

U.S. DEPARTMENT OF ENERGY'S WASTE TYPE MANAGEMENT PROGRAMS - INTEGRATED LOW-LEVEL WASTE MANAGEMENT PROGRAM AND STRATEGIC PLANNING

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ABSTRACT

The need for an Integrated Low-Level Waste Management Program and strategic planning effort became apparent when the U.S. Department of Energy recently shifted a portion of the emphasis on its nuclear energy and weapons programs from production to waste management. The environmental and budget sensitive climate in which DOE operates today has made its task of waste management all the more difficult. DOE is striving to manage its nuclear waste using a more centralized complex-wide approach. In order to better manage its nuclear waste, DOE created the Office of Environmental Restoration and Waste Management (EM) in 1989.

DOE has established the Low-Level Waste Management Program (LLWMP) within the Division of Technical Support (EM-351). This paper describes the purpose, functions, and activities associated with the LLWMP. The LLWMP covers the management of Low-Level Waste from generation to disposal. The LLWMP is currently developing a long-term strategic plan and an integrated management plan that will use the most technically effective and cost efficient means possible to safely and acceptably minimize, characterize, treat, store, transport, and dispose of DOE LLW.

A Steering Committee for Low-Level Waste Planning was created to ensure that the LLWMP meets the complex-wide needs of DOE. The Steering Committee, which is chaired by the Low-Level Waste Program Manager, is comprised of DOE/EM personnel, DOE Office of Environment, Safety, and Health (EH), and DOE Field Office management and/or contractors. Field Office and Headquarters personnel will work together in order to ensure the success of the LLWMP. The LLWMP will also strive to coordinate and cooperate with other EM activities such as the Five-Year-Plan, Roadmaps, Programmatic Environmental Impact Statement, and the Waste Management Operations Committee so that the goals of EM and the LLWMP can both be met.

The strategic planning approach implemented by the LLWMP includes the following major stages: Low-Level Waste Current State (Background) Report, Future State Document, Comprehensive Strategic Plan, and Long Range Integrated Management Plan (LRIMP). The stages comprising the strategic planning approach are by no means exclusive of one another. They build off of one another; overlapping and being updated as necessary.

The LLWMP will allow DOE to fulfill its responsibility of managing Low-Level Waste effectively and efficiently by promoting a complex-wide, equitable, safe, and cost-effective system.

INTRODUCTION

At the advent of the nuclear age in the 1940's, little attention was given to the management of waste resulting from research and production activities. America was at war and the secret Manhattan Project's objectives were clearly defined; nuclear waste management was not a priority. Since World War II, nuclear energy programs (both commercial and defense) have continued, and the U.S. Department of Energy (DOE) and its predecessor agencies have played a major role. But the focus until recent years remained "production." Definitions of types of radioactive waste and associated management methods [including those for low-level waste (LLW)] were developed, but they were based primarily on operational requirements for safe handling by generators, not on permanent safe disposal.

For many years, waste generated in DOE installations was managed using a site-by-site approach, with minimum coordination and integration between sites. Today, with the focus on environmental responsibility, waste management op-

erations have a new mission and face a wide variety of managerial and technical challenges. DOE is now subject to many new interagency agreements and regulations and is working to comply with complex, and at times conflicting requirements. Even now, many DOE field offices and sites are developing site-specific strategies to manage LLW that do not maximize the value of DOE resources. Regulatory compliance issues, coupled with budget and manpower constraints, are leading DOE to a more centralized management approach. An integrated waste management program is essential as a result of DOE's changing mission. Resource limitations, increasing waste volume from environmental restoration (ER), and decontamination and decommissioning (D&D) activities, risk reduction requirements, and public concern and opposition to new waste management facilities are issues that DOE must address.

To meet the DOE's commitment to operate its facilities in a safe, economic, and environmentally sound manner, and to comply with all applicable Federal, State, and local rules, regulations, and agreements, DOE created the Office of

Environmental Restoration and Waste Management (EM) in 1989 to focus efforts on controlling waste management and cleaning up contaminated sites. The EM mission is to:

1. manage waste operations and environmental restoration activities to achieve full compliance with applicable laws, regulations, and agreements aimed at protecting human health and the environment;
2. make compliance with the letter and spirit of environmental laws, regulations, and requirements an integral function of operating DOE facilities; and
3. reduce the generation of new wastes.

In the first few years of its existence, the Office of Waste Management (EM-30) has concentrated on operational and corrective activities at the sites. The goals of the Department's Waste Management Program are to reduce regulatory uncertainty and conflict, to optimize management of major waste streams, to implement a uniform, comprehensive management system, to improve public understanding and participation, and to manage waste more safely, effectively, and economically. In 1992, the Office of Waste Management began to apply an integrated approach to managing its various waste types. Consequently, DOE established the Low-Level Waste Management Program (LLWMP) to properly manage its complex-wide LLW in a consistent manner.

The objective of the LLWMP is to build and operate an integrated, safe, and cost-effective program to meet the needs of waste generators. The primary goal of the LLWMP is to establish an integrated DOE complex-wide plan for managing LLW, which avoids generating LLW as much as possible and disposes of it safely and cost effectively with little or no use of interim storage. The program will be based on acceptable risk and sound planning. The objectives of the LLWMP are to:

- Assist generators in minimizing waste generation through sound planning, recycling, process alteration, and technology development;
- Bring operating facilities into compliance with applicable and acceptable requirements;
- Reduce risks to the environment, workers, and the public for all LLW operations;
- Ensure that the infrastructure for LLW management is available on time, and is efficiently operated; and
- Ensure cost-effective and efficient use of resources.

LOW-LEVEL WASTE MANAGEMENT PROGRAM (LLWMP)

The LLWMP was established within the Division of Technical Support (EM-351) as part of the Office of Waste Management's specific waste-type management initiative to develop and implement a system-wide, coordinated approach for managing LLW from generation of waste to its disposal. The LLWMP is managed by an EM program manager. The organizational structure for the LLWMP is provided in Fig. 1.

The LLWMP also will assess technology needs for waste management equipment and systems, and participate in cooperative demonstration projects with the Office of Environmental Restoration, the Office of Technology Development, and the Office of Facility Transitions, as appropriate. The LLWMP will participate in DOE system-wide cooperative planning projects with the Office of Programmatic Guidance and Compliance, the Office of Planning and Resource

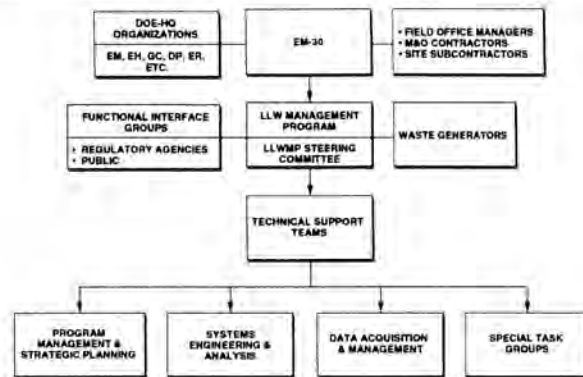


Fig. 1. Organization structure of DOE Low-Level Waste Management Program.

Management, and the Office of Facility Transitions, as appropriate. The LLWMP will provide other technical assistance for activities affecting the management of DOE radioactive waste to include supporting DOE meetings and conferences, supporting international technology exchange programs, and supporting technical working groups having system-wide concerns.

The LLWMP is currently developing a long-term strategic plan and an integrated management plan that will use the most technically effective and cost efficient means possible to safely and acceptably prevent/minimize, handle, characterize, treat, store, transport, and dispose of DOE LLW. Through development and implementation of this integrated, documented plan, which will incorporate waste generators' experience and public participation during the planning process, DOE expects to improve its credibility and its decision-making effectiveness.

Steering Committee for Low-Level Waste Planning

A Steering Committee, comprised of DOE/EM personnel, DOE Office of Environment, Safety, and Health (EH), and DOE Field Office management and/or contractors, has been established. Committee meetings will be held as necessary to provide guidance, review information, and approve deliverables prepared by the Program. Several Work Groups have also been established to provide technical support to the Steering Committee to develop strategies for specific technical issues. The Steering Committee will provide guidance and recommendations in support of the DOE LLWMP, with the goal of developing and implementing an integrated and comprehensive LLW management system. The Steering Committee presently consists of a Chairperson, from the Office of Waste Management, the Division of Technical Support, and 16 members with representatives from DOE-HQ and from each of the major DOE field offices. The DOE-HQ organizations represented include Environment, Safety, and Health (EH-232), Waste Management (EM-30), Site Operations (EM-32), Projects (EM-34), Environmental Restoration (EM-40), and Technology Development (EM-50).

Field office participants are key to the success of the program where as they propose ideas, review progress, and provide the perspective of the field to the LLWMP. The success of the Program is dependent upon the proactive participation of the committee. The Steering Committee is the LLWMP Program Manager's tool for decision making and implementation of the LLWMP.

Three Steering Committee meetings have been held since June 1992, and two more are planned for 1993. Vision and mission statements were developed for the LLWMP. The Steering Committee also identified key LLW issues in regulatory, institutional/ management, technical, risk, public and general areas for further detailed analysis; developed a preliminary strategy with options to address each key issue identified; and reviewed and discussed LLW management alternatives proposed in the Programmatic Environmental Impact Statement (PEIS).

STRATEGIC PLANNING APPROACH

The fundamental approach to the strategic planning process is to: 1) develop and implement a complex-wide LLWMP jointly with field offices to meet waste generator's needs and incorporate operational experience from DOE installations, commercial facilities, and international practices; 2) establish a proactive and flexible program based on anticipated forthcoming regulatory requirements, new technology development, and coordination among field offices; and 3) document the strategic planning process. The strategic planning process includes the following major stages and is summarized in Fig. 2.

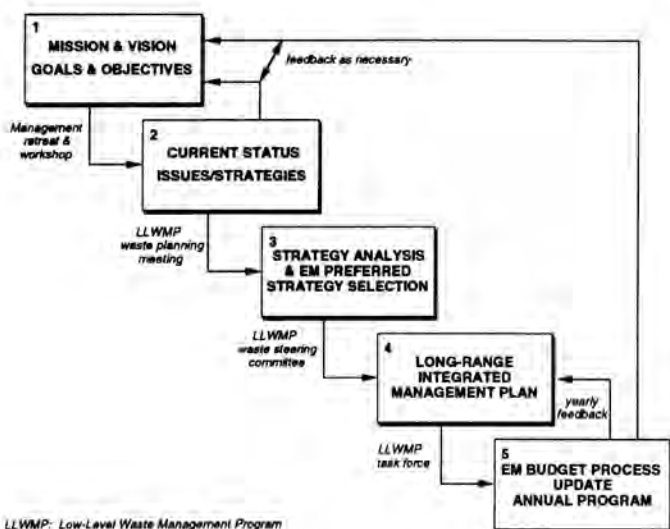


Fig. 2. Strategic planning process.

Low-Level Waste Current State (Background) Report

A Background Report is being prepared to provide a comprehensive description of the present waste management system, and to provide a baseline for measurement of progress. The Background Report includes information on:

- current and planned physical treatment, storage, and disposal (TSD) capabilities, conditions, and constraints;
- regulatory requirements (laws, regulations, compliance agreements, etc.) pertinent to DOE's LLW management;
- low-level waste inventories and their characterization;
- production and programmatic commitments; and
- unit and life-cycle costs.

The first draft of the Report was completed in September 1992 and reviewed by the Steering Committee. A major revision effort is ongoing to provide a broader spectrum of complex-wide waste management activities and to compile the most up-to-date information. A revised draft of the report is scheduled for delivery to the Steering Committee in July 1993.

Future State Document

A Future State Document to define the desired future state of the LLWMP has been prepared. It provides foundations for the program and defines its mission, vision, goal, and objectives. It also establishes the policies under which the management program is to be conducted, and develops a set of strategic principles to provide guidance in low-level waste strategic planning and low-level waste long-term management program implementation. The first draft of the Future State Document has been completed and is under review. A draft vision statement has been developed as:

"DOE Operating a Nationally Integrated, Cost-Effective, Low-Level Waste Management Program Based on Acceptable Risk and Sound Planning, and Incorporating Structured and Defined DOE Regulatory and Oversight Programs, Resulting in Public Confidence and Support."

and a draft mission statement as:

"Develop and Implement a Nationally Integrated Program for DOE Low-Level Waste Management Using a Combination of Federal and Private Facilities to Meet the Needs of Waste Generators, While Fully Protecting Workers, the Public, and the Environment, and Establish and Implement a Comprehensive DOE LLW Regulatory and Oversight Program to Fulfill the Department's Responsibilities to Ensure that the Management of DOE LLW is Protective of the Public and Environment and Consistent with the Protection Provided in the Commercial Sector."

The visionary goals and objectives are established to be optimistic, realistic, and sensitive to the public perception. Yet, in no way are they meant to constrain the development of a preferred strategy to achieve the future-state vision and corresponding system configuration.

Comprehensive Strategic Plan

The Comprehensive Strategic Plan is based on the commitment in the Future State Document of how DOE will manage its LLW in the current and the future state. The LLWMP will identify the differences and develop strategic options for achieving the projected vision during the strategic planning process. The first phase of the strategic planning process is to identify issues and develop strategic options. The second phase is to evaluate options and select a preferred strategy using a system analysis methodology. The two-phased planning process will be documented in a Comprehensive Strategic Plan. The tasks for the first phase include:

- identification of the differences between the current and the desired future state of the LLWMP;
- identification of program issues (including barriers and constraints);
- identification of missing technology links/elements;
- establishment of system requirements and configuration; and

- development of strategic options for accomplishing the desired future state.

Once the strategic options are identified, the second phase, systems analysis will be performed to determine how to modify the current approach, and to evaluate various options developed to accomplish the objectives of the future state. The System and Engineering Analysis Work Group will identify and collect required data and will analyze strategic options including their related planning assumptions, program uncertainties, and contingency plans. Analysis for each candidate strategic option will include technical performance of the final waste form in the disposal facility, life-cycle "cradle to grave" costs, schedule, regulatory compliance and health-based risk assessment. Results of the analysis will be used to identify critical policy issues and to rank strategic options.

The LLWMP Systems Analysis Work Group will systematically assess the technical validity and accuracy of current information on critical issues, such as waste inventories, waste characterization, waste treatment, waste storage, waste disposal, and best life-cycle waste management alternatives. A detailed description of subtasks to be performed in the second phase include:

- Identification of critical issues and data needs. The Systems Analysis Work Group will assess the issues identified and associated data needs as well as collect data. Reference cases and TSD options to be evaluated will be identified.
- Development of a comprehensive pathway analysis model. The Work Group will develop and refine appropriate model(s) and use LLW physical and chemical characteristics to evaluate the reference cases and TSD options. Additional TSD options will be evaluated as they are identified.
- Evaluation of the cost and schedule information for LLW management options. Based on historical cost and schedule information, the Work Group will apply appropriate cost estimation methodology to determine the cost/schedule estimates for LLW options.
- Identification of the impact of regulatory compliance issues. The Work Group will identify current and impending LLW regulations and evaluate their impact on LLW management options.
- A system-wide, health-based risk assessment. The Work Group will refine the pathway analysis methodology, develop scenarios, collect data, and evaluate risks associated with various LLW management options.
- Integration of various methodology components. The Work Group will evaluate various alternatives for LLW management options, based on the risk, regulatory compliance, and cost to evaluate and document the recommended management alternatives.

The system analysis will be supported by a credible quality management program and ensure the participation from both HQ and field offices. A Comprehensive Strategic Plan will be prepared to recommend the final LLW management approach.

Long Range Integrated Management Plan (LRIMP)

The LLWMP's Long Range Integrated Management Plan (LRIMP) will be developed to implement the DOE preferred strategy. The LRIMP will contain task-oriented LLWMP work breakdown structure (WBS), schedule, milestones, estimated costs, and breakdown of budget information by task and site. Component activities include:

- definition of the preferred system configuration (consistent with the PEIS);
- identification of the preferred technology to be used;
- development of a priority list for key implementation activities;
- identification of the key regulatory commitments and completion dates; and
- establishment of an implementation schedule.

The LRIMP will be reviewed and updated annually. Implementation of the plan and annual program review activities include:

- providing SP/LRIMP planning process quality improvement and control;
- reviewing plans, roadmaps, technical reports, and other comparable documents;
- developing draft program guidance;
- reviewing budget and scheduling requests;
- establishing and facilitating workshop groups to interface between EM and other DOE and outside organizations;
- reviewing program progress and developing corrective actions to improve progress; and
- interacting and communicating with stakeholders.

Communication, Coordination, and Public Participation

It is important to coordinate LLW strategic planning efforts with other planning efforts, including the Five-Year Plan, Roadmaps, PEIS, the Waste Management Operations Committee (WMOC), and other waste type planning activities. Liaison with internal and external stakeholder organizations will allow the LLWMP to establish and maintain a mechanism for integrating and coordinating all activities and for enhancing and sustaining public involvement and communication. Briefings and presentations have been given by the PEIS and other planning committees to familiarize the LLWMP Steering Committee with their processes and status. Joint working groups have been formed to develop strategies for specific technical issues which have common interest.

SCHEDULE

A series of documents will be developed to properly document the strategic planning process (Fig. 3). Documentation of LLW strategic planning will include developing and updating, as appropriate, the Current State (Background) Report, the Future State Report, the System Analysis Workplan, the Program Plan, the Comprehensive Strategic Plan, and the LRIMP.

A status report will be prepared on the results of the annual review of DOE's LLWMP. This report will contain a summary of the accomplishments and recommendations for the planned activities. Review and recommendations will include the areas of technical program, program management,

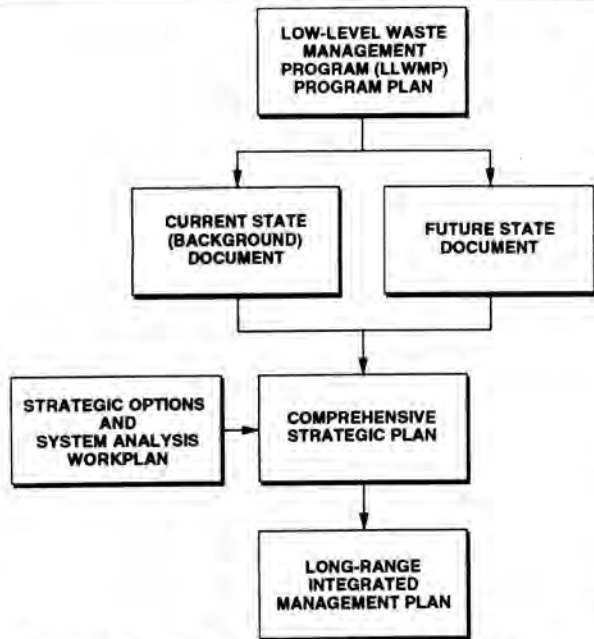


Fig. 3. Documentation for Low-Level Waste Management Program.

integration with other DOE programs, and communications and outreach programs.

A schedule for completion of this integrated strategic planning effort is presented in Fig. 4. The primary activities include the following:

- Low-Level Waste Management Program (LLWMP)
- Steering Committee and Meetings
- Program Plan
- Future State of LLW Management
- Current State of LLW Management
- Strategic Plan (I) - Issue Identification/Option Analysis
- Strategic Plan (II) - System Analysis
- Long-Range Integrated Management Plan (LRIMP)

CONCLUSION

The development of an efficient and effective management system for DOE LLW is one that is worthwhile and necessary. DOE can no longer afford to take a parochial approach to management of waste at its sites. Instead, it must look to life-cycle waste management incorporating quality practices into an equitable, safe, cost-effective, and complex-wide system. The approach will require dedication, communication, and commitment from all those involved in its formulation, and courage by DOE decision makers to implement the necessary changes. With the integration and cooperation among sites, field offices, and DOE headquarters, DOE will be able to manage its waste in a more efficient and consistent way.

