Nix	ESWMO	Waste PWT Systems	4-9368	X3001	6029
Mark Saunders	ESWMO	Waste Coordinator	4-9714	K1423	7467
Tom Scanlan	ESWMO	Waste Management	4-4562	X3047	6023
Joe Sexton	ESWMO	Economic Analysis	1-5950	3 Main	7603
Brenda Snyder	TSCA	Burn Plan Manager	6-4976	K1435	7345
Carl Starling	CES	VE/FA	6-7557	X1000	7337
Louis C. Wesley	WM/RMA	Hazardous Waste Operations	4-7467	X3001	6029
Mary Wiginton	ESWMO	Solid Waste	6-7768	9704-1	8060

Attachment # 1

**ATTENDEES - WASTE INFORMATION & TRACKING-FUNCTION ANALYSIS SESSION
OPERATIONS MANAGERS
January 31, 1996**

<u>Name</u>	<u>Organization</u>	<u>Specialty</u>	<u>Phone</u>	<u>Building</u>	<u>Mail Stop</u>
Jim Bailey	ESWMO	Off-Site Waste Shipments	6-4489	K1037	7357
Phil Butler	ESWMO	Waste Trans./Storage	6-8952	K1423	7467
Tina Heath	DSRD	Waste Info Systems	4-3251	1099 Comm	
J. J. Maddox	ESWMO	LGWOD	4-4786	X3130	6058
Billy Matthews	DSRD	Computing	4-8703	9119	8235
B. C. McClelland	ESWMO	RAD Waste Ops.	4-4126	X3001	6029
Eddie Monroe	DSRD	KWTARS	4-4203	1099 Comm	7624
Charlie Neal	ESWMO	Waste Info Systems	1-2111	K1037	7357
J. C. Nix	ESWMO	Waste PWT Systems	4-9368	X3001	6029
Mark Saunders	ESWMO	Waste Coordinator	4-9714	K1423	7467
Joe Sexton	ESWMO	Economic Analysis	1-5950	3 Main	7603
Brenda Snyder	TSCA	Burn Plan Manager	6-4976	K1435	7345
Carl Starling	LMES/CES	Value Engineering	6-7557	1000	6337
Louis C. Wesley	WM/RMA	Hazardous Waste Operations	4-7467	X3001	6029
Mary Wiginton	ESWMO	Solid Waste	6-7768	9704-1	8060

AGENDA FOR WASTE OPERATIONS & TSCA
FUNCTION ANALYSIS EXERCISE
FOR
WASTE INFORMATION & TRACKING
701 Scarboro, Lobby Conference Rm.
January 29, 1996

<u>DAY # 1</u>	<u>ACTION</u>	<u>FACILITATOR</u>
12:30PM	Introduction of Participants & Statement of Purpose	Joe Sexton
12:45	Presentation of facts related to problem Confirm understanding of meeting objective	Charlie Neal
1:15	Overview of F/A process & Review FAST Diag. from Program Mgrs. Session	C. Starling
1:45	Identify functions for Operations & start FAST diagram	Team
2:30	BREAK	
2:45	Complete drawing FAST diagram	Team
4:00	Review plans for Wednesday's session Review Requirements Matrix from Program Mgrs. session Determine expected attendance on Wednesday Recommend Generators to attend a future session	Joe/Carl/Charlie
4:30	Adjourn	

CDS: January 26, 1996

Attachment # 2

WASTE INFORMATION & TRACKING - LMES WASTE OPERATIONS & TSCA MANAGERS FUNCTIONS
FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- 1-29-96

MATRIX OF FUNCTIONS AND REQUIREMENTS LMES WASTE OPERATIONS & TSCA MANAGERS

Requirements/Actions	TSD Waste	Transport Waste	Package Waste	Certify Waste	Evaluate Data & WAC	Develop WAC/ WEC	Identify Disposal	Characterize Waste	Input Character Data	Identify Group	Sample Waste	Receive Notification	Meet Regulations	Minimize Waste	QA/QC Data Input	Generate Reports	Track Waste	Maintain Facility
RAD Characteristic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Chemical Characteristics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Physical Characteristics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Generation Rate*	✓			✓			✓							✓		✓		✓
EPA Codes (Waste)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Facility Capacities	✓		✓		✓	✓	✓						✓			✓	✓	✓
Inventory (Qty/Loc)	✓	✓					✓				✓			✓		✓	✓	✓
TSD Unit Cost	✓						✓							✓		✓		✓
Cert. Of Disposal	✓												✓			✓	✓	
TSD Date(s)/Generation	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Packaging Information	✓	✓	✓	✓	✓	✓	✓			✓	✓		✓	✓		✓	✓	✓
"Manifest" Information	✓	✓	✓	✓									✓		✓	✓	✓	✓
Confirmation To Ship	✓	✓	✓		✓											✓	✓	✓
Destination WAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Package Pedigree	✓	✓	✓	✓									✓					✓
IIP Survey Data	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓			✓	✓	✓
Generation Process				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Approved Certifier				✓								✓						
LMES TSD Approval	✓	✓		✓														

*Short term - projected & actual

Appendix E

Report - Sessions with DOE-ORO-WMTD

Report on Waste Information/Tracking

Function Analysis

Session # 3

DOE Program Managers

February 1 & 14, 1996

**REPORT ON WASTE INFORMATION/TRACKING FUNCTION ANALYSIS
SESSION # 3 - DOE WASTE PROGRAM MANAGERS
FEBRUARY 1, 1996**

A. INTRODUCTION- MEETING ON FEBRUARY 1, 1996

This third of a series of sessions planned on waste information/tracking was conducted on February 1, 1996, at # 3 Main, Oak Ridge, TN. The meeting was held with DOE Waste Program Managers (DOEWPM's) to explore the functions that they perform in order to determine their information needs.

It is intended to meet separately with each group (about six groups) of stake holders that are affected by information and/or data regarding waste at all sites. After those meetings are held, it is intended to have a meeting with one or two representatives from each group for a consolidated approach to assure that all needs are met and that the best solution is identified for providing the needed functionality. This last meeting is currently expected to take place about the latter part of February. Shortly after that meeting a recommended approach will be furnished to DOE.

B. ATTENDEES (TEAM)

Attendees at this first meeting with DOEWPM's are shown in Attachment # 1. Joe Sexton started the meeting by having all attendees introduce themselves and then he gave an overview of why we are having this meeting and why we will be having similar meetings with others who need information regarding waste. An agenda that was followed, in general, is included as attachment # 2.

C. PURPOSE AND GOAL

Charlie Neal introduced the "purpose" and the "goal" of the meeting as follows:

Purpose: Assess Waste Tracking to identify opportunities for decreased cost, improved efficiency, and improved waste and information management for ESWMO, LMES and DOE.

Goal: Provide a recommended direction for Waste Tracking across ESWMO

In accordance with a suggestion by DOE, the scope of discussions was expanded to include all information necessary for the waste program and was not limited to "tracking" information.

D. FUNCTION ANALYSIS (F/A) OVERVIEW

Carl Starling gave an overview of the function analysis process which is a part of the Value Engineering (VE) methodology. VE has been utilized by Central Engineering Services to improve projects and reduce cost since 1988. A copy of that presentation was included as Appendix A to the minutes of the first session which was held with the LMES Waste Program Managers, and will not be duplicated in this report.

E. FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST) DIAGRAM

After an explanation of the F/A technique and discussion of the problems listed above, the team identified the following functions as potential functions of the DOEWPM's.

Identify Waste
Track Waste Inventory
Quantify Waste
Record Waste (Times/Duration)
Accept Waste (Generator)
Fund Programs

Monitor Waste Movement
Evaluate Contractor Performance
Negotiate with Regulators
Award Contracts
Prioritize Funding
Develop Strategy

Allocate Costs
Inform State Regulators
Formulate Plans
Approve/Disapprove Cost Savings
Trend Waste Inventory
Inform Headquarters

Approve Work Scope
Monitor Spending
Monitor Progress
Comply with Regulations
TSD Waste

After a thorough discussion of the subject, the team developed the FAST Diagram shown in Attachment # 3. Basic and secondary functions are identified with an * ; design objectives are identified by DO; and functions that are operative all the time are identified by AT. All other functions listed were discarded as not being applicable to the responsibilities of this group of managers.

After completing the FAST Diagram, the team started to identify the requirements (i.e., data, activities, etc.) necessary to accomplish the functions on the FAST Diagram. Considerable progress was made on this activity, but the day ended before it could be completed.

F. FOLLOW UP MEETING ON FEBRUARY 14, 1996

A follow up meeting was held on February 14, and was attended by those listed in Attachment # 1-A. The FAST diagram Attachment # 3 was reviewed and the team made the following changes to the diagram which are reflected in Attachment # 3-A: Modified the design objective by adding "/DOE Orders" to the function of "Comply With Regulations," added a new all-the-time function of "Communicate w/M&O," and moved the supporting function of "Consult Stake Holders" to make it an all-the-time function.

When the team was satisfied that the FAST diagram reflected the functions of the DOEWPM's, the team completed developing the matrix which was started during the first meeting on February 1. This matrix is included as Attachment # 4.

That effort concludes this first phase of the function analysis activities of the DOEWPM's. After similar sessions are held with other managers involved in the waste information/tracking activities, a wrap up session will be held with representatives of each group. That session is expected to utilize brainstorming to identify various alternatives for solving this problem, and also an analysis of the alternatives to identify the preferred one or two. At that time a life cycle cost analysis will probably be necessary in order to choose the best solution.

The schedule for the brainstorming and analysis session has not been firmed up at the time of this report.

ATTACHMENTS:

- Attachment # 1 - Attendees of meeting on February 1, 1996
- Attachment # 1-A - Attendees of meeting on February 14, 1996
- Attachment # 2 - Agenda for meeting on February 1, 1996
- Attachment # 3 - FAST Diagram from meeting on February 1, 1996
- Attachment # 3-A - FAST Diagram from meeting on February 14, 1996
- Attachment # 4 - Matrix of Functions & Requirements from meeting on February 14, 1996

ATTENDEES - WASTE INFORMATION/TRACKING -FUNCTION ANALYSIS SESSION
DOE MANAGERS
February 1, 1996

<u>Name</u>	<u>Organization</u>	<u>Specialty</u>	<u>Phone</u>	<u>Building</u>	<u>Mail Stop</u>
Jim Bird	DOE	Economic Analysis	6-0826	3-Main	EW-922
Alfreda Cook	ERWM	Waste Data Analyst	4-1071	K1037	7346
Brian DeMonia	DOE/WM	Hazardous Waste	1-6182	3-Main	EW-92
Dan Fetzer	ITS/DRA	Waste Data Administration	6-4133	1099 Commerce	7624
Alicia Harris	DOE	Program Analyst	1-6423	3-Main	EW-922
Tina Heath	DSRD	Waste Mgt. Info Systems	4-3251	1099 Commerce	7624
Bob Hightower	ESWMO	Mixed Waste Mgmt	4-6777	K1037	7348
Iver Jeter	ESWMO	Hazardous Waste Mgt	6-5453	9624	8222
Billy Matthews	DSRD	Computing	4-8703	9119	8235
Eddie Monroe	DSRD	KWTARS	4-4203	1099 Commerce	7624
Tom Monk	ESWMO	TRU Waste	4-0660	3047	6023
Charlie Neal	ESWMO	Waste Info Systems	1-2111	K1037	7357
J. C. Nix	ESWMO	System Adm	4-9368	X3001	6029
Harvey Rice	DOE/WM	Program Manager	1-2157	3-Main	EW-92
Joe Sexton	ESWMO	Economic Analysis	1-5950	3 Main	7603
Carl Starling	LMES/CES	Value Engineering	6-7557	X1000	6337

ATTENDEES - WASTE INFORMATION/TRACKING -FUNCTION ANALYSIS SESSION
DOE MANAGERS
February 14, 1996

<u>Name</u>	<u>Organization</u>	<u>Specialty</u>	<u>Phone</u>	<u>Building</u>	<u>Mail Stop</u>
Brian DeMonia	DOE/WM	Hazardous Waste	1-6182	3-Main	EW-92
Dan Fetzer	ITS/DRA	Waste Data Administration	6-4133	1099 Commerce	7624
Sherry Gibson	DOE		6-0109	3-Main	EW-92
Bill Gilbert	DOE/WM	Program Manager	6-1817	3-Main	EW-922
Alicia Harris	DOE	Program Analysis	1-6423	3-Main	EW-922
Tina Heath	DSRD	Waste Info Systems	4-3251	1099 Comm	7624
Robert May	Y-12 WM	Computer Systems	6-7029	3001	6029
Eddie Monroe	DSRD	KWTARS	4-4203	1099 Comm	7624
Charlie Neal	ESWMO	Waste Info Systems	1-2111	K1037	7357
J. C. Nix	ESWMO	Waste PWT Systems	4-9368	X3001	6029
Harvey Rice	DOE/WM	Program Manager	1-2157	3-Main	EW-92
Joe Sexton	ESWMO	Economic Analysis	1-5950	3 Main	7603
Ralph Skinner	DOE-WM	Projects	6-7403	3 Main	EW-922
Carl Starling	LMES/CES	Value Engineering	6-7557	X1000	6337

**AGENDA FOR DOE WASTE PROGRAM MANAGERS
FUNCTION ANALYSIS EXERCISE
FOR
WASTE INFORMATION/TRACKING**

February 1, 1996

<u>Meeting # 1</u>	<u>ACTION</u>	<u>FACILITATOR</u>
1:00PM	Introduction of Participants & Statement of Purpose	-Joe Sexton
	Presentation of facts related to problem & Confirm understanding of meeting objective	-Charlie Neal
	Overview of F/A process & Review FAST Diag. from Operations Mgrs. Session	- Carl Starling
	Identify functions for Program Mgrs. and make FAST diagram	- Carl

Meeting # 2

Develop Requirements Matrix

Compare Matrix with Requirements Matrix from Operations Mgrs. session

WASTE TRACKING/INFORMATION - DOE WASTE MANAGERS FUNCTIONS
FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- 2-1-96

WASTE TRACKING/INFORMATION - DOE WASTE MANAGERS FUNCTIONS

FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- 2-14-96

MATRIX OF FUNCTIONS AND REQUIREMENTS DOE MANAGERS

Requirement/ Information Needs	Manage Waste	Fund Programs	Allocate Funds	Inform Regulators	Inform Hdquarters	Request Funding	Award Contracts	Communi- cate with M&O	Consult with Stake- holders	Formulate Plans	Define Work Scope	Approve Work Scope
Current Inventory by Waste Type (Q)	✓		✓	✓	✓			✓	✓	✓	✓	
Future Generation Rates (Q)	✓			✓		✓				✓		
TSD Capacities BWT	✓									✓		
Planned Thru-put	✓									✓		
Permit Information by FAC	✓									✓		
Storage Information	✓									✓		
TSD Costs by Facility*	✓					✓				✓		
Character Information	✓									✓		
Currency of Information	✓									✓		
Info Needs On/Off Site												
TSD Service Providers												
Match WG to Potential TSD Providers												
WAC												
\$/Unit Quantity												
M&O Contr. Waste Groups												

*Needed at Activity Level
(Q) Quarterly

MATRIX OF FUNCTIONS AND REQUIREMENTS DOE MANAGERS

Requirements/ Information Needs	Develop Strategy	Negotiate with Regulators	Evaluate Information	Trend Waste Inventory	Approve /Disapprove Cost Savings	Evaluate Contractor Performance	Gather Informa- tion	Track Inventory	Comply with Require- ments	Monitor Spending	Monitor Progress	Monitor Waste Move- ment
Current Inventory by Waste Type (Q)	✓			✓		✓	✓	✓	✓		✓	✓
Future Generation Rates (Q)	✓		✓				✓					
TSD Capacities BWT	✓		✓				✓					
Planned Thru-put	✓		✓									
Permit Information by FAC	✓											
Storage Information	✓											
TSD Costs by Facility*	✓											
Character Information	✓		✓				✓					
Currency of Information	✓		✓									
Info Needs On/Off Site												
TSD Service Providers												
Match WG to Potential TSD Providers												
WAC												
\$/Unit Quantity												
M&O Contr. Waste Groups												

*Needed at Activity Level
(Q) Quarterly

Appendix F

Report - Sessions with LMES Waste Generators

Report on Waste Information/Tracking

Function Analysis

Session # 4

LMES Waste Generators

February 15 & 16, 1996

**REPORT ON WASTE INFORMATION/TRACKING FUNCTION ANALYSIS
SESSION # 4 -LMES WASTE GENERATORS
FEBRUARY 15 & 16, 1996**

A. INTRODUCTION- MEETING ON FEBRUARY 15, 1996

This fourth of a series of sessions planned on waste information/tracking was conducted on February 15, 1996, at 105 Mitchell Rd., Oak Ridge, TN. The meeting was held with LMES Waste Generators to explore the functions that they perform in order to determine their information needs.

It is intended to meet separately with each group (about six groups) of stake holders that are affected by information and/or data regarding waste at all sites. After those meetings are held, it is intended to have a meeting with one or two representatives from each group for a consolidated approach to assure that all needs are met and that the best solution is identified for providing the needed functionality. This last meeting has not been scheduled as of the time of this report. Shortly after that meeting a recommended approach will be furnished to DOE.

B. ATTENDEES (TEAM)

Attendees at this first meeting with Waste Generators are shown in Attachment # 1. Joe Sexton started the meeting by having all attendees introduce themselves and then he gave an overview of why we are having this meeting and why we will be having similar meetings with others who need information regarding waste. An agenda that was followed, in general, is included as attachment # 2.

C. PURPOSE AND GOAL

Charlie Neal introduced the "purpose" and the "goal" of the meeting as follows:

Purpose: Assess Waste Tracking to identify opportunities for decreased cost, improved efficiency, and improved waste and information management for ESWMO, LMES and DOE.

Goal: Provide a recommended direction for Waste Tracking across ESWMO

In accordance with a suggestion by DOE, the scope of discussions was expanded to include all information necessary for the waste program and was not limited to "tracking" information.

D. FUNCTION ANALYSIS (F/A) OVERVIEW

Carl Starling gave an overview of the function analysis process which is a part of the Value Engineering (VE) methodology. VE has been utilized by Central Engineering Services to improve projects and reduce cost since 1988. A copy of that presentation was included as Appendix A to the minutes of the first session which was held with the LMES Waste Program Managers, and will not be duplicated in this report.

E. FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST) DIAGRAM

After an explanation of the F/A technique and discussion of the problems listed above, the team identified the following functions as potential functions of the DOEWPM's.

- *Identify Waste
- Identify Regulatory Requirements
- Evaluate P2
- Identify Generation Potential
- Review Criteria
- *Characterize Waste
- Interpret Analytical Results

- Document Process Knowledge
- Sample Waste
- Survey Waste (RAD)
- Analyze Waste
- Segregate Waste
- Package Waste
- Survey Container (RAD)

Treat Waste
Aggregate Like Waste
Verify Data
Prepare/Submit Forms
+Get Trained
+Perform Audits

Store Waste
*Certify Waste
*Request Pick-up
Complete Document
+Write Procedures

After a thorough discussion of the subject, the team developed the FAST Diagram shown in Attachment # 3. Basic and secondary functions on the critical path are identified with an *; and functions that are operative all the time are identified by +. All functions not shown above were discarded as not being applicable to the responsibilities of this group.

After completing the FAST Diagram, the team started to identify the requirements (i.e., data, activities, etc.) necessary to accomplish the functions on the FAST Diagram. Considerable progress was made on this activity, but the day ended before it could be completed.

F. FOLLOW UP MEETING ON FEBRUARY 16, 1996

A follow up meeting was held on February 16, and was attended by those listed in Attachment # 1-A. The FAST diagram Attachment # 3 was reviewed and the team made changes to the diagram which resulted in the revised diagram shown as Attachment # 3-A.

When the team was satisfied that the FAST diagram reflected the functions of the group, the team completed developing the matrix. This matrix is included as Attachment # 4.

That effort concludes this first phase of the function analysis activities of the LMES Waste Generators. After similar sessions are held with other managers involved in the waste information/tracking activities, a wrap up session will be held with representatives of each group. That session is expected to utilize brainstorming to identify various alternatives for solving this problem, and also an analysis of the alternatives to identify the preferred one or two solutions. At that time a life cycle cost analysis will probably be necessary in order to choose the best solution.

The schedule for the brainstorming and analysis session has not been firmed up at the time of this report.

ATTACHMENTS:

Attachment # 1 - Attendees of meeting on February 15, 1996
Attachment # 1-A - Attendees of meeting on February 16, 1996
Attachment # 2 - Agenda for meeting on February 15, 1996
Attachment # 3 - FAST Diagram from meeting on February 15, 1996
Attachment # 3-A - FAST Diagram from meeting on February 16, 1996
Attachment # 4 - Matrix of Functions & Requirements from
meeting on February 16, 1996

**ATTENDEES - WASTE INFORMATION/TRACKING
LMES WASTE GENERATORS-FUNCTION ANALYSIS SESSION
February 15, 1996**

<u>Name</u>	<u>Organization</u>	<u>Specialty</u>	<u>Phone</u>	<u>Building</u>	<u>Mail Stop</u>
Doug Davies	ASO	Waste Management	873-6999	K1004C	
R. E. Dearien	ORNL/M&C/IFEL		4-5911	3525	6295
A. DeVaney	RRD/ORNL	WC-Operations	4-7610	7900	6387
M. L. Evans	ORNL/M&C/IFEL		4-7089	3037	6014
Dan Fetzer	ITS/DRA	Waste Data Administration	6-4133	1099 Comm	7624
Tina Heath	DSRD	Waste Info Systems	4-3251	1099 Comm	7624
Marilyn S. Hendricks	ORNL/ESD	EPO/ESH Officer	4-7296	1505	6035
S. B. Kennedy	ORNL/Physics	ESH Officer	6-0240	6000	6368
W. W. Koch	ORNL/I&C	EPO	4-9824	3546	6012
Rachel Merwin	RRD/ORNL	Compliance/EPO/WC	6-4995	7917	6399
Eddie Monroe	DSRD	KWTARS	4-4203	1099 Comm	7624
Charlie Neal	ESWMO	Waste Info Systems	1-2111	K1037	7357
J. C. Nix	ESWMO	Waste PWT Systems	4-9368	X3001	6029
Joe Sexton	ESWMO	Economic Analysis	1-5950	3 Main	7603
Carl Starling	LMES/CES	Value Engineering	6-7557	X1000	6337

ATTENDEES - WASTE INFORMATION/TRACKING
LMES WASTE GENERATORS-FUNCTION ANALYSIS SESSION
February 16, 1996

<u>Name</u>	<u>Organization</u>	<u>Specialty</u>	<u>Phone</u>	<u>Building</u>	<u>Mail Stop</u>
Doug Davies	ASO	Waste Management	873-6999	K1004C	
R. E. Dearien	ORNL/M&C/IFEL		4-5911	3525	6295
A. DeVaney	RRD/ORNL	WC-Operations	4-7610	7900	6387
M. L. Evans	ORNL/M&C/IFEL		4-7089	3037	6014
Dan Fetzer	ITS/DRA	Waste Data Administration	6-4133	1099 Comm	7624
Marilyn S. Hendricks	ORNL/ESD	EPO/ESH Officer	4-7296	1505	6035
S. B. Kennedy	ORNL/Physics	ESH Officer	6-0240	6000	6368
W. W. Koch	ORNL/I&C	EPO	4-9824	3546	6012
Rachel Merwin	RRD/ORNL	Compliance/EPO/WC	6-4995	7917	6399
Eddie Monroe	DSRD	KWTARS	4-4203	1099 Comm	7624
Charlie Neal	ESWMO	Waste Info Systems	1-2111	K1037	7357
Carl Starling	LMES/CES	Value Engineering	6-7557	X1000	6337

AGENDA FOR LMES WASTE GENERATORS
FUNCTION ANALYSIS EXERCISE
FOR
WASTE INFORMATION/TRACKING

February 15 & 16, 1996

<u>Meeting # 1 Feb. 15</u>	<u>ACTION</u>	<u>FACILITATOR</u>
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11:30AM	Introduction of Participants & Statement of Purpose	-Joe Sexton
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Presentation of facts related to problem &

Confirm understanding of meeting objective	-Charlie Neal
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Overview of F/A process & Review FAST Diag.

from Operations Mgrs. Session	- Carl Starling
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Identify functions for Waste Generators and make FAST diagram	- Carl
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<u>Meeting # 2 Feb. 16</u>

11:30AM	Develop Requirements Matrix	- Carl
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Compare Matrix with Requirements Matrix from Operations Mgrs. session

CDS: February 15, 1996

Attachment # 2

WASTE INFORMATION/TRACKING - LMES WASTE GENERATORS FUNCTIONS

FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- 2-15-96

**MATRIX OF FUNCTIONS AND REQUIREMENTS
LMES WASTE GENERATORS**

#4

Requirements/Info Needs	Request Pick-up	Prepare /Submit Forms	Complete Document	Certify Waste	Verify Data	Characterize Waste	Interpret Analytical Results	Document Process Knowledge	Sample Waste	Survey Waste (RAD)
Pick-up Location	✓	✓	✓		✓					
Priority	✓	✓	✓		✓				✓	
Requester	✓	✓	✓		✓					
2109 Data		✓	✓	✓	✓					
PK Form		✓	✓	✓	✓	✓				
S & A Data		✓	✓	✓	✓	✓	✓	✓		
Variance Form		✓	✓	✓	✓	✓				
RAD Characteristic		✓	✓	✓	✓	✓	✓	✓	✓	✓
MSDS		✓	✓	✓	✓	✓			✓	
CFR's			✓	✓	✓	✓				
Time Limits			✓		✓	✓				
Special Forms		✓	✓	✓	✓	✓				
When to Sample Criteria				✓		✓		✓	✓	
Results Assessment Criteria				✓	✓	✓	✓	✓		
Forms Receiver	✓	✓								
Origin Location								✓	✓	✓
Originator								✓	✓	✓
Origin Process								✓	✓	✓
Operating Procedure										
NMC&A									✓	
Fissile Limits										
Current Fac. Inventory										
Permits										

**MATRIX OF FUNCTIONS AND REQUIREMENTS
LMES WASTE GENERATORS**

Requirements/Info Needs	Analyze Waste	Identify Waste	Identify Regulatory Requirement	Review Criteria	Write Procedures	Perform Audits	Get Trained	Generate Document	Receive Waste	Prioritize Waste	Handle Waste
Pick-up Location								✓			
Priority	✓							✓			✓
Requester								✓			
2109 Data								✓	✓		
PK Form	✓							✓			
S & A Data	✓							✓			✓
Variance Form				✓				✓			
RAD Characteristic	✓							✓	✓		✓
MSDS	✓							✓			✓
CFR's				✓				✓			✓
Time Limits	✓					✓	✓	✓	✓		✓
Special Forms	✓							✓			✓
When to Sample Criteria	✓							✓			
Results Assess. Criteria	✓			✓				✓			
Forms Receiver								✓			
Origin Location	✓	✓						✓	✓		
Originator	✓	✓						✓	✓		✓
Origin Process	✓	✓						✓	✓		✓
Operating Procedure								✓	✓		✓
NMC&A			✓					✓	✓		✓
Fissile Limits			✓					✓	✓		✓
Current Fac. Inventory			✓					✓	✓		✓
Permits			✓					✓	✓		✓

Appendix G

Report - Sessions with Portsmouth and Paducah Operations

Report on
Waste Information & Tracking

Function Analysis
Session # 5

LMES

Portsmouth/Paducah Operations

February 19 & 20, 1996

**REPORT ON WASTE INFORMATION/TRACKING
FUNCTION ANALYSISSESSION # 5
LMES PORTSMOUTH/PADUCAH WASTE OPERATIONS MANAGERS
FEBRUARY 19 & 20, 1996**

A. INTRODUCTION- MEETING ON FEBRUARY 19, 1996

This fifth of a series of sessions planned on waste information & tracking was conducted on February 19, 1996, at 105 Mitchell, conference room. The meeting was held primarily with waste operations managers to explore the functions that they perform in order to determine their information needs.

It is intended to meet separately with each group of stake holders that are affected by information and/or data regarding waste at all sites. After those meetings are held, it is intended to have a meeting with one or two representatives from each group for a consolidated approach to assure that all needs are met and that the best solution is identified for providing the needed functionality. This last meeting is currently not scheduled as of the writing of this report. Shortly after that meeting a recommended approach will be furnished to DOE.

B. ATTENDEES (TEAM)

Attendees at this first meeting with Portsmouth/Paducah Waste Operations Managers are shown in Attachment # 1. Joe Sexton started the meeting by having all attendees (team) introduce themselves and then he gave an overview of why we are having this meeting and why we will be having similar meetings with others who need information regarding waste. An agenda that was followed, in general, is included as attachment # 2.

C. PURPOSE AND GOAL

Charlie Neal introduced the "purpose" and the "goal" of the meeting as follows:

Purpose: Assess Waste Tracking to identify opportunities for decreased cost, improved efficiency, and improved waste and information management for ESWMO, LMES and DOE.

Goal: Provide a recommended direction for Waste Tracking across ESWMO

In accordance with a suggestion by DOE, the scope of discussions was expanded to include all information necessary for the waste program and was not limited to "tracking" information.

D. FUNCTION ANALYSIS (F/A) OVERVIEW

Carl Starling gave an overview of the function analysis process which is a part of the Value Engineering (VE) methodology. VE has been utilized by Central Engineering Services to improve projects and reduce cost since 1988. A copy of that presentation was included as Appendix A to the minutes of the first session which was held with the LMES Waste Program Managers, and will not be duplicated in this report.

E. FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST) DIAGRAM

After an explanation of the F/A technique and discussion of the problems listed above, the team identified the following functions as potential functions of the Waste Operations Managers.

Eliminate Waste (Disposal)	*Manage Waste	Store USEC Waste
Certify Waste (Treatment Disposal)	Inspect Waste	Transport Waste
Arrange Off-Site Transport	Sample Waste	*Accept Waste
Arrange Off-Site TSD	*Group Waste	*Receive RFD
Certify Waste (Storage)	*Interface With Project	Contaminated Site
Develop Waste Mgmt. Plans	Review Project Waste Plan	ER Project

Define Waste Acceptance Criteria
+Report Waste Information
+Source Reduce Waste
+Minimize Waste

Review Project P2 Potential
+Forecast Spending
+Recycle Waste
+Track Waste

Waste Exists
+Train Generator
+Track Costs

After a thorough discussion of the subject, the team developed the FAST Diagram shown in Attachment # 3. Basic and secondary functions are identified with an *; and functions that are operative all the time are identified by +. All other functions shown on the FAST Diagram are supporting functions.

After completing the FAST Diagram, the team started to identify the requirements (i.e., data, activities, information needs, etc.) necessary to accomplish the functions on the FAST Diagram.

E. FOLLOW UP MEETING ON FEBRUARY 20, 1996

A follow up meeting was held on February 20, and attendees are listed in Attachment # 1-A. The team completed developing the matrix which was started during the first meeting on February 19. This matrix shows the relationship of the functions on the FAST Diagram and the information needs of this group of managers, and is included as Attachment # 4.

That effort concludes this phase of the function analysis activities of the Portsmouth/Paducah Operations Managers. After similar sessions are held with other managers involved in the waste information & tracking activities, a wrap up session will be held with representatives of each group. That session is expected to utilize brainstorming to identify various alternatives for solving this problem, and also an analysis of the alternatives to identify the preferred one or two. At that time a life cycle cost analysis will probably be necessary in order to choose the best solution.

ATTACHMENTS:

- Attachment # 1 - Attendees of meeting on Feb. 19, 1996
- Attachment # 1-A - Attendees of meeting on Feb. 20, 1996
- Attachment # 2 - Agenda for meeting on Feb. 19, 1996
- Attachment # 3 - FAST Diagram from meeting on Feb. 19, 1996
- Attachment # 4 - Matrix of Functions & Requirements from meeting on Feb. 20, 1996

ATTENDEES - ER PROJECT MANAGEMENT FUNCTIONS
(Emphasis on Waste Operations)
WASTE INFORMATION/TRACKING PORTS/PGDP-FUNCTION ANALYSIS SESSION

February 19, 1996

<u>Name</u>	<u>Organization</u>	<u>Specialty</u>	<u>Phone</u>	<u>Building</u>	<u>Mail Stop</u>
Candy Cole	Engineering	Off-Site	574-9063	K-1320	7592
Gary Conner	ER-PORTS	WM	614-897-4016	X-7725	
Alfreda Cook	ER-WM	Information Management	574-1071	K1037	7346
Christine Goddard	ER-WM	PZ	5764034	K1037	7346
Tina Heath	DSRD	Waste Info Systems	574-3251	1099 Commerce	7624
E. Fraser Johnstone	ER-PGDP	WM	(502)441-5077	Kevil	Kevil
Richard Kaehn	WM-PGDP	WM	(502)441-6818	C-743-T3	C-743-T3
Jill A. Mortimore	ER	Project Manager Off-Site	574-1462	9983-58	8247
Charlie Neal	ESWMO	Waste Info Services	1-2111	K1037	7357
Carl Starling	LMES/CES	Value Engineering	6-7557	X1000	6337
Sam Suffern	ESWMO	PZ	576-0126	K1037	7357 ¹

ATTACHMENT 1

ATTENDEES - ER PROJECT MANAGEMENT FUNCTIONS
(Emphasis on Waste Operations)
WASTE INFORMATION/TRACKING PORTS/PGDP-FUNCTION ANALYSIS SESSION

February 20, 1996

<u>Name</u>	<u>Organization</u>	<u>Specialty</u>	<u>Phone</u>	<u>Building</u>	<u>Mail Stop</u>
Gary Conner	ER-PORTS	WM	614-897-4016	X-7725	
Alfreda Cook	ER-WM	Information Management	574-1071	K1037	7346
Tina Heath	DSRD	Waste Info Systems	574-3251	1099 Commerce	7624
Jeff Henderson	ERWM	WM	241-2114	K1037	7346
Fraser Johnstone	ER-PGDP	WM	(502)441-5077	Kevil	Kevil
Richard Kaehn	WM-PGDP	WM	(502)441-6818	C-743-T3	C-743-T3
Charlie Neal	ESWMO	Waste Info Services	1-2111	K1037	7357
Carl Starling	LMES/CES	Value Engineering	6-7557	X1000	6337
Steven Trotter	ER	WM	576-2114	K1037	7346

ATTACHMENT #1-A

AGENDA
FOR
PORTSMOUTH/PADUCAH OPERATIONS
FUNCTION ANALYSIS EXERCISE
FOR
WASTE INFORMATION/TRACKING

February 19 & 20, 1996

<u>Meeting # 1 Feb. 19</u>	<u>ACTION</u>	<u>FACILITATOR</u>
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1:00PM	Introduction of Participants & Statement of Purpose	-Joe Sexton
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Presentation of facts related to problem &

Confirm understanding of meeting objective		-Charlie Neal
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Overview of F/A process & Review FAST Diag.

from Operations Mgrs. Session		- Carl Starling
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Identify functions for Waste Generators and make FAST diagram		- Carl
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<u>Meeting # 2 Feb. 20</u>		
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8:30AM	Develop Requirements Matrix	- Carl
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Compare Matrix with Requirements Matrix from OR Operations Mgrs. session

CDS: February 16, 1996

Attachment # 2

WASTE INFORMATION & TRACKING
LMES PORTSMOUTH/PADUCAH WASTE OPERATIONS FUNCTIONS
FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- 2-19-96

**MATRIX OF FUNCTIONS (Emphasis on Waste Operations)
ER PROJECT MANAGERS**

Requirement/ Information Needs	Eliminate (Dispose Waste	Manage Waste	Store USEC Waste	Certify Waste Disposal Treatment	Inspect Waste	Transport Waste	Arrange Off-Site Transport	Arrange Off-Site TSD	Sample Waste	Accept Waste	Group Waste	Certify Waste Storage	Process RFD	Interface With Project
Analytical Data	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	
Waste Regulations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Waste Volumes	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓
BDAT's	✓	✓		✓				✓	✓		✓			
FACWAC	✓	✓		✓				✓	✓	✓	✓	✓	✓	✓
Waste Type	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
DOT	✓	✓				✓	✓		✓					
Unit Translators	✓	✓											✓	
Project Description	✓	✓							✓		✓			✓
Risk Factors	✓	✓												✓
Project Schedules	✓	✓												✓
Waste Destination	✓	✓		✓						✓	✓		✓	
Project Prioritization	✓	✓												✓
Costs	✓	✓												✓
Commitments	✓	✓												✓
Accruals	✓	✓												
Originator	✓	✓												
Current Location	✓	✓	✓						✓				✓	
Packaging Requirements	✓	✓			✓	✓	✓	✓			✓		✓	
TSD Facility Capacity	✓	✓	✓		✓				✓			✓	✓	
Off-Site TSD Capacity (Facility)	✓	✓				✓	✓	✓		✓				

**MATRIX OF FUNCTIONS (Emphasis on Waste Operations)
ER PROJECT MANAGERS**

Requirement/ Information Needs	Develop W/M Plans	Review Project Waste Plan	Define WAC	Review Project PZ Potential	Waste Forecast	Manage Baseline	Minimize Waste	Recycle Waste	Source- Reduce Waste	Track Waste	Track Casks	Train Generator	Forecast Spendin	Manage Contracts	Report Waste Info
Analytical Data	✓						✓	✓	✓	✓				✓	✓
Waste Regulations	✓		✓				✓	✓	✓	✓		✓		✓	✓
Waste Volumes	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
BDAT's										✓					✓
FACWAC	✓											✓	✓	✓	
Waste Type	✓					✓	✓	✓	✓	✓			✓	✓	✓
DOT													✓		
Unit Translators										✓					✓
Project Description	✓					✓									
Risk Factors															
Project Schedules	✓					✓							✓	✓	
Waste Destination	✓									✓			✓	✓	✓
Project Prioritization													✓	✓	
Costs						✓							✓		✓
Commitments						✓							✓		
Accruals						✓							✓		
Originator													✓		✓
Current Location										✓					✓
Packaging Requirements											✓				
TSD Facility Capacity	✓						✓	✓				✓			✓
Off-Site TSD Capacity (Facility)															

Appendix H

Report - Sessions with Portsmouth and Paducah Waste Generators

Report on
Waste Information & Tracking

Function Analysis
Session # 6

LMES

Portsmouth/Paducah Generators

February 20 & 21, 1996

**REPORT ON WASTE INFORMATION/TRACKING
FUNCTION ANALYSIS SESSION # 6
LMES PORTSMOUTH/PADUCAH WASTE GENERATOR MANAGERS
FEBRUARY 20 & 21, 1996**

A. INTRODUCTION- MEETING ON FEBRUARY 20, 1996

This sixth of a series of sessions planned on waste information & tracking was conducted on February 20, 1996, at 105 Mitchell, conference room. The meeting was held primarily with waste generator managers to explore the functions that they perform in order to determine their information needs.

It is intended to meet separately with each group of stake holders that are affected by information and/or data regarding waste at all sites. After those meetings are held, it is intended to have a meeting with one or two representatives from each group for a consolidated approach to assure that all needs are met and that the best solution is identified for providing the needed functionality. This last meeting is currently not scheduled as of the writing of this report. Shortly after that meeting a recommended approach will be furnished to DOE.

B. ATTENDEES (TEAM)

Attendees at this first meeting with Portsmouth/Paducah Waste Generator Managers are shown in Attachment # 1. Joe Sexton started the meeting by having all attendees (team) introduce themselves and then he gave an overview of why we are having this meeting and why we will be having similar meetings with others who need information regarding waste. An agenda that was followed, in general, is included as attachment # 2.

C. PURPOSE AND GOAL

Charlie Neal introduced the "purpose" and the "goal" of the meeting as follows:

Purpose: Assess Waste Tracking to identify opportunities for decreased cost, improved efficiency, and improved waste and information management for ESWMO, LMES and DOE.

Goal: Provide a recommended direction for Waste Tracking across ESWMO

In accordance with a suggestion by DOE, the scope of discussions was expanded to include all information necessary for the waste program and was not limited to "tracking" information.

D. FUNCTION ANALYSIS (F/A) OVERVIEW

Carl Starling gave an abbreviated overview of the function analysis process which is a part of the Value Engineering (VE) methodology. VE has been utilized by Central Engineering Services to improve projects and reduce cost since 1988. A copy of that presentation was included as Appendix A to the minutes of the first session which was held with the LMES Waste Program Managers, and will not be duplicated in this report.

E. FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST) DIAGRAM

After an explanation of the F/A technique and discussion of the problems listed above, the team identified the following functions as potential functions of the group.

*Achieve Site Regulation Closure	*Remediate Site	*Negotiate Closure Plans
*Clean up Environment	*Assess Risk	*Characterize Site
Determine Clean up Levels	Develop WM Plan	Optimize Project vs. WM \$
Provide Waste Characterization	Segregate Waste	Provide Interim Storage
Minimize Waste Generation P2	Package Waste	Segregate Waste Types
+Forecast Waste Generation	Lab in Place	+ Train Contractor Personnel

After a thorough discussion of the subject, the team developed the FAST Diagram shown in Attachment # 3. Basic and secondary functions are identified with an *; and functions that are operative all the time are identified by +. All other functions shown on the FAST Diagram are supporting functions.

After completing the FAST Diagram, the meeting was adjourned until the next day.

F. FOLLOW UP MEETING ON FEBRUARY 21, 1996

A follow up meeting was held on February 21, and attendees are listed in Attachment # 1-A. Charlie Neal led the team in developing the matrix which shows the relationship of the functions on the FAST Diagram and the information needs of this group of managers, and is included as Attachment # 4.

That effort concludes this phase of the function analysis activities of the Portsmouth/Paducah Generator Managers. After similar sessions are held with other stakeholders involved in the waste information & tracking activities, a wrap up session will be held with representatives of each group. That session is expected to utilize brainstorming to identify various alternatives for solving this problem, and also an analysis of the alternatives to identify the preferred one or two. At that time a life cycle cost analysis will probably be necessary in order to choose the best solution.

ATTACHMENTS:

- Attachment # 1 - Attendees of meeting on Feb. 20, 1996
- Attachment # 1-A - Attendees of meeting on Feb. 21, 1996
- Attachment # 2 - Agenda for meeting on Feb. 20 & 21, 1996
- Attachment # 3 - FAST Diagram from meeting on Feb. 20, 1996
- Attachment # 4 - Matrix of Functions & Requirements from
meeting on Feb. 21, 1996

**ATTENDEES -FUNCTION ANALYSIS SESSION
WASTE INFORMATION/TRACKING PORTS/PGDP GENERATORS**

February 20, 1996

<u>Name</u>	<u>Organization</u>	<u>Specialty</u>	<u>Phone</u>	<u>Building</u>	<u>Mail Stop</u>
Candy Cole	Engineering	Off-Site	574-9063	K-1320	7592
Alfreda Cook	ER-WM	Information Management	574-1071	K1037	7346
Christine Goddard	ER-WM	PZ	5764034	K1037	7346
Tina Heath	DSRD	Waste Info Systems	574-3251	1099 Commerce	7624
E. Fraser Johnstone	ER-PGDP	WM	(502)441-5077	Kevil	Paducah
Richard Kuehn	WM-PGDP	WM	(502)441-6818	C-743-T3	C-743-T3
Chris Smith	WM	WM Interface	576-6526	9983-AH	8247
Carl Starling	CES	Value Engineering	576-7557	1000	6337
Miller Taylor	ESWMO	Information Service	576-2922	9103	8160

**ATTENDEES -FUNCTION ANALYSIS SESSION
WASTE INFORMATION/TRACKING PORTS/PGDP GENERATORS**

February 21, 1996

<u>Name</u>	<u>Organization</u>	<u>Specialty</u>	<u>Phone</u>	<u>Building</u>	<u>Mail Stop</u>
Candy Cole	Engineering	Off-Site	574-9063	K-1320	7592
Alfreda Cook	ER-WM	Information Management	574-1071	K1037	7346
Tina Heath	DSRD	Waste Info Systems	574-3251	1099 Commerce	7624
E. Fraser Johnstone	ER-PGDP	WM	(502)441-5077	Kevil	Paducah
Richard Kuehn	WM-PGDP	WM	(502)441-6818	C-743-T3	C-743-T3
Billy Matthews	DSRD	Computing	574-8703	9119	8235
Charlie Neal	ESWMO	W. Info Services	241-2111	K1037	7357

Attachment # 1-A

AGENDA
FOR
PORTSMOUTH/PADUCAH GENERATORS
FUNCTION ANALYSIS EXERCISE
FOR
WASTE INFORMATION/TRACKING

February 20 & 21, 1996

<u>Meeting # 1 Feb. 20</u>	<u>ACTION</u>	<u>FACILITATOR</u>
----------------------------	---------------	--------------------

1:00PM Introduction of Participants & Statement of Purpose		-Joe Sexton
Presentation of facts related to problem &		
Confirm understanding of meeting objective		-Charlie Neal
Overview of F/A process & Review FAST Diag.		
from session with Operators' or Generators'		- Carl Starling
Identify functions for Waste Generators and make FAST diagram		- Carl

Meeting # 2 Feb. 21

8:30AM Develop Requirements Matrix		- Carl
Compare Matrix with Requirements Matrix from OR Operations Mgrs. session		

CDS: February 19, 1996

Attachment # 2

Appendix I

Report - Sessions with LMES Pollution Prevention Program

Report on
Waste Information & Tracking

Function Analysis
Session # 7

LMES
Pollution Prevention Program

March 15, 21, & 26, 1996

**REPORT ON WASTE INFORMATION/TRACKING FUNCTION ANALYSIS
SESSION # 7 - LMES POLLUTION PREVENTION FUNCTION
MARCH 15, 21, & 26, 1996**

A. INTRODUCTION - MEETING ON MARCH 15, 1996

This meeting was conducted on March 15, 1996, at 3 Main conference room. The meeting was held with the Pollution Prevention Program (P2) manager to describe the purpose of function analysis and to discuss the function of the Pollution Prevention Program. This meeting was conducted more informally than previous sessions and involved only the P2 Program Manager as the stake holder.

It is intended to meet separately with each group (about 9 groups) of stake holders that are affected by information and/or data regarding waste at all sites. After those meetings are held, it is intended to have a meeting with one or two representatives from each group for a consolidated approach to assure that all needs are met and that the best solution is identified for providing the needed functionality. This last meeting has not been scheduled as of the time of this report. Shortly after that meeting a recommended approach will be furnished to DOE.

B. ATTENDEES (TEAM)

Attendees at this meeting for the P2 Program were Sam Suffern--the LMES P2 Program Manager, Charlie Neal, Joe Sexton, and Tina Heath. Joe Sexton started the meeting by having all attendees (team) introduce themselves and then he gave an overview of why we are having this meeting and why we will be having similar meetings with others who need information regarding waste.

C. PURPOSE AND GOAL

Charlie Neal introduced the "purpose" and the "goal" of the meeting as follows:

Purpose: Assess Waste Tracking to identify opportunities for decreased cost, improved efficiency, and improved waste information management for ESWMO, LMES, and DOE.

Goal: Provide a recommended direction for Waste Tracking across ESWMO.

In accordance with a suggestion by DOE, the scope of discussions was expanded to include all information necessary for the waste program and was not limited to "tracking" information.

D. FOLLOW UP MEETING ON MARCH 21, 1996

A follow up meeting was held on March 21, 1996 at the office of Sam Suffern at the K-25 Plant, Oak Ridge, TN. The attendees were Charlie Neal, Sam Suffern, and Tina Heath. The meeting was held to explore the functions that the P2 Program performs.

E. FUNCTION ANALYSIS (F/A) OVERVIEW

A brief overview of the function analysis process, which is part of the Value Engineering (VE) methodology, was given to Sam.

F. FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST) DIAGRAM

The team identified the following functions as potential functions of the P2 Program.

Avoid waste generation	Identify major waste streams
Identify processes that create waste	Find funding
Analyze processes for P2 Opportunities (PPOs)	Select best PPOs
Prepare PPO proposals	Rank proposals
*Implement P2 projects	Validate projects
Generate reports	Determine report baseline
+Fulfill P2 compliance-driven reporting requirements	+Fulfill ad hoc reporting requests
Establish & maintain data collection	+Report P2 costs & benefits
*Develop P2 program	Develop & update P2 plans
Establish goals and objectives	Develop activity schedules
Formulate budgets	Establish disposal costs & savings
Integrate P2 practices into sites	Conduct awareness and outreach
Subcontract management	Solicit award
*Organize & administer program	+Turn in reports
Designate & maintain P2 coordination	Link generator & ER
Interface with DOE & corporate	Comply with regulations (DO)
*Provide technical assistance	Implement affirmative procurement
Designate & maintain P2 committees	+Upgrade & maintain P2IMS

Basic and secondary functions are identified above with an *; design objectives are identified by DO; and functions that are operative all the time are identified by +. All other functions listed above are supporting functions. After a thorough discussion of the subject, the team developed the FAST Diagram shown in Attachment #1. ~~A copy of the Pollution Prevention Measurement Plan is included as Attachment #2.~~

An additional reference provided for review was the "High Investment Value P2 Projects "How To" Notebook". This document is in draft, but provides guidance on submission of P2 projects for funding, proposal standards and guidelines, estimating and reporting cost benefits guidance, and guidelines for evaluating P2 projects.

After completing the FAST Diagram, the meeting was adjourned.

G. FOLLOW UP MEETING ON MARCH 26, 1996

An additional follow up meeting was held by Tina Heath on March 26, 1996 at the offices of World Computer Systems in Oak Ridge, TN with Jeff Given. Jeff provides software support for the Pollution Prevention Information Management System (P2IMS). The significant data needs of the P2 program have been incorporated into this application.

A demonstration of the P2IMS application was given. P2IMS consists of three modules: HIVAL (High Investment Value), PPOA (Pollution Prevention Opportunity Analysis), and P2RS (a reporting function). ~~Examples of information requirements and reports of P2IMS are included in Attachments #3-6.~~

ATTACHMENTS: Attachment #1 - FAST Diagram from meeting on March 21, 1996

WASTE INFORMATION & TRACKING - LMES POLLUTION PREVENTION FUNCTIONS

FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- March 1996

Appendix J

Report - Sessions with LMES Environmental Compliance Program

Report on
Waste Information & Tracking

Function Analysis
Session # 8

LMES
Environmental Compliance Program

March 29, 1996

**REPORT ON WASTE INFORMATION/TRACKING FUNCTION ANALYSIS
SESSION #8 - LMES ENVIRONMENTAL COMPLIANCE FUNCTION
MARCH 29, 1996**

A. INTRODUCTION - MEETING ON MARCH 29, 1996

This meeting was conducted on March 29, 1996, at 1099 Commerce Park conference room. The meeting was held with the Environmental Compliance Program managers to describe the purpose of function analysis and to discuss the functions of the Environmental Compliance Program.

B. ATTENDEES (TEAM)

Attendees at this meeting are shown in Attachment # 1. Joe Sexton started the meeting by having all attendees (team) introduce themselves and then he gave an overview of why we are having this meeting and why we have had similar meetings with others who need information regarding waste.

C. PURPOSE AND GOAL

Joe introduced the "purpose" and the "goal" of the meeting as follows:

Purpose: Assess Waste Tracking to identify opportunities for decreased cost, improved efficiency, and improved waste information management for ESWMO, LMES, and DOE.

Goal: Provide a recommended direction for Waste Tracking across ESWMO.

In accordance with a suggestion by DOE, the scope of discussions was expanded to include all information necessary for the waste program and was not limited to "tracking" information.

D. FUNCTION ANALYSIS (F/A) OVERVIEW

Joe also gave a brief overview of the function analysis process which is part of the Value Engineering (VE) methodology. VE has been utilized by Central Engineering Services to improve projects and reduce cost since 1988.

E. FUNCTION ANALYSIS SYSTEM TECHNIQUE (FAST) DIAGRAM

The team identified the following functions as potential functions of the Environmental Compliance Program.

Protect Health & Environment
Enhance Compliance
Track Regulatory Changes
*Provide Regulatory Guidance
*Assist in Implementation
Develop Permits
Develop/Implement Training
Improve Data Timeliness
Revise Compliance Programs

Minimize Liability
*Interpret Regulations
Comment Regulatory Changes
Interface with Regulators
Maintain Permits
Develop Reports
Verify Data Quality
*Maintain Compliance Programs
Provide Oversight

Negotiate Compromise

When the team was satisfied that the FAST Diagram reflected the functions of the program, a matrix was developed to show the requirements necessary for those functions. This matrix is included as Attachment # 3. Several significant needs of the Environmental Compliance program were discussed. The need for tracking of reporting milestones (e.g., RCRA accumulation, exception reports, satellite area, PCB, etc.) In order to stay in compliance is a high priority need of this program. The most critical need is QUALITY data on waste. The types of information needed on waste include sampling data, characterization, TSD status and plans, generation process, dates, and fit with other regulatory programs.

ATTACHMENTS: Attachment # 1 - Attendees of meeting March 29, 1996
Attachment # 2 - FAST Diagram from meeting on March 29, 1996
Attachment # 3 - Matrix of Functions & Requirements from meeting on
March 29, 1996

**ATTENDEES - WASTE INFORMATION/TRACKING FUNCTION ANALYSIS SESSION
ENVIRONMENTAL COMPLIANCE PROGRAM**

March 29, 1996

<u>Name</u>	<u>Organization</u>	<u>Specialty</u>	<u>Phone</u>	<u>Building</u>	<u>Mail Stop</u>
Nancy Dailey	OECD	RCRA/TSCA	4-8774	6026C	6395
Chuck Estes	Central ESWMO	RCRA/TSCA/ WM Compliance	6-0127	K1037	7357
Tina Heath	DSRD	WM Systems	4-3251	1099COM	7624
Wade Hollinger	K-25 EMD	PCB	6-3968	K-303-8	7314
Cheryl LaBorde	K-25 EMD	RCRA	4-9531	K-303-8	7314
Sonja Maddox	X-10 ESWMO	Waste Mgmt.	1-2082	3047	6022
Dee Markelonis	Central ESWMO	RCRA/TSCA/ CERCLA	4-6274	K1037	7357
Stacey Rathke	Y-12 EMD	RCRA	4-9394	9116	8098
Joe Sexton	ESWMO	Economic Analysis	1-5950	3 Main	8620
Linda L. Smith	OECD	RCRA/WTS	1-3711	6026C	6395

WASTE INFORMATION/TRACKING - LMES ENVIRONMENTAL COMPLIANCE FUNCTIONS
FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM- 3-29-96

**MATRIX OF FUNCTIONS AND REQUIREMENTS
ENVIRONMENTAL COMPLIANCE PROGRAM**

Requirements/Actions	Interpret Regulations	Provide Regulatory Guidance	Assist Implementation	Maintain Compliance Program
40 CFRs	✓	✓	✓	✓
OSWER Directives	✓	✓	✓	✓
Relevant Case Law	✓	✓	✓	✓
Regulatory Policies	✓	✓	✓	✓
Site Data (90 Day & RCRA areas)	✓	✓	✓	✓
Waste Data	✓	✓	✓	✓
Project Data	✓	✓	✓	✓
Organization Highlights	✓	✓	✓	✓
State Regulations	✓	✓	✓	✓
DOE Orders	✓	✓	✓	✓
Organization Data (who needs guidance)		✓	✓	✓
Regulator Information		✓	✓	✓
Site Procedure Data			✓	✓
Permit Data			✓	✓
Report/Milestone Tracking			✓	✓

Requirements/Actions	Interpret Regulations	Provide Regulatory Guidance	Assist Implementation	Maintain Compliance Program
Permit Requirements			✓	✓
Internal Procedures				✓
Internal Oversight Data				✓
Non Compliance Data				✓

Appendix K

Material - Sessions with Mr. Angel Rivera on Requirements for Compliance
with the Tennessee Department of Environment and Conservation
Commissioner's Order for Mixed Waste Treatment

"SITE IMPLEMENTATION PLAN"

**A PERFORMANCE-BASED APPROACH
TO MEETING THE REQUIREMENTS OF THE
COMMISSIONER'S ORDER SITE TREATMENT PLAN**

ANGEL L. RIVERA

ENERGY SYSTEMS WASTE MANAGEMENT ORGANIZATION

MARCH 5, 1996

OUTLINE

- **Define the need and schedule for the Site Implementation Plan**
- **Demonstrate that the net reduction in waste inventory must be the basis for performance-based planning**
- **Describe the Approach for Development of the Site Implementation Plan for Mixed Low-Level Waste**

Need for the Implementation Plan

- Review/Verify the requirements of the STP issued on September 26, 1995
- Support development of the first annual update of the STP to be issued on September 15, 1996
 - New Milestones
 - New Targets
 - New Compliance Dates
- Support development of the first Semiannual Progress Report to be issued on April 30, 1996
 - New Inventory Projections

Schedule for Preparation of the Baseline Site Implementation Plan

- **March 30, 1996 - Complete development of the dataset for the implementation plan**
 - **Develop official Assignment of MLLW to Task Managers**
 - * **Kimmitt**
 - * **Noakes**
 - * **Conley**
 - * **ER Program**
 - **Task Managers Complete Assignment of MLLW to Waste Stream Project Managers**
 - * **Kimmitt**
 - * **Noakes**
 - * **Conley**
 - **Meetings with Task Managers and Waste Stream Project Managers to Support the Development of the Site Implementation Plan Dataset**
 - * **Net Inventory Reduction Goals**
 - * **Costs**
 - * **Other Resource Requirements**
 - **Review Implementation Plan Dataset with the Sites**

**PROJECT-BASED APPROACH TO IMPLEMENTATION OF THE
SITE TREATMENT PLAN**

Waste Stream Project	Project Manager	Task Manager
MLLW		
Inorganic Solids/Sludges for TVS	T. B. Conley	T. B. Conley
Soils	C. W. Broughton	C. M. Noakes
TC Waste (D004-D011) Variance	T. B. Conley	T. B. Conley
TVS Demonstration Residuals	L. R. Dole/ESWMO-K	T. B. Conley
Incinerable Liquids	P. M. Backus	R. R. Kimmitt
Unstabilized Pond Sludge	Christine Goddard	S. M. Trotter
CNF Sludge	K. M. Cash	C. M. Noakes
WETF Sludge	H. A. Valentine	C. M. Noakes
Crushed Light Bulbs	S. Astoria	C. M. Noakes
Broad Spectrum Plan	F. H. Miller	C. M. Noakes
TVS Demonstration	L. R. Dole	T. B. Conley
TSCAI Residuals	D. P. Schaefferkoetter	R. R. Kimmitt
TC Waste (D018-D043) Variance	C. L. Calhoun	R. R. Kimmitt
Incinerable Solids	T. O. Rogers	R. R. Kimmitt
Explosive Wastes	K. G. Edgemon/J. K. Gilpin	R. R. Kimmitt
Compressed Gases	W. T. Wright	T. B. Conley
Bulking of Scintillation Fluids	K. Wilson	C. M. Noakes
No-Rad-Added Lab Packs	K. Wilson	C. M. Noakes
Aqueous Waste for Wastewater Treatment	P. M. Backus	R. R. Kimmitt
MTRU		
RH TRU Sludge	T. H. Monk	T. H. Monk
MVST Supernatant Stabilization	C. B. Scott	T. H. Monk
CH/RH TRU Solids	T. H. Monk	T. H. Monk

Schedule for Preparation of the Baseline Site Implementation Plan (con't.)

- **April 30, 1996 - Complete Preparation of the Site Baseline Implementation Plan**
 - * **Kimmitt**
 - * **Noakes**
 - * **Conley**
 - * **Rogers**
 - * **Mezga**
 - * **Estes**
 - * **Rivera**
 - * **Hightower**
 - * **Sites**

**Net Reduction in Waste Inventory as the
Basis for Performance-Based Planning**

Compliance-Driven Performance Requirement for Mixed Waste

To achieve and maintain a state of full compliance with the storage prohibitions of the Resource Conservation and Recovery Act Land Disposal Restrictions by reaching a point (steady state) where mixed waste is stored (inventoried) only for the purpose of accumulating sufficient quantities to facilitate treatment, disposal, or recycle.

Guiding Principle for Performance Management

- To achieve the required state of compliance in the shortest time
- at a minimum cost
- and maximum reduction of risk

An Alternative Way of Describing the Guiding Principle for Performance Management

- To maximize the net reduction of waste inventory in each performance period*
- at a minimum cost
- and maximum reduction of risk

*A performance period is defined as one fiscal year.

WASTE INVENTORY REDUCTION MODEL

WASTE INVENTORY REDUCTION MODEL - GLOBAL

For a performance period n

$$R_n^* = B_n - E_n$$

or

$$E_n = B_n - R_n^*$$

where:

$$n = 1, 2, 3, \dots, N$$

If N is the performance period when the state of compliance is achieved, it can be shown that

$$E_N = B_1 - \sum_{n=1}^{n=N} R_n^*$$

or

$$\sum_{n=1}^{n=N} R_n^* = B_1 - E_N$$

where:

B_1 = baseline beginning inventory

E_N = inventory meeting the state of compliance at the end of performance period N

The Annual Updates of the Commissioner's Order Site Treatment Plan specify minimum reduction levels for the beginning inventory in each performance period

- **Enforceable Milestones for 3 Consecutive Fiscal Years**
- **Targets by fiscal year necessary to achieve the state of compliance**
- **The fiscal year to achieve the state of compliance**

DRAFT

Commissioner's Order Site Treatment Plan Waste Inventory Reduction Goals for MLLW

04-Mar-96

STP Waste Group	STP Waste Group Description	Inventory 12/31/94 (kgs)	Annual Generation (kgs/yr)	Waste Inventory Reduction Goals (kgs/yr) (kgs in thousands)																Total
				FY96	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10		
STP01	Aqueous Liquids for Existing Wastewater T	405,632.84	53,564.00	130	130	160	0	0	0	0	0	0	0	0	0	0	0	0	420	
STP02-LIQUID	Incinerable Liquids (Organic Liquids, Aqueous)	854,771.32	124,704.00	400	400	0	0	0	0	0	0	0	0	0	0	0	0	0	800	
STP02-SOLID	Incinerable Solids (Organic Sludges, Organic Solids)	881,741.12	54,408.00	75	200	0	0	0	0	0	0	0	0	0	0	0	0	0	275	
STP03-1301	Inorganic Sludges for Stabilization - CNF Solids	523,697.97	100,800.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP03-1304	Inorganic Sludges for Stabilization - TSCA	168,807.53	40,511.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP03-1318	Inorganic Sludges for Stabilization - B/C Potentials	12,881,000.00	0.00	0	1400	1400	1400	1400	1400	1400	1400	1400	1400	0	0	0	0	0	12600	
STP03-3305	Inorganic Sludges for Stabilization - WETFO	7,883,527.00	274,395.00	0	900	900	900	900	900	900	900	900	900	900	900	0	0	0	9900	
STP03-OTHER	Inorganic Sludges for Stabilization - Other	800,050.47	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP04	Broad Spectrum	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP05	Soils	4,725,005.18	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP08-1303	Inorganic Homogeneous Solids - TSCA As	117,529.22	1,118.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP08-OTHER	Inorganic Homogeneous Solids - Other	375,703.78	59,897.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP07	Containerized Soils	154,132.90	12,803.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP08-1307	Inorganic Debris - TSCA Kiln Brick	91,233.20	85.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP08-0018-43	Inorganic Debris - TC Waste	12,380.37	4,323.00	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	
STP08-OTHER	Inorganic Debris - Other	538,113.71	85,798.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP09	Lab Packs	31,568.00	1,558.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP10	Elemental Mercury	6,408.22	122.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP11	Elemental Hazardous Metals	143,275.35	884.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP12	Beryllium Dust	278.81	0.18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP13	Batteries	31,889.87	3,248.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP14	Reactive Metals	17,321.44	3.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP15	Explosives	15.03	0.10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP16	Compressed Gases	7,774.71	555.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP17	Uncategorized	157,488.95	9,183.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP18	CERCLA - MLLW	7,118,419.50	1,298.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STP19	Stabilized Pond Sludge (Envirocare Disposal)	24,040,327.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL MLLW		61,546,167.27	829,051.28	617	3030	2460	2300	2300	2300	2300	2300	2300	2300	900	900	0	0	0	24007	

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Internal Milestones Waste Inventory Reduction Goals for MLLW

04-1c

STP	Waste Group	STP	Waste Group Description	Inventory 12/31/94 (kgs)	Annual Generation (kgs/yr)	FY96	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	Total
STP01	Aqueous Liquids for Existing Wastewater T			405,632.64	53,564.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP02-LIQUID	Inclinerable Liquids (Organic Liquids, Aqueous)			854,771.32	124,704.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP02-SOLID	Inclinerable Solids (Organic Sludges, Organic)			881,741.12	54,408.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP03-1301	Inorganic Sludges for Stabilization - CNF S			523,897.97	100,800.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP03-1304	Inorganic Sludges for Stabilization - TSCA			168,807.53	40,511.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP03-1318	Inorganic Sludges for Stabilization - B/C Po			12,881,000.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP03-3305	Inorganic Sludges for Stabilization - WETF			7,863,527.00	274,395.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP03-OTHER	Inorganic Sludges for Stabilization - Other			600,050.47	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP04	Broad Spectrum			0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP05	Soils			4,725,005.16	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP06-1303	Inorganic Homogeneous Solids - TSCA As			117,529.22	1,118.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP06-OTHER	Inorganic Homogeneous Solids - Other			375,703.78	59,897.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP07	Containerized Soils			154,132.80	12,803.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP08-1307	Inorganic Debris - TSCA K/in Brick			91,233.20	85.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP08-D018-43	Inorganic Debris - TC Waste			12,380.37	4,323.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP08-OTHER	Inorganic Debris - Other			538,113.71	85,798.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP09	Lab Packs			31,568.00	1,558.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP10	Elemental Mercury			6,408.22	122.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP11	Elemental Hazardous Metals			143,275.35	884.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP12	Beryllium Dust			278.81	0.18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP13	Batteries			31,989.87	3,246.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP14	Reactive Metals			17,321.44	3.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP15	Explosives			15.03	0.10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP16	Compressed Gases			7,774.71	555.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP17	Uncategorized			157,488.95	9,183.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP18	CERCLA - MLLW			7,118,419.50	1,289.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP19	Stabilized Pond Sludge (Envirocare Dispos)			24,040,327.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL MLLW			61,546,167.27	829,051.28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Internal Milestones Supporting the Commissioner's Order Site Treatment Plan

STATUS	DUE DATE	INTERNAL MILESTONES	INVENTORY REDUCTION GOAL	PROJECT MANAGER	SOURCE
TBD		Declare Sealed and Unopened Lab Packs no-rad added	TBD	Wilson, K	Data Dictionary
TBD		Declare Crushed Fluorescent Lamps no-rad added	TBD	Astoria, S	Data Dictionary
TBD	31-May-96	Recommendation on direct shipment of CNF Sludge for disposal versus grouting		Cash, K	96-2 PMT Expectations
TBD	30-Jun-96	Treat remaining explosive waste inventory	123.09 kgs	Gilpin, J./Edgemon, K.	Letter, Mezga to Sager, dated 2/16/98
TBD	31-Jul-96	Ship characteristically hazardous mixed solid waste to Envirocare	110 drums	Kimmitt, R.	96-2 PMT Expectations
TBD	15-Sep-96	Ship mixed waste to Envirocare for macroencapsulation under Technology Development cooperative agreement	40,000 lbs	Conley, T.	96-2 PMT Expectations
TBD	15-Dec-96	Ship TSCA Residues (Sludge) to Envirocare	30 drums	Schaefferkoetter, D.	TIRM Schedule
TBD	15-Feb-97	Ship TSCA Residues (Ash) to Envirocare	85 drums	Schaefferkoetter, D.	TIRM Schedule
TBD	15-Apr-97	Ship TSCA Residues (Kiln Brick) to Envirocare	308 drums	Schaefferkoetter, D.	TIRM Schedule

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Total Waste Inventory Reduction Goals for MLLW (STP + Internal)

STP Waste Group	STP Waste Group Description	Inventory 12/31/94 (kgs)	Annual Generation (kgs/yr)	Waste Inventory Reduction Goals (kgs/yr) (kgs in thousands)															
				FY96	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	Total
STP01	Aqueous Liquids for Existing Wastewater T	405,632.64	53,564.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP02-LIQUID	Incombible Liquids (Organic Liquids, Aque	854,771.32	124,704.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP02-SOLID	Incombible Solids (Organic Sludges, Orga	881,741.12	54,408.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP03-1301	Inorganic Sludges for Stabilization - CNF S	523,697.97	100,800.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP03-1304	Inorganic Sludges for Stabilization - TSCA	169,807.53	40,511.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP03-1316	Inorganic Sludges for Stabilization - B/C Po	12,881,000.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP03-3305	Inorganic Sludges for Stabilization - WET F	7,663,527.00	274,395.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP03-OTHER	Inorganic Sludges for Stabilization - Other	600,050.47	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP04	Broad Spectrum	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP05	Soils	4,725,005.16	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP06-1303	Inorganic Homogeneous Solids - TSCA As	117,529.22	1,118.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP06-OTHER	Inorganic Homogeneous Solids - Other	375,703.78	59,697.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP07	Containerized Solids	154,132.90	12,803.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP08-1307	Inorganic Debris - TSCA Kiln Brick	91,233.20	85.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP08-D018-43	Inorganic Debris - TC Waste	12,360.37	4,323.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP08-OTHER	Inorganic Debris - Other	536,113.71	85,793.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP09	Lab Packs	31,568.00	1,558.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP10	Elemental Mercury	6,408.22	122.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP11	Elemental Hazardous Metals	143,275.35	884.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP12	Beryllium Dust	276.81	0.18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP13	Batteries	31,989.87	3,248.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP14	Reactive Metals	17,321.44	3.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP15	Explosives	15.03	0.10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP16	Compressed Gases	7,774.71	555.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP17	Uncategorized	157,486.95	9,163.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP18	CERCLA - MLLW	7,116,419.50	1,298.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STP19	Stabilized Pond Sludge (Envirocare Dispos	24,040,327.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL MLLW	61,546,167.27	829,051.28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

The Semiannual Progress Report requires the beginning inventory and new inventory projections for five fiscal years

According to Section 2.3.3.1 of the Commissioner's Order Site Treatment Plan -

"The Semiannual Progress Reports will provide the following:

1. *The amount of each LDR mixed waste stored on the Oak Ridge Reservation as follows:*
 - A. *the estimated amount in storage at the end of the previous six month period, and*
 - B. *the estimated amount anticipated to be placed in storage in the next five fiscal years. "*

Approach for Development of the Site Implementation Plan for Mixed Low-Level Waste

Planning Basis

- The basis for the Site Implementation Plan is the "Net Reduction in Waste Inventory"
- The Site Implementation Plan will be developed to define the resource requirements to achieve the "Net Reduction in Waste Inventory"

Working Draft
February 26, 1996

**PLAN FOR MEETING THE
REQUIREMENTS OF THE COMMISSIONER'S ORDER/SITE TREATMENT PLAN
FOR THE CAK RIDGE RESERVATION**

PROPOSED OUTLINE

- I. INTRODUCTION
- II. RELATIONSHIP TO REGULATORY DRIVERS AND WASTE MANAGEMENT PLANS
- III. DESCRIPTION OF TARGET WASTE
- IV. DESCRIPTION OF WASTE INVENTORY REDUCTION ACTIVITIES FOR TARGET WASTE
- V. NET INVENTORY REDUCTION GOALS FOR TARGET WASTE
- VI. METHOD OF ACCOMPLISHMENT
- VII. RESOURCE REQUIREMENTS
- VIII. SOURCE OF RESOURCES
- IX. REFERENCES
- X. PLAN SUPPORTING DATA

Long-Range Performance-Based Planning

***** Performance Goals for Each Fiscal Year*****

- **Technical-Based Performance Goals**
 - **Net Waste Inventory Reduction (kg, m³, containers, percent)**
- **Cost-Based Performance Goals**
 - **Cost of Net Waste Inventory Reduction (\$, \$/kg, \$/m³, \$/container)**
- **Risk-Based Performance Goals (Program)**
 - **Risk Reduction (Risk of Beginning Inventory - Risk from Ending Inventory)**
 - **Cost of Risk Reduction (\$/Risk Reduction)**

Levels of Performance-Based Planning

- Program
- Site
- Program Task
- Waste Stream Project/Waste Inventory Reduction Activity

Performance-Based Planning will be done at the waste stream project/waste inventory reduction activity and rolled up to the Program Task, Site, and Program.

A PROJECT MANAGEMENT APPROACH TO IMPLEMENTATION OF THE COMMISSIONER'S ORDER SITE TREATMENT PLAN AND THE ORR PCB FFCA

A PROJECT MANAGEMENT APPROACH TO IMPLEMENTATION OF THE COMMISSIONER'S ORDER SITE TREATMENT PLAN AND THE ORR PCB FFCA

Description of Waste Inventory Reduction Activities

Waste Inventory Reduction Activity	Waste Management Method	Waste Management Option	Waste Management Option Location	Waste Management Option Ownership
Treatment	Incineration	TSCAI	Onsite	DOE
Disposal				
Treatment "fb" Disposal				
Recharacterization Out-Transfers	NA	Waste Type Program	NA	NA
Offsite Storage	Storage			
Recycle				

A PROJECT MANAGEMENT APPROACH TO IMPLEMENTATION OF THE COMMISSIONER'S ORDER SITE TREATMENT PLAN AND THE ORR PCB FFCA

WASTE INVENTORY REDUCTION MODEL

WASTE INVENTORY REDUCTION MODEL

ORNL DWG 95A-122B

WASTE INVENTORY REDUCTION MODEL

ORNL DWG 95A-122C

$$R_n^* = [B_n - E_n] = [RB_n] - \{[G_n - RG_n] + [I_n - RI_n] + [T_n - RT_n]\}$$

$$CR_n^* = CB_n + CG_n + CI_n + CT_n + CP_n$$

$$\text{Risk Reduction} = [\text{Risk of } B_n - \text{Risk of } E_n]$$

PERFORMANCE-BASED MANAGEMENT SYSTEM FOR MEETING THE REQUIREMENTS OF THE COMMISSIONER'S ORDER SITE TREATMENT PLAN

Appendix L

Material - Session with Mr. Rolf Migun on ESWMO Enterprise Model

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Energy Systems
Waste Management Organization
Enterprise
Model

December 20, 1995

Strategic Objectives - Survival

(1) Control Waste Management Process

- Waste Forecasting (Change Control by Waste Types, etc.)
- Waste Processing (Flowcharts & Definition by Waste Types, etc.)
- Waste Tracking (Physical Identification of Waste Through the Process)
- Waste Process Scheduling (Capacities & Capabilities - Throughput)
- Waste Processing Resource Standards (Cost Estimating)
- Waste Processing Accounting (Cost Accounts and Work Orders)

(2) Fixed Price Business

- Establish Tested Resource Standards (Activity Based Cost Estimating and Costing)
- Bid or Charge Work on a Fixed Price Bases (Provide Proper Incentives)
- Benchmark Against Federal & Private Sectors

(3) Marketing New Business

- Internal Customers (ER, DP, Energy, Etc.)
- External Customers (Other DOE Sites, TVA, NFS, etc.)

R. P. Migun, 12/1/95

Waste Management Life Cycle Model

This graphical presentation captures the primary elements in the Energy Systems Waste Management Organization and the relationship of those elements in support of the business. The elements are Strategic Planning, a multi year Baseline, and the Waste Operations Machine (waste processing). Other captured elements are the demands made on ESWMO from external and internal customers (DOE, Stakeholders, and Waste Generators). These demands are balanced and addressed against the organization capacities and capabilities. This is the prioritization process. Lastly, the augmentation of the organizations capacities and capabilities are Line Item Planning, General Plant Projects, Privatization & Off-Site, and Technology Development.

WASTE MANAGEMENT LIFE CYCLE MODEL

Waste Forecasting

As in any business the sales forecast is the starting point in the planning process. Without some level of confidence or validity, production or/and processing control is impossible. The following information highlights the present and recommended approach to waste forecasting.

Waste Forecasting is Needed for Effective Planning, Cost Control, and Waste Minimization

Current Situation (STP, BEMR):

Business Operation:

Effective Waste Forecasting Requires the Following Elements:

- **Identification of Generators / Customers**
- **Forecast for Contract Period by Generators**
- **Change Control / Contract**
- **Chargeback System**

Example of a Forecast Database

Site	Funding Program	Generator/Project	Generator ID	Generator Location	Waste Type	Waste Stream ID	Waste Desc.	Waste Class	Container Type	FY 97	FY 98	FY 99
OP&L	EP	OP&L	X21	OP&L, Bldg 6010	LIW	OP&LA01	PPE and wipes	Incineration	55 g drum	3		
Y-12	DP	UCOF	Y801	UCOF, Bldg. #401-5	LIW	UCOF01	U Oxide Metal	Ready For Disposal	55 g drum		14.0	1.1
K-25	EM30	TSCA	K228	TSCA, K-1435 C	MW	TSCA01	Ash	Compaction	55 g drum			2.3
K-25	EM30	TSCA	K228	TSCA, K-1435 C	MW	TSCA02	Kiln Brick/Debris	Debris	55 g drum		0.0	1.5
K-25	EM30	TSCA	K228	TSCA, K-1435 C	MW	TSCA03	Dewatered Sludge	Stabilization	55 g drum	100		25.0
K-25	EM40	Cooling Tower Demolition	K4302-10	K-801-11 Cooling Tower Basin	LIW	4302-01	Coolant Lines	RSM	8.25 Box	0	0	10

Waste Management Flowcharts
By
Waste Type & Below

These graphical representations provide waste flows by waste types and one level below. The flowcharts are organized in the following manner:

- Generic Waste Management Flowchart - provides the highest level of waste flow and compels uniformity among and between Waste Type flowcharts. Also, provides step identification for orientation and subsequent step definition refinement.
- Mixed Waste Flowcharts - provides many of the treatability groups in mixed waste processing
- Low Level Waste Flowcharts - provides many of the treatability groups in low level waste processing
- Hazardous Waste Flowcharts - provides the site liquid waste flows and the commercial treatment alternatives
- Sanitary Waste Flowcharts - provides liquid, solid, and clean scrap metal recycling alternatives
- Transuranic Waste Flowcharts - provides the RH, CH, and RH TRU waste categories
- Spent Nuclear Fuel Flowcharts - provides the waste categories and their associated repackaging

GENERIC WASTE MANAGEMENT FLOWCHART PROCESS WORK BREAKDOWN STRUCTURE STEPS

GENERIC WASTE MANAGEMENT FLOWCHART AT 5TH LEVEL PROCESS WORK BREAKDOWN STRUCTURE

MW ORGANIC LIQUIDS, SOILS, & SOILS FLOWCHART

Waste Tracking

The following information recommends two distinct informational requirements for the waste tracking system. The first information area is the Waste Acceptance Criteria required for treatment, storage, and/or disposal. The second information area is the physical location and the waste processing pathway the waste unit has and is taking. ESWMO present tracking system NEEDS to be enhanced in order to address the second information area.

BUSINESS INFORMATION INTEGRATION

Effective Waste Tracking to Support Waste Processing Material Accounting Requires the Following Elements:

Process Pathway & Physical Location Status

- Container or Item Level Tracking
- Location History in Process Stream
- Current Processing Location in Waste Stream Processing Flowchart(s)
- Periodic Audit Confirmation
- Ability to track inter-plant transfers, treatment transformations, and private sector trans-shipments (i.e. treatment-disposal)
- Information Accessibility to Waste Stream Managers and Customers

Waste Acceptance Criteria

- Waste Item Description or Request for Disposal (Common Form 2109)
- Container Packing List (Form TX-5749)
- Waste Pickup Request (Form TX-5753)

WASTE PROCESSING MATERIAL ACCOUNTING REQUIREMENTS

FORM 2109A WASTE PROCESSING INFORMATION

Waste Stream ID No.	L1001	LLW Combustible Debris						Curr
Process Step	1	2	3	4	5	6	7	Loc
Date In	10/1/95	12/15/95	2/4/95					
Date Out	12/15/95	2/4/96						

Low-Level Waste Process Status Report		
Step		Volume
1	Current Month Generation	350 m ³
2	Ready for Pickup	100 m ³
3a	Beginning Storage Inventory	15.067 m ³
4	Ready for Treatment	4,045 m ³
5	Waste in Treatment	124 m ³
6a	Awaiting Characterization Results	42 m ³
6b	Returned from Treatment	15 m ³
6c	Ready to Ship for Off-Site Disposal	67 m ³
7	Disposed	0 m ³
3b	Ending Inventory	15,333 m ³

Production Processing Model & Supporting Control System

The following graphical representation provides a crosswalk between the Process Model (waste flows, volume, functions, etc.) and the process information system (resource standards, cost, scheduling, reporting). The private sector is required to maintain and control this connectivity in order to stay in business.

Production Processing Model (Being Developed) & Supporting Control System (IC&IS)

Volume ↓ Functions

Standards ↑ Performance
Est Cost Actual Cost

Information Integration

The following graphical representations and example Data Dictionary and Cost Estimates provides the philosophy and the rationale behind the data connection, data consistency, and data collection. These pages migrate from the waste process and its physical units to the fundamental building blocks (data dictionary) over time. All information must be structured to answer the intended questions at the lowest level. Without this structure, the data gathering efforts will be costly, and more importantly not factual.

INTEGRATION OF WASTE PROCESS BUSINESS WITH THE FUNDAMENTAL INFORMATION BUILDING BLOCKS

INTEGRATED CONTROL AND INFORMATION PROCESS

Baseline - 6/30/92

Process Flow Analysis And Standards Determination

The following two graphical representations provide the concept of a variable cost system and the information application of the information to Facility Utilization via an operating schedule. These two charts represent standard private sector resource input definition and the application of those standards in controlling a process or production system. This approach has been used over the past thirty five years and has resulted in many production scheduling refinements (MRP).

PROCESS FLOW ANALYSIS AND STANDARDS DETERMINATION

<div style="text-align: center;"> VARIABLE INPUT </div>	<u>STEP A</u>			<u>STEP B</u>			<u>STEP C</u>			<div style="text-align: center;"> MEASURABLE OUTPUT </div>
	CATEGORY	STANDARD	ACTUAL	CATEGORY	STANDARD	ACTUAL	CATEGORY	STANDARD	ACTUAL	
	LABOR	XXX	000	LABOR	XXX	000	LABOR	XXX	000	
	MTLS	XXX	000	MTLS	XXX	000	MTLS	XXX	000	
	SERVICES	XXX	000	SERVICES	XXX	000	SERVICES	XXX	000	
	(COST CENTER)			(COST CENTER)			(COST CENTER)			

OPERATIONS PERFORMANCE METRIC

MEASURABLE OUTPUTS (TIMES) STANDARD INPUT (MINUS) ACTUAL INCURRED COST
EQUALS
PERFORMANCE METRICS

OPERATING SCHEDULE & NONROUTINE MAINTENANCE AND FACILITY UTILIZATION (CAPACITY)

Appendix M

Report - Preliminary Benchmarking

WASTE INFORMATION/TRACKING FUNCTION ANALYSIS BENCHMARKING QUESTIONS

The following is a summation of the telephone interview with Rhonda Carpenter, Tennessee Eastman representative who functions as a waste manager in their Environmental Affairs office.

A. General Organizational Information -

1. Name and function (title) of person being interviewed

Rhonda Carpenter, Waste Manager, Environmental Affairs office, and Vickie Welch who is a programmer-person working/assisting Rhonda Carpenter.

2. Type of business (e.g., chemical company, trucking company, etc.)

Chemical industry

3. Number of sites or locations involved (important in meeting State EPA regulations)

The majority of time Rhonda and others in Environmental Affairs work primarily with the Kingsport site. However, they also advise and help out with other non-hazardous waste streams at the other sites in South Carolina, Arkansas, and Texas.

B. General Information Related to Waste Management Responsibilities -

1. Are they a waste generator, or are they involved in waste treatment, storage, and disposal (TSD)?

Not really. They are an oversight for the divisions, but they are not really generators themselves, other than sanitary waste.

2. General types of waste generated (e.g., Hazardous, Mixed, etc.):

Tennessee Eastman generates RCRA (Environmental Affairs has no part in obtaining permits), PCB, Bio-solids (waste water), some small amount of radioactive waste (these are scintillation vials at a facility in Florida), Sanitary waste, Carcinogens, but the majority of their waste is solvents ("F3, F4, F5, D1, D2, Arsenic, and Selenium").

3. Typical waste-generating and/or TSD processes or activities:

The majority of the waste comes from chemical processes. The TSD activities are done by other organizations. Environmental Affairs approves facilities and these facilities are the treatment centers including those that burn the bio-solids in boilers.

A separate organization from Environmental Affairs though belonging to Tennessee Eastman is responsible for the transportation of the waste items. They use tankers, dump trucks, a lot of fiber drums, a few metal drums, dumpsters which are actually pressure vessels, and small plastic drums that are less than 5-gallon capacity.

There is a hazardous landfill on-site and a non-hazardous landfill on-site.

4. Typical disposal avenues (e.g., incineration, recycle, etc.):

There is an incinerator facility. The bio-solids are de watered using an activated carbon filtering system and then burned in boilers approved for burning them. They recycle, but the majority of the waste is solvents. There was a hazardous waste boiler, but they quit using this because the permit requirements got too tough to meet. PCBs from 2 to 500 ppm are sent offsite to a contractor for incineration. Some of the fiber drums are recycled and they are made available through Environmental Affairs. They have a drum washing station.

5. Percentage of total budget devoted to waste management responsibilities:

A guess is 20%.

C. General Waste Management Tracking/Information System Information -

1. To what extent are their waste management activities automated?

There used to be a waste disposal authority sheet, but the whole system is now electronic. The entire Environmental Management tracking-information-system provides on-line, real-time data. The system is set up to track waste from the generators, the processes, the waste streams from the processes, and then to treatment or offsite.

To get a waste stream approved, the office of Environmental Affairs approves a waste stream, the generating area (process management) approves the waste stream, and the disposal facility approves the waste stream.

To have waste picked up, the waste stream is first approved as to material, quantity expected to be treated, and the process, and finally it is characterized (a sample is taken and this is okay for a year) for a year at a time for a process. The Tennessee Eastman permits require that samples be taken at least once a year on our waste streams. The process is identified to its product with a product identifier, the stream, (because in some cases they mix waste streams), and a waste plan detailing the expected percent of each waste component over the life of the process.

The generators sometimes have to mix waste in a stream. The waste tracking system is capable of handling the mixing of unique waste streams. If they have to mix the waste, the waste stream is re-sampled every 90 days.

For RCRA streams we have a 10-day lead time in picking the waste up in case there is a problem so that we don't have the waste exceed the 90-day accumulation area limit.

Sometimes the generators ask for several things to go at one time such as carpet scraps (following renovation) waste oil, and floor sweepings.

Through the active file for a waste-stream waste-item, a generator secures the form used to schedule a pick-up. The generator must enter the components of the waste, the percent of each, and the weight. They can enter the component information based upon process knowledge.

The forms, once approved are printed by the requester on dot-matrix printers. A lot of time laser printers cannot be used because of concern for explosions because of the presence of vapors.

The organization picking up the waste as well as the disposal facility look at the waste request to see if they agree to the waste containers, the volume, and the waste itself. The pick-up notice leads to a decision as to whether the waste container is adequate and if repackaging is warranted. If the volume is too large or if the disposal facility cannot handle the volume at the time of the notice, the pick-up notice is rejected.

Once everyone approves a pick-up (approves electronically), a three letter disposal code is given to the event. The waste is ready to be picked up by the plant's trucking organization. The waste to be picked up must match exactly to the ticket information or the organization picking up the waste won't pick it up.

The waste material has to have labels on the waste item for hazardous waste.

The disposal facility enters into the Environmental Management System, tracking-information-system, the amount of waste burned or treated or shipped off-site per a ticket number so the generator can track the waste after it is picked up.

The Tennessee Eastman waste tracking system can track by container type, liquid or solid, hazardous (yes or no), high volume waste streams, and disposal facility.

The waste tracking system includes the Chemical Abstract Numbers. The components and even the molecular components such as the components for methanol, Carbon-3x% & Hydrogen-1x% & Oxygen-6x% are matched within the system when a waste stream is set up. They are capable of doing a mass balance, if necessary. For example we were challenged about the air by the community. We came up with a number representing the potential loss to the atmosphere. In another example, when Ethyl-methyl-ketone might have gotten to the atmosphere, there were complaints about the odor. They investigated their process quantities received and the amount taken away as waste, and were able to arrive at how much must have entered the atmosphere.

2. What type of system(s) do they have (e.g., manual, purchased with no modifications, purchased with minor modifications, purchased with major modifications, developed in-house)?

The system, the Environmental Management System, tracking-information-system, was bought off the shelf in the early 70s.

It evolved over the years. No model has ever been developed for it or with it. It was revamped about 3-4 years ago. The decision was made then to take the system on-line. The old data is put in a historical section. It can be easily retrieved from the historical section.

3. To what extent does the waste information/tracking system(s) meet the needs of the waste management business? (e.g., very well, well, fair, poor, etc.)

Yes, it meets their needs.

4. How many plants/facilities/entities does the waste information/tracking system support?

One: the Kingsport plant.

5. What waste processes are supported by the waste information/tracking system?

All waste streams are tracked, including runoff from digging and demolition for new or remodeled facilities.

6. Major modules of functionality (e.g., forecasting, reporting, etc.):

The modules are entitled Active, History, and Utility, and include the passwords, Cost Centers, and Report Menus.

7. Major categories of data content (i.e., types of waste contained in system):

The major categories of waste are Carcinogens, PCB, RCRA, and Sanitary.

8. To what extent do they forecast future waste management needs?

(never answered in the conversation)

D. Implementation of Waste Management Tracking/Information System -

1. Hardware environment? (e.g., workstation, PC, mainframe, etc.)

The waste tracking system now operates on a DEC Alpha machine. This was done this past January. They are very proud of the fact they were able to make the change in just four hours. The waste tracking used to reside on mainframes, both VAX and IBM. The waste tracking system is also loaded onto some personal computers at disposal facilities.

2. Software environment? (e.g., operating system, database engine, language, 4GL, etc.)

They use a software called SMART-STAR, a Sabien product, that uses a special developing language called SMART GL, which is very similar to DCL, and they use some fortran. The database engine is RdB for the DEC Alpha. SMART-STAR is considered much easier to support and runs faster because it will not load a subroutine or function until it is actually needed by the program. SMART GL writes fields "behind," thus it saves a lot of time and effort. Now there are less than 75 thousand lines of code.

Originally there was fortran for the VAX, and screens were written in FMS. When the system was written with fortran on the VMS, it was slow (it bogged down a lot).

3. Distributed, centralized, or client/server?

The waste tracking system now operates on a DEC Alpha machine. The system has interfaces with terminals or personal computers. The emulation software is a Z-stem software.

Inside the plant, all waste items are handled exclusively by the waste tracking system.

To get to where waste has been approved for pick-up, the Environmental Affairs and waste transportation and disposal facility all have to approve it. The user can follow the approval process through getting an approved ticket for pick-up.

Access is controlled as to who can enter and change data. Very few people can actually change the data.

4. Percentage of overall waste management budget dedicated to waste tracking systems? To waste information systems?

Waste tracking is about 3% of their budget and waste tracking information systems are about 3% of their budget.

E. Usage of Waste Management Tracking/Information System -

1. What User Interaction exists for the system?

In the previous waste tracking system, there were numerous multi-user accounts. In the revamped waste tracking system, each user has a personal account, and there are over 1300 accounts.

2. How do they achieve data entry?

Everything is electronic, except for the hazardous landfill, which requires a signed form to stay in compliance with their permit. There is no paper copy at all. Generators fill out a request for a waste stream pick-up for a pre-approved waste stream. There used to be a lot of edit checks to account for variations in spelling. In the revamped system, there is a common set of tables.

3. What mechanisms do they use for data retrieval?

The report function, "Smart Report" from SMART-STAR, is one of the menu options within waste tracking. It is hard to understand and to use, but the users love its ad hoc reporting which has reduced a lot of our requests for ad hoc reports.

SAS software is used a lot with the environmental data, so it was added to the menu system as a choice when working with the data. Microsoft ACCESS is used with production data and waste data. The waste tracking system menu spawns off to Microsoft ACCESS for the user to use. The total staff responsible for it and the total number of users are two people.

4. What are their reporting requirements (both internally and externally)?

There are annual RCRA and PCB reports as well as annual inspections. The majority of the RCRA annual report is written from the system. The waste page numbers for the RCRA annual report are stored within the waste stream information.

5. To what extent are reporting requirements met by their system? (both data availability and electronic generation)

Users can enter qualifiers on the screen to make the criteria for a report. When they examined the reports in the past, they had a lot of reports that were being made, but the customers had no idea why they were created. There were about 60 reports, but this number has been reduced. Now the users interact, fill in their qualifiers, and then get their report.

F. Opportunities?

1. What opportunities for improvement have they identified related to their waste information/tracking system(s)?

They did not get the data interface with the laboratory worked out, thus they have to rekey the laboratory data into the waste tracking system.

G. Lessons Learned?

1. What lessons learned could they pass on to us related to waste information/tracking systems?

Their lessons learned are as follows:

- Get the rules straight up front.
- The waste tracking system is under configuration control so that no one can arbitrarily get something changed to suit them. All the interested parties can comment as to how they believe a change will affect them.
- Design the system so producers have to track waste in order to have it moved.
- Most people are happier with this system because of greater ease in inputting and retrieving data.

**WASTE INFORMATION/TRACKING FUNCTION ANALYSIS
RESULTS OF BENCHMARKING WITH SATURN**

A. General Organizational Information -

1. Name and function:

Lisa Caron, Environmental Engineer. Ms Caron provides site oversight on waste issues regarding classification and type of waste, provides guidelines on handling, and identifies reduction opportunities. Each facility also has its own Environmental Engineer.

2. Type of business:

Auto manufacturing in 3 areas: body systems, power train (engines and transmissions), and general assembly.

3. Number of sites or locations involved: one site, multiple facilities.

B. General Information Related to Waste Management Responsibilities -

1. Are they a waste generator, or are they involved in waste treatment, storage, and disposal (TSD)?

They are largely a waste generator. Waste primarily comes from steel stamping, the foundry, and paint-related hazardous waste. They do wastewater pretreatment on site before sending it on to the county waste water treatment facility. They have large quantities of hazardous chemical types of waste which are stored on site for up to 90 days. They have no on-site disposal. Everything is sent offsite to be recycled, disposed, or treated.

2. General types of waste generated:

RCRA - largest volume is paint solvent. This is collected and sent back to the manufacturer to be cleaned and then is sold back to Saturn. Also, they have lots of paint-contaminated materials like clothing, rags, etc. Another source of waste is found in the filters used in the painting process --- they contain lead.

Industrial - foundry waste which includes sand, refractory, machining, and grinding materials. Also, they have lots of scrap metals and plastics which are recycled.

3. Typical waste-generating and/or TSD processes or activities:

Waste Generation - Painting, foundry, waste water treatment (oily sludge and sludge from filter press cake), Sanitary (segregate oily rags and filters, paper & cardboard, scrap auto parts)

TSD Activities - landfill, fuel blending, recycling

4. Typical disposal avenues:

Waste is segregated at the source into different containers. They have handling plans for each type of waste. They do a lot of recycling. They have a contract with Waste Management of Tennessee who works onsite providing waste services and helps administer the waste management program. An advantage of using a company like Waste Management of Tennessee is that they helped identify potential markets for recycling.

5. Percentage of total budget devoted to waste management responsibilities:

She had no idea.

C. General Waste Management Tracking/Information System Information -

1. To what extent are their waste management activities automated?

She only really knew of two systems. One system called ManGuard and another called Automatic Shipper are used by Saturn. Waste Management of Tennessee has its own systems that she was unfamiliar with them.

2. What type of system(s) do they have (e.g., manual, purchased with no modifications, purchased with minor modifications, purchased with major modifications, developed in-house)?

ManGuard is purchased with customizations made by the vendor. It was started by a couple of GM employees.

She did not know about Shipper.

3. To what extent does the waste information/tracking system(s) meet the needs of the waste management business?

Very well. All information is in one place in ManGuard making it easy to find and use the information.

4. How many plants/facilities/entities does the waste information/tracking system support?

Used across the entire plant at all the facilities. Approximately 10 users. The users are mostly environmental engineers and safety personnel.

5. What waste processes are supported by the waste information/tracking system?

All plant processes. A designated employee has the sole responsibility of providing empty containers specific to a waste stream and seeing that they get picked up once the container is filled, and then entering the data in the system.

6. Major modules of functionality:

ManGuard tracks information on transporters and disposal facilities, tracks containers, does manifesting and reporting. Costs are allocated back to the generator to encourage waste minimization.

Few, if any, repackaging activities are done---nothing exists in the system to do this function. There is no forecasting. Once per week they print a canned report to check on where hazardous containers are and go pick them up.

They also do little lab analysis; most characterization is from MSDS and process knowledge.

7. Major categories of data content:

MSDS sheets, HazCom data, hazardous waste

8. To what extent do they forecast future waste management needs?

None

D. Implementation of Waste Management Tracking/Information System - My contact really didn't know much about this area. She was making a best guess at these answers.

1. Hardware environment?

VAX, maybe on LAN

2. Software environment?

VMS sounded familiar, otherwise, no knowledge

3. Distributed, centralized, or client/server?

Don't know

4. Percentage of overall waste management budget dedicated to waste tracking systems? To waste information systems?

Primary costs were from license fees for the software and hardware, but she had no real idea of actual expenses or overall budget percentages.

E. Usage of Waste Management Tracking/Information System -

1. What User Interaction exists for the system?

Windows

2. How do they achieve data entry?

Environmental Engineers and each facility's Hazardous Materials Coordinator maintained MSDS information; Waste Management of Tennessee folks generated Manifest; Safety personnel entered some data.

3. What mechanisms do they use for data retrieval?

Ad hoc reporting provided by a query database that is not currently Windows based. ManGuard is currently working on a Windows-based interface. However, she can currently download data from the query tool into Excel.

4. What are their reporting requirements (both internally and externally)?

They do RCRA Annual Report, Tenn. Annual Report, SARA TR1, SARA 312.

Hazardous Chemical Inventory Report, and Work Place Chemical List. Some are automatically provided and some are built from the query tool.

5. To what extent are reporting requirements met by their system? (both data availability and electronic generation):

Very well. The system has good, reliable, detailed, up-to-date information. They begin tracking chemicals even before they come onsite. They currently have over 4000 chemicals in inventory.

F. Opportunities?

1. What opportunities for improvement have they identified related to their waste information/tracking system(s)?

There is currently no automatic menu option for purchasing information. It is manually entered in the ManGuard system.

G. Lessons Learned?

1. What lessons learned could they pass on to us related to waste information/tracking systems?

To allocate costs to the generator, you must have good information and tracking.

Doing up-front chemical management is very important to properly and efficiently managing over 4000 chemicals onsite.

**WASTE INFORMATION/TRACKING FUNCTION ANALYSIS
BENCHMARKING QUESTIONS**

A. General Organizational Information -

1. Name and function (title) of person being interviewed:

Bill Knopf
Solid Waste Management
Waste Tracking System Project Lead
Westinghouse Savannah River

2. Type of business (e.g., chemical company, trucking company, etc.):

Tritium and plutonium production, separation facilities, non-active reactors; soon will have a waste incenerator.

3. Number of sites or locations involved (important in meeting State EPA regulations):

One large site with many functions. Some waste is also handled from other government sites, e.g. Pinellas and Norfolk shipyards

B. General Information Related to Waste Management Responsibilities -

1. Are they a waste generator, or are they involved in waste treatment, storage, and disposal (TSD)?

Both generator and TSD. Total of 49 generators.

2. General types of waste generated (e.g., Hazardous, Mixed, etc.):

Rad, Mixed, and Hazardous. Waste tracking system currently handles only LLW. Next version will handle mixed and hazardous.

3. Typical waste-generating and/or TSD processes or activities:

Reactors, high-level waste tanks, Tritium production, shipyards.

4. Typical disposal avenues (e.g., incineration, recycle, etc.):

TRU is stored.
High level - has been stored in tanks and is now in a vitrification process.
Storage vaults.
Compact then store.
Incenerator on line later this year.

5. Percentage of total budget devoted to waste management responsibilities:

Don't know.

C. General Waste Management Tracking/Information System Information -

1. To what extent are their waste management activities automated?

Only at low levels in the system. Generators use the system for initially inputting the information. Many WAC values are calculated and checked against limits. A waste stream concept is used where a given stream has known values and container limits are calculated for given volume.

2. What type of system(s) do they have (e.g., manual, purchased with no modifications, purchased with minor modifications, purchased with major modifications, developed in-house)?

Developed in-house. The system began life as a stand-alone PC-based system for tracking within a single tank farm. It evolved and now services the whole site. Some problems still exist because they were carried from the original system.

3. To what extent does the waste information/tracking system(s) meet the needs of the waste management business? (e.g., very well, well, fair, poor, etc.)

Works pretty well for LLW. Not used for mixed, hazardous, or TRU.

4. How many plants/facilities/entities does the waste information/tracking system support?

Primarily a single site. On-site waste management personnel enter data from manifests for off-site generators.

5. What waste processes are supported by the waste information/tracking system?

- Primarily nuclide inventory and limit checking
- Tracking
- Storage

6. Major modules of functionality (e.g., forecasting, reporting, etc.):

Ship, Receiving (including Generator to Generator)
Reporting is primarily handled via MS Access.
Next year they will be able to track actuals against forecast, but will not do forecast.

7. Major categories of data content (i.e., types of waste contained in system):

LLW

8. To what extent do they forecast future waste management needs?

Next year they will be able to track actuals against forecast, but will not do forecast.

D. Implementation of Waste Management Tracking/Information System -

1. Hardware environment? (e.g., workstation, PC, mainframe, etc.)
VAX VMS accessed via remote terminals (PCs with emulators).
2. Software environment? (e.g., operating system, database engine, language, 4GL, etc.)
Oracle 7, Oracle Forms
Reporting via MS Access by support team
3. Distributed, centralized, or client/server?
Currently the system is a character based, centralized system. Next version will be client server with some functionality on PCs.
4. Percentage of overall waste management budget dedicated to waste tracking systems? To waste information systems?
Don't know.

E. Usage of Waste Management Tracking/Information System -

1. What User Interaction exists for the system?
Generators enter their own data. Processing facilities use the system to track their processes. There are currently 32,000 waste packages (items) on the system. A waste package can have multiple waste cuts (e.g., stuff separated in plastic bags, etc.).
2. How do they achieve data entry?
Generators enter their own data.
3. What mechanisms do they use for data retrieval?
Packages, shipping manifests, etc. can be retrieved for review or reprinting. Access is normally used by support team for reporting.
4. What are their reporting requirements (both internally and externally)?
No major reports from system. Data are retrieved for others to do reporting.
5. To what extent are reporting requirements met by their system? (both data availability and electronic generation)
No major reports from system. Data are provided for others to do reporting.

F. Opportunities?

1. What opportunities for improvement have they identified related to their waste information/tracking system(s)?

- Reporting
- Application to TRU, one day
- Improved method for Generators to do Currie counts
- Ability for users to get data

G. Lessons Learned?

1. What lessons learned could they pass on to us related to waste information/tracking systems?

Don't take something intended for one purpose and try to modify it to do something it was not designed for.

Appendix N

Comprehensive List of Session Attendees

COMPREHENSIVE ATTENDEE LISTING
FOR WASTE INFORMATION & TRACKING FUNCTION ANALYSIS
SESSIONS 1 THROUGH 10

1	2 - 1/2 day sessions LMES Waste Type Managers (group)
2	2 - 1/2 day sessions LMES Waste Operations Managers (group)
3	2 - 2 hour sessions DOE-ORO WMTD (group)
4	2 - 1/2 day sessions Oak Ridge Generators (group)
5	1 - 1/2 day session Portsmouth & Paducah ER Waste Operations Managers (group)
6	1 - 1/2 day session OR, Ports. & Pad., ER Generators (group)
7	2 - 2 hour sessions Pollution Prevention (P2) Program - Sam Suffern (individual)
8	1 - 1/2 day session OR Environmental Compliance (group)
9	1 - 2 hour session Commissioner's Order (Mixed Waste) - Angel Rivera (individual)
10	1 - 2 hour session ESWMO Enterprise Model - Rolf Migun (individual)

<u>NAME</u>	<u>SESSION(S) ATTENDED</u>	<u>SPECIALTY</u>
Jim Bailey	2	Off-Site Waste Shipments
Jim Bird	3	Economic Analysis
Phil Butler	2	Waste Trans./Storage
Candy Cole	5,6	Off-Site
Gary Conner	5	WM
Alfreda Cook	3,5,6	ER Waste Information Mgmt.
Sadjana Crosley	1	Work Technologies
Nancy Dailey	8	RCRA/TSCA
Doug Davies	4	WM
R. Dearien	4	
Ken. Delius	1	WM WTLC
Brain DeMonia	3	Hazardous Waste
A. DeVaney	4	WC-Operations
Chuck Estes	8	RCRA/TSCA, WM Compliance
M. Evans	4	
Dan Fetzer	1,2,3,4	Waste Data Administration
Sherry Gibson	3	
Bill Gilbert	3	Program Manager
Christine Goddard	5,6	P2
Alicia Harris	3	Program Analyst
Tina Heath	1,2,3,4,5,6,7,8	Waste Info Systems
Jeff Henderson	5	WM
Marilyn Hendricks	4	EPO/ESH Officer
Robert Higginbotham	1,2	Waste Tracking/Info Services
Bob Hightower	1,3	Mixed Waste Program
Wade Hollinger	8	PCB
Bob Hydzik	1	Waste Accept. Prog.
Iver Jeter	1,3	Hazardous Waste Mgmt.
Fraser Johnstone	5,6	WM
Larry Jones	2	Storage/Disp.
Richard Kuehn	5,6	WM
S. Kennedy	4	ESH Officer
W. Koch	4	EPO
Cheryl LaBorde	8	RCRA
J. Maddox	2	LGWOD
Sonya K. Maddox	8	WM

Dee Markelonis	8	RCRA/TSCA/CERCLA
Billy Matthews	1,2,3,6	Computing
Robert May	3	Computer Systems
Brad McClelland	1,2	RAD Waste Ops
Rachel Merwin	4	Compliance/EPO/WC
Lance Mezga	1	WM
Rolf Migun	10	Enterprise Model
Tom Monk	3	TRU Waste
Eddie Monroe	3,4	KWTARS
Jill Mortimer	5	Project Manager Off-Site
Charlie Neal	1,2,3,4,5,6,7	Waste Info Systems
Jim Nix	1,2,3,4	Waste PWT Systems
Stacey Rathke	8	RCRA
Harvey Rice	3	Program Manager
Angel Rivera	9	MW & Commissioner's Order
Mark Saunders	2	Waste Coordinator
Tom Scanlan	1,2	WM
Joe Sexton	1,2,3,4,7,8,9	Economic Analysis
Ralph Skinner	3	Projects
Chris Smith	6	WM Interface
Brenda Snyder	2	Burn Plan Manager
Carl Starling	1,2,3,4,5,6	Value Engineering
Linda Smith	8	RCRA/WTS
Sam Suffern	5,7	P2
Miller Taylor	6	Information Service
Steven Trotter	5	WM
Martin Tull	1	Low Level Waste
Doug Turner	1	Spent Nuclear Fuel
Louis Wesley	2	Hazardous Waste Oper.
Mary Wiginton	2	Solid Waste

DISTRIBUTION

J. K. Bailey, MS 7357
P.W. Baird, MS 7015
J. S. Baldwin, MS 6023
K. A. Balo, MS 7364
P.L. Butler, MS 7467
W. S. Christenberry, MS 6488
J. F. Clayton, MS 7357
C.J. Cole, MS 7592
G.C. Conner (PORTS), MS 7550
A. L. Cook, MS 7346
S. M. Crosley, MS 8050
G. A. Dailey, MS 7615
N. C. Dailey, MS 6395
K. D. Delius, MS 8060
F. P. DeLozier, MS 7355
L. F. Denton, MS 7069
A. Devaney, MS 6387
C. H. Estes, MS 7357
D. T. Fetzer, MS 8160
P. J. Franco, MS 7357
C. M. Goddard, MS 8035
R. O. Green, MS 8227
F. D. Hammerling, MS 7049
H. E. Harper, MS 8164
T. C. Heath, MS 8141
J. E. Heiskell, MS 8222
J. C. Henderson, MS 7346
M. S. Hendricks, MS 6035
R. E. Higginbotham, MS 7467
J. R. Hightower, MS 7348
D. W. Hollinger, MS 7155
C. G. Holmes, Jr., MS 8141
F. J. Homan, MS 7357
R. J. Hydzik, Jr., MS 7357
I. W. Jeter, MS 8222
L. S. Jones, MS 7357
W. W. Koch, MS 6012
C. M. LaBorde, MS 8098

J. J. Maddox, MS 6058
S. K. Maddox, MS 6316
C. A. Manrod, MS 6023
D. D. Markelonis, MS 7357
R. C. Mason, MS 6023
W. B. Matthews, MS 8235
R. C. May, MS 8164
R. C. Merwin, MS 6392
L. J. Mezga, MS 7357
B. C. McClelland, MS 6029
R. P. Migun, MS 7357
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