96-0001908

The Secretary of Energy
Washington, DC 20585

May 7, 1996

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, NW
Washington, D.C. 20004

Dear Mr. Chairman:

As discussed in my February 28, 1996, letter to you, enclosed is the Department's revision of the Implementation Plan for Recommendation 94-2, "Conformance with Safety Standards at Department of Energy Low-Level Nuclear Waste and Disposal Sites," of September 8, 1994. The revised Implementation Plan reflects the Department's renewed commitment to respond to Recommendation 94-2.

As in the original Plan, the revised Plan describes the actions the Department is taking in response to the Board's recommendation. The revised Plan reflects enhancements to the Department's approaches in systems engineering, radiological assessments of disposal facilities, research and development, and in supporting the revision of DOE Order 5820.2A, Radioactive Waste Management. The revisions to the Plan also reflect improved linkages between the tasks and more efficient use of the Department's resources. Commitments and due dates in the Plan have been modified to reflect these changes. Progress to date, as well as the proposed changes to the original Plan, were presented to the Board by our Environmental Management staff on April 26, 1996.

The Department is confident that the revised Plan will result in the needed improvements to the low-level waste program, and that the resources are in place to carry out the Implementation Plan as revised.

If you have further questions, please contact me or have a member of your staff contact Rear Admiral Richard Guimond, Deputy Assistant Secretary for Environmental Management, at (202) 586-7710.

Sincerely,

Hazel R. O'Leary

Hazel R. O'Leary

Enclosure

96/1908

IMPLEMENTATION PLAN

Defense Nuclear Facilities Safety Board Recommendation 94-2

Conformance with Safety Standards at Department of Energy Low-Level Nuclear Waste and Disposal Sites

REVISION I

April 1996

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EXECUTIVE SUMMARY

On September 8, 1994, the Defense Nuclear Facilities Safety Board (DNFSB or the Board) issued Recommendation 94-2, Conformance with Safety Standards at Department of Energy (DOE) Low-Level Nuclear Waste and Disposal Sites. The Department accepted Recommendation 94-2 on October 28, 1994. This revised Implementation Plan is submitted in response to Recommendation 94-2.

In making Recommendation 94-2, the Board concluded that the Department of Energy low-level waste (LLW) program has not kept pace with the evolution of commercial practices. The Board noted that no defense nuclear LLW disposal facility radiological performance assessments required by Order DOE 5820.2A, Radioactive Waste Management had been approved. The Board also noted that LLW radiological performance assessments do not account for other source terms that potentially add to the dose projected for the LLW disposal facilities.

The Board recommended that the Department conduct a complex-wide review to establish the dimensions of the LLW problem, take steps to complete the performance assessments, and in completing the performance assessments, include all of the radioactive source terms. The Board also recommended that DOE include in this Implementation Plan issuance of new standards, requirements, and guidance for LLW management; studies to improve modeling capability; studies to enhance waste form and to deter intruders and radionuclide migration; studies of volume reduction; a program to improve volume projections of LLW; and a study of the safety merits and demerits of LLW disposal privatization.

In order to accomplish the commitments in this Implementation Plan, the Department has established the Low-Level Waste Management Task Group to direct program activities, and the Low-Level Waste Executive Management Group to provide top-level management attention to technical and programmatic issues. Tasks to address the DNFSB recommendations have been identified and grouped in the following six functional areas:

- Systems Engineering for the LLW Program
- Complex-Wide Review
- DOE Regulatory Structure and Process
- Radiological Assessments
- Low-Level Waste Projections
- Research and Development

Table ES-1 shows the Departmental commitment associated with each of the specific Board recommendations in DNFSB 94-2, and the section of this Implementation Plan which describes the tasks, milestones, and deliverables to achieve the commitment.

Table ES-1: Summary of Recommendations and Departmental Commitments

Recommendation in DNFSB 94-2		Departmental Commitment	Plan Section
(1)	Conduct a Complex-Wide Review: establish dimensions of LLW problem, identify corrective actions.	A Complex-Wide Review will be conducted on LLW treatment, storage, and disposal facilities; corrective actions will be prepared.	V. and IV.
(1a)	Plan should include regularized program for volume projections.	Guidance will be issued to direct the preparation of volume projections; a program to routinely evaluate LLW disposal capacity will be implemented.	VIII.
(1b)	Plan should include development and issuance of additional LLW requirements, standards, and guidance.	Essential LLW requirements, implementation guidance, and standards will be developed for inclusion in the revised DOE Order for Radioactive Waste Management.	VI.
(1c) (1d)	Plan should include planned studies directed towards improving modeling capability, waste form stability, and intrusion and migration deterrence; and Plan should include studies of enhanced methods to reduce volume of LLW.	A research and development program will be initiated to support improved LLW management.	IX.
(1e)	Plan should assess the safety merits/demerits of privatization of LLW disposal facilities.	An analysis of safety merits and demerits of the use of private (non-LLW compact) facilities for the disposal of DOE LLW will be conducted and used to develop guidelines for sites to use when considering disposal options.	IV.
(2)	More immediate steps to complete PAs	A schedule is included for completion of current PAs.	VII.

Table ES-1: Summary of Recommendations and Departmental Commitments

Recommendation in DNFSB 94-2		Departmental Commitment	Plan Section
(2a)	PAs are to be based upon the total inventories at the facility.	A schedule is included for completion of composite analyses to address sources that add to doses from current waste management and CERCLA disposal facilities.	VII.
(2b)	PAs with entire source term are to meet 5820.2A dose objectives	PAs will use Order DOE 5820.2A dose objectives. Composite analyses will evaluate performance with Order 5400.5 (or 10 CFR 834 when issued) criteria for protection of the public.	VII.
(3)	Corrective Action Plans are developed for bringing sites into compliance that don't meet 5820.2A dose objectives for the entire source term.	Corrective action plans will be prepared and executed if dose criteria are exceeded for either a PA or a composite analysis. Options analyses will be prepared if dose goals are exceeded and as necessary to ensure that projected doses are as low as reasonably achievable.	VII.

I. INTRODUCTION

On September 8, 1994, the Defense Nuclear Facilities Safety Board (DNFSB or the Board) issued Recommendation 94-2, Conformance with Safety Standards at Department of Energy (DOE) Low-Level Nuclear Waste and Disposal Sites. The Department accepted Recommendation 94-2 on October 28, 1994. On March 31, 1995 the Department issued the Implementation Plan, Defense Nuclear Facilities Safety Board Recommendation 94-2, which was accepted by the Board, with conditions, on June 15, 1995.

The Department has realized that there was considerable complexity in its implementation of the plan. In addition, consistent with the conditions in the Board's acceptance letter, DOE has reevaluated its approach to ensuring that low-level waste (LLW) and other radioactive source terms at a DOE site do not threaten long-term safety of the public. As a result of interactions with Board members and the Board staff, DOE has made mid-course changes to the approaches for accomplishing some of the task initiatives in the plan.

In keeping with the Board's acceptance of the original Implementation Plan, the overall goals and commitments in this revision are only slightly changed. The systems engineering tasks have been reorganized such that the same end products are developed, but in a more logical order than in the original plan. Following multiple interactions with Board staff, the Complex-Wide Review is being conducted in a manner that fulfills the commitment to evaluate DOE LLW management for vulnerabilities.

The Regulatory Structure and Process section has been revised to reflect DOE's current plans for revising Order DOE 5820.2A, Radioactive Waste Management. The original plan assumed that a revised Order, including LLW requirements, would be completed in the summer of 1995. Order revision efforts are underway with completion of a draft for comment planned by February 1997. Therefore, many of the task initiatives in this revision of the plan are intended to provide the technical basis supporting development of the LLW chapter of the revised draft Order and providing guidance for its ultimate implementation.

The commitments regarding assessments of the long-term impacts of LLW disposal have been revised based on the evolution in approach to disposing of waste originating from cleanups and to support decision-making regarding the myriad of radioactive sources at DOE sites. Commitments in the Radiological Assessments section recognize differences in the regulatory regimes for waste management disposal facilities and environmental remediation disposal cells. The commitments also distinguish between performance assessments, whose purpose is to ensure proper current disposal, and composite analyses, whose purpose is to aid in planning long-term site management by evaluating the impacts of the current disposal facility and other radioactive sources that contribute to the dose to a hypothetical member of the public.

The Waste Volumes Projection section clarifies that the disposal capacity report will evolve over time to include radiological capacity in addition to volumetric capacity. Pending completion of the radiological assessments, sufficient information is currently not available to address radiological capacity.

The Research and Development tasks now combine Board-identified studies and other research and development activities rather than addressing them sequentially. Additionally, the identification and cataloging of completed or ongoing research and development will follow, rather than precede, needs identification and be an integral part of defining outstanding research and development needs.

A. Background

The Department of Energy and its predecessor agencies have been generating and disposing of LLW at its facilities since the dawn of the Manhattan Project in the 1940s. The classified nature of work conducted under the Manhattan Project and succeeding programs led to a variety of site-specific processes and procedures for management and disposal of LLW. The system for managing LLW has evolved over the years into the present day system, which continues to be based primarily on site-specific considerations.

The Atomic Energy Act of 1954, as amended, provides the Department with the authority to manage the LLW it generates, and ensure that it is managed in a way that protects the health and safety of the public, workers, and the environment. Order DOE 5820.2A, Radioactive Waste Management, contains the primary requirements governing the safe management of radioactive waste by DOE. Chapter III of the Order addresses the management of LLW.

B. Understanding the Problem

The provisions of Chapter III, "Low-Level Waste," of Order DOE 5820.2A, require that a radiological performance assessment (PA) be conducted to provide a reasonable expectation that LLW disposal facilities will comply in the future with the radiological dose objectives of the Order. The results of the PA are to be used as one of the bases for waste acceptance criteria, disposal facility operational conditions, and any other required actions and conditions to ensure that the LLW is disposed of safely. Long-term compliance with the dose objectives in the Order is demonstrated through the PA process.

The Department's process for development, review, and approval of PAs for the currently active LLW disposal facilities has taken too long. Performance assessments for many, but not all, active LLW disposal facilities have been completed, and one of those has been approved. Further, the Order calls for including in the radiological PA for the disposal

facility only LLW disposed of after the Order was issued in 1988. This means that LLW disposed of prior to the issuance of the Order, and other radioactive sources at DOE sites, have not been considered relative to their potential long-term radiological impacts.

The reliance on the PA to determine conditions of operation, combined with the lack of approved PAs, means the Department is disposing of LLW without the benefit of a "regulatory" review. The inclusion in the PA of only LLW disposed of since 1988 means that the Department may lack information that should be considered in making decisions regarding long-term site control and management. Additionally, due to the lack of well-defined technical criteria for each component of the LLW disposal system, DOE cannot easily demonstrate a level of consistency in protection as can be done by the "defense-in-depth" system used in the commercial regulation of LLW disposal. In that system, minimum technical criteria must be met in several functional areas important to safety in addition to a demonstration through a PA that radiation dose objectives will be met.

C. Objectives of the Implementation Plan

The overall objective of this Implementation Plan is to lay out an approach to respond to Recommendation 94-2 which will result in improvements to the LLW management system so that: LLW disposal facility performance assessments that demonstrate compliance with Order DOE 5820.2A radiological performance objectives are prepared and approved; composite assessments to account for other radioactive source terms are conducted; and, an appropriate set of LLW requirements are in place and effectively implemented to protect workers, the public and the environment. This objective will be accomplished by conducting a systems engineering evaluation of the LLW system, establishing the technical basis for LLW management, and developing and implementing effective policies, requirements, and compliance criteria for managing LLW. Efforts to achieve the objective will be accomplished by an integrated LLW management program within the Department's Office of Environmental Management (EM). The program and the initiatives committed to in this plan will be designed and implemented in a manner that builds on activities and practices currently in existence. Examples of this are the use of existing audit results as supporting data for completion of the Complex-Wide Review; the standardization of waste projections activities undertaken to meet other needs; and coordination with programs such as waste minimization and research and development.

Guiding principles that frame the basis for decisions to include the actions in the Implementation Plan are:

- Long-term protection of public safety and health, and the environment;
- Protection of LLW facility worker safety;
- Effective and efficient disposal of LLW;

- Minimization of storage of LLW, and;

- Minimization of generation of new LLW.

D. Summary of DNFSB 94-2 Recommendations and Departmental Commitments

The overall objective of the Implementation Plan will be met by the following commitments addressing the Board's recommendations on management of LLW:

1. DNFSB 94-2, paragraph 1, recommends:

   A comprehensive complex-wide review be made of the low-level waste issue similar to the review the Department conducted regarding spent nuclear fuel. As with spent fuel, the objective of such review should be the establishment of the dimensions of the low-level waste problem and the identification of corrective actions to address safe disposition of past, present, and future volumes [of low-level waste].

   Commitment:

   The Department will conduct a Complex-Wide Review of LLW generation, treatment, storage and disposal by the end of May 1996. Similar to the Spent Nuclear Fuel Vulnerabilities Study conducted by the Department, the review will identify situations within DOE's LLW management system which could result in unnecessary radiation exposures to workers or the public, or releases to the environment. The Complex-Wide Review will be based on a systems approach which will identify the key technical and programmatic functions of the LLW management program and determine the most probable sources of vulnerabilities. The Complex-Wide Review will lead to identifying weaknesses that could impact workers, the public, and the environment. By the end of July 1996, initial corrective action plans will be developed at each site to address site-specific vulnerabilities, and at Headquarters to address system-wide vulnerabilities.

2. DNFSB 94-2, paragraph 1, subparagraph a, recommends the Implementation Plan should include:

   A regularized program for forecasting future burial needs relative to existing capacity, taking into account the projected programs for decontamination and decommissioning of defense nuclear facilities and environmental restoration activities as well as current operational units.

Commitment:

The Department will conduct an evaluation of current waste generation and volume projections of LLW received by LLW disposal facilities, current methodologies used to project LLW volumes, and planned disposal capacity for LLW. Following this effort, LLW projection implementation guidance will be developed, by the end of 1996, to describe the recommended methodologies for LLW volume projections and their recommended frequencies. The guidance document will also contain a system for evaluation of the projected volumes of waste requiring disposal to determine the accuracy and validity of waste volume projections. The guidance will be directed specifically at improving projections of LLW from decontamination and decommissioning and remedial action projects, but it will also be coordinated with generators creating LLW routinely.

3. DNFSB 94-2, paragraph 1, subparagraph b, recommends the Implementation Plan should include:

The development and issuance of additional requirements, standards or guidance on low-level waste management that address safety aspects of waste form and packaging, burial ground siting and performance assessment, facility design, construction, operation, and closure, and environmental monitoring. Such guidance should reflect consideration of concepts of good practices in low-level waste management as applied in the commercial sector, both nationally and internationally, and results of DOE's technological developments and advisories to the State Compacts pursuant to the Low-Level Radioactive Waste Nuclear (sic) *Waste Policy Act of 1982* (sic), *as amended.*

Commitment:

The Department will take immediate steps to elaborate on existing requirements in Order DOE 5820.2A to achieve compliance with the radiation dose objectives in the Order. These steps will be to clarify and strengthen the regulatory structure for LLW management by identifying and clarifying the roles and responsibilities for compliance and oversight at LLW disposal facilities. Additionally, direction will be provided to the sites that composite analyses that account for radioactive sources other than those at an active LLW disposal facility must be conducted as an adjunct to the performance assessment, or Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or Resource Conservation Recovery Act (RCRA) risk assessment. The Department will provide guidance on the PA preparation, maintenance, and review and approval process, including standardizing review criteria by the end of January 1997. In support of the revision of Order DOE 5820.2A, by the end of February 1997, the Department will conduct studies and technical analyses that will form the basis for the LLW requirements to be included

in the Order revision, will identify these requirements, and will augment the draft Order revision with LLW guidance documents.

4. DNFSB 94-2, paragraph 1, subparagraphs c and d, recommend the Implementation Plan should include:

Planned studies directed towards (1) improving modeling and predictive capability for assessing migration of radionuclides and (2) enhancing the stability of buried waste forms, deterring intrusion and inhibiting migration of radionuclides; and

Studies of enhanced methods that can be used to reduce the volume of waste to be disposed of, such as compaction and more environmentally acceptable incineration.

Commitment:

Through the efforts of a Research and Development Task Team (RDTT), the Department will identify its needs for improvement in modeling and predictive capability of migration of radionuclides, enhancing the deterrence of intrusion, enhancing the stability of waste, inhibiting the migration of radionuclides, and volume reduction technologies and other technical areas affecting LLW management by the end of March 1997. Through an evaluation of past and ongoing research, results from the Complex-Wide Review, completed radiological assessments, and the systems engineering effort, outstanding needs will be identified by the end of June 1997. Results from completed studies will be utilized appropriately in efforts to improve the LLW management program, and coordination with ongoing research will be accomplished through the efforts of the RDTT and the LLW management program. By the end of September 1997, a strategy will be prepared that identifies the highest priorities and proposed mechanisms for conducting the necessary research and development to fill any needs not being met by completed or ongoing research. Plans are to include the R&D strategy in a future revision of the LLW Program Management Plan (see Section IV, Systems Engineering).

5. DNFSB 94-2, paragraph 1, subparagraph e, recommends the Implementation Plan should include:

Assessment of the safety merits/demerits of privatization of facilities for disposal of DOE low-level wastes.

Commitment:

As part of the systems engineering activities for LLW management, the Department will conduct a study of the safety merits and demerits of using privately operated (non-LLW compact) disposal facilities by the end of September 1996. The evaluation will consider the use of a private facility located away from the Department's sites, operated for the exclusive disposal of DOE LLW, a private facility located within a DOE site, and a private, non-LLW compact facility which accepts both commercial and DOE LLW for disposal. Other options for privatizing may also be evaluated. Study results will be used to establish guidelines for DOE sites to use when considering disposal options.

6. DNFSB 94-2, paragraph 2, recommends:

More immediate steps be taken to complete the performance assessment process for all active low-level waste burial sites as required by DOE Order 5820.2A. In so doing clarifying instructions should be issued to insure that: (a) performance assessments are based upon the total inventories (past, present, and future) emplaced or planned for the burial site(s); and (b) performance objectives (dose criteria) of DOE Order 5820.2A are achieved for the composite of all low-level waste disposal facilities on the site.

Commitment:

The Department will complete outstanding PAs for active LLW disposal facilities in accordance with the schedule included in this Implementation Plan. For all active disposal facilities and the pending CERCLA disposal facility that has not accounted for potential impacts of other source terms, the Department will conduct a composite analysis that accounts for other source terms that add to the dose to a hypothetical future member of the public projected for the disposal facilities, also in accordance with the schedule included in this Plan.

The Department will issue a disposal authorization statement (Headquarters approval) for each active disposal facility based on a Headquarters review and acceptance of the performance assessment and composite analysis prepared for that facility. For the CERCLA facility, Headquarters will review the composite analysis for approval and the site will incorporate results into the LLW disposal facility's remedial action/remedial design phase. This will ensure that the facility's design features are fully effective in protecting human health and the environment.

7. DNFSB 94-2, paragraph 3, recommends:

If non-compliance with reference dose criteria set forth in DOE Order 5820.2A is found, an action plan with schedule be developed for bringing operations into compliance or other acceptable compensating measures be undertaken in the interim pending final closure.

Commitment:

If the performance assessments or composite analyses indicate that applicable performance objectives will be exceeded, the Department will prepare and implement mitigation plans. In addition, the Department will conduct options analyses, as appropriate, to evaluate alternatives for reducing future doses to levels as low as reasonably achievable. Alternatives to be considered in the mitigation plans and options analyses will include more refined analyses, remediation of source terms, limitations on new LLW disposed in the facility, and termination of disposal operations. A cost-benefit analysis will be conducted to support the decision on appropriate actions. Although remediation actions at past disposal facilities will be influenced by the composite analysis, final remedial action decisions for those facilities will be made through the CERCLA process. Future revision of PAs or composite analyses would then reflect the corrective actions that are implemented.

A summary level schedule showing major elements of this Implementation Plan and their interrelationships is presented in Figure I.1. Plan commitments will be implemented through the integrated LLW Management Program by either new actions and programs, or by feeding into existing efforts that are already underway within the Department. Interactions with existing efforts will be addressed specifically in the task initiatives sections that follow. The LLW management program will continue interfaces with other programs to ensure that the results of task initiatives in response to Recommendation 94-2 are effected.

E. Organization of the Implementation Plan

The Implementation Plan first provides a discussion of the baseline of the LLW Management System, based on work conducted by the Low-Level Waste Steering Committee and the report prepared by the Board staff entitled, Low-Level Waste Disposal Policy for Department of Energy Defense Nuclear Facilities. The baseline presentation provides an introduction to the sections that follow, which are the commitments of the Department to improve the management of LLW. The sections

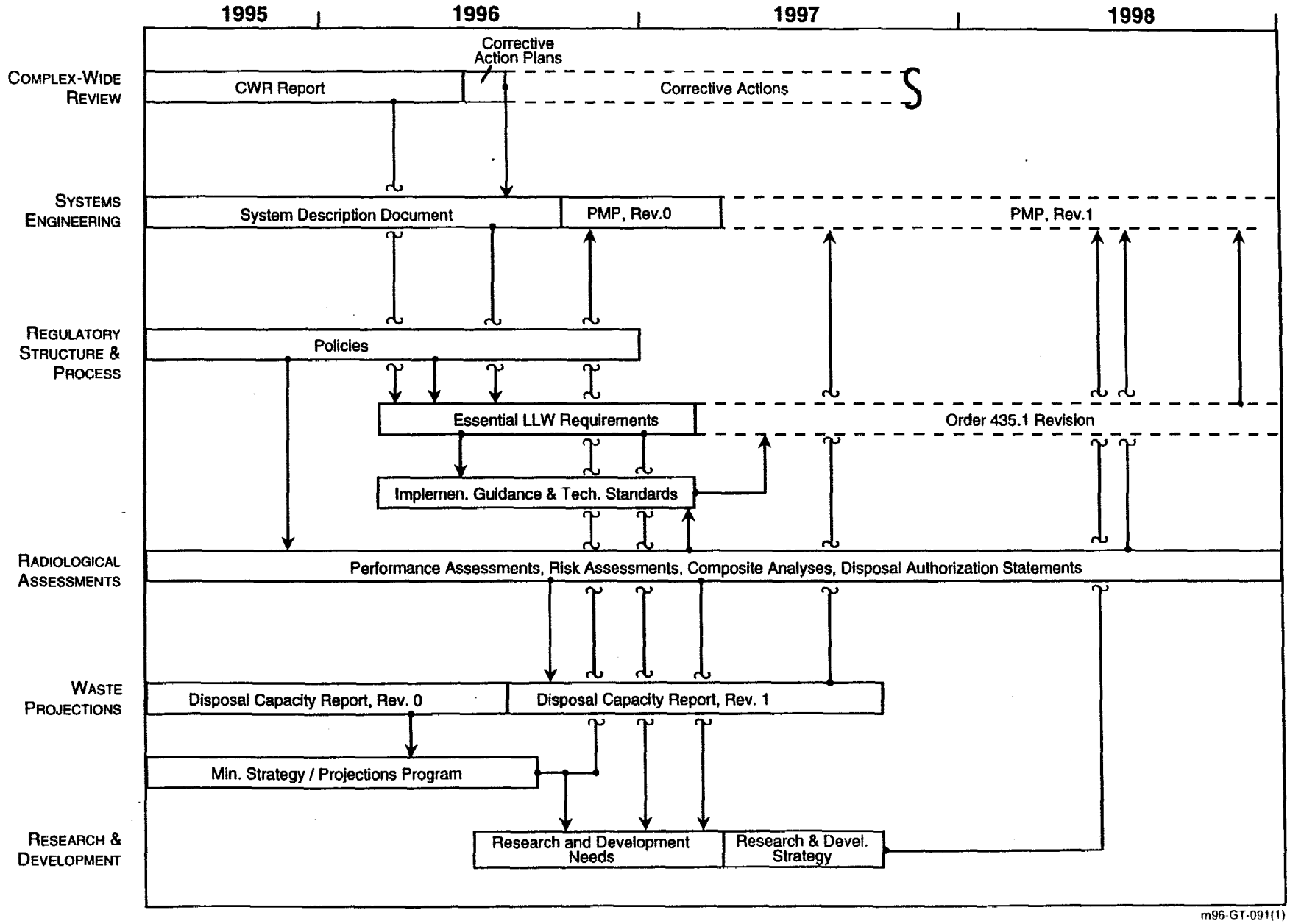

Figure I.1 DNFSB 94-2 IP Schedule

describe the tasks and milestones for achieving the commitments, responsibilities for meeting commitments and milestones, and the documentation of the commitments. Only those items identified as "Task Initiatives" in this Implementation Plan are commitments to close Recommendation 94-2.

II. BASELINE OF THE LOW-LEVEL WASTE MANAGEMENT SYSTEM

The Low-Level Waste Management Steering Committee (LLW SC or Steering Committee) performed an evaluation of the LLW management system over a three year period. The approach used by the Steering Committee was to determine the basic functions of the system and how they interrelate. The basic LLW management system considered is depicted in the flow diagram presented in Figure II.1. As illustrated, the technical functions of LLW management include generation, characterization, packaging, treatment, storage, disposal and transport of waste between the other functions. Mixed LLW and LLW generated from remediation of past disposal of LLW are considered as inputs to the current LLW management system.

The Steering Committee applied a "gap analysis" methodology to the system to determine the first priority actions it would recommend for improving the LLW management system. The methodology involved describing the conditions of the current state of the LLW management system and comparing it to a desired future state. An analysis of the gaps was performed to identify major actions required to progress from the current state to the desired future state. This methodology resulted in identifying issues the Department needs to address and technical weaknesses that need to be corrected to achieve the future state. The highest priority actions the Department needs to take can be identified once the previously identified issues, those derived from Recommendation 94-2, and those identified by the Complex-Wide Review are collected.

A. Current State of System

The current state of the LLW management system, as evaluated in detail by the LLW Steering Committee, is documented in the Low-Level Waste Current State System Description draft, November 1994). The Current State System Description identifies complex-wide and site-specific issues which indicate a lack of integration of the LLW management system and failure to systematically address its problems. Table II-1 summarizes the programmatic and complex-wide issues identified by the LLW Steering Committee in the Current State System Description as the highest priority challenges to improving the LLW management system. At the time the Department received Recommendation 94-2, the LLW management program had begun efforts to address the gaps necessary to achieve the desired future state.

The Board, in issuing Recommendation 94-2, pointed to several of the same issues identified by the Steering Committee, and raised additional concerns that were not identified by the Steering Committee. The Department evaluated the Board's recommendation in

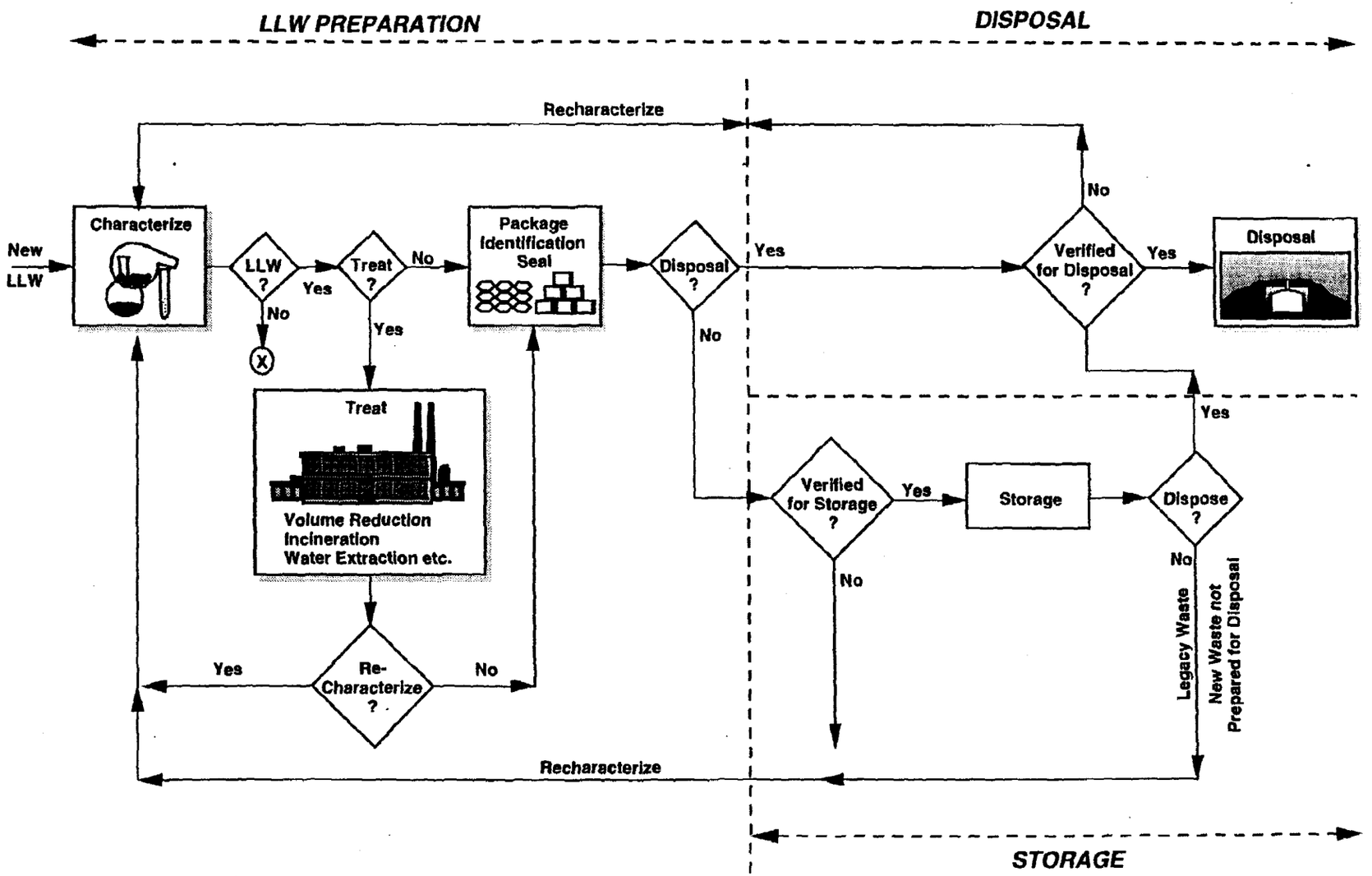

Figure II.1 Low-Level Waste Functional Logic

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Table II-1
DOE Complex-wide LLW Issues Identified by the LLW Management Program Steering Committee

Issue Classification	Issue
Waste Generation and Minimization	Motivation to minimize the generation of LLW needs improvement.
	Projections for LLW volumes and characteristics need to be more reliable.
	A lower limit for radioactivity below which waste can be managed as other than LLW is needed.
Waste Data Management	LLW data need to be more complete, consistent, reliable, and retrievable.
Waste Characterization	Requirements for accuracy and precision of radioactive characteristics and identification of physical and chemical characteristics of LLW need to be defined.
Treatment	The decision-making process for LLW treatment alternatives needs to be conducted with more consideration of technical input, and more coordination and communication.
Storage	Storage space needs to be increased because of bottlenecks in the LLW disposal certification process.
	The DOE moratorium on off-site shipments of hazardous waste, WIPP delays, and problematic LLW forms (GTCC and special case) are contributing to storage problems.
Disposal	The process for involving the States in decisions involving LLW disposal operations needs to be better defined and established.
	Approvals of PAs for operating LLW disposal facilities are needed.
	The use of LLW disposal facilities, both commercial and DOE, needs to be expanded and certain restrictions removed.
Institutional	Roles and responsibilities need to be better defined to improve communications, which will result in adequate staffing to perform the LLW management mission at DOE-HQ and the Field levels.
	The decision-making process for responding to technical, policy, and institutional management issues needs to be improved.
Credibility and Public Trust	DOE Waste Management's credibility and public trust needs to be increased. The public participation process and equity discussions relating to DOE technical decisions needs to be well established.
	An independent LLW oversight organizational structure or procedures needs to be established to enhance public credibility and trust.

light of the work already done by the Steering Committee, and has identified some root causes of the issues and weaknesses with the management of LLW.

Despite having Order DOE 5820.2A in place since 1988, DOE has not demonstrated compliance with the Order at all of the DOE LLW disposal facilities. One cause of this is a weak structure for providing policy, requirements and compliance criteria, and for conducting oversight of operational implementation of LLW management policies and directives. The difficulty in strengthening the system lies in the historically decentralized management structure of the Department and in the need for a more coherent and widely understood philosophy of DOE's "self-regulation" principles. Also, until recent years, the emphasis on weapons production resulted in secondary consideration being given to management of radioactive waste. The situation was further exacerbated by the perceived low relative risk posed by LLW and the Department giving LLW management a lower priority than other waste management activities. This situation results from the simultaneous demand for resources and management attention across a range of competing environmental mandates, each with its own constituency.

B. Future State of System

The future state of the LLW management system projected by the LLW Steering Committee is reported in the Low-Level Waste Chapter (Chapter 11) of the Waste Type Report (internal Department of Energy draft, dated February 28, 1995).

The vision of the future program as seen by the Steering Committee is:

> *. . . a nationally integrated, cost-effective program, based on acceptable risk and sound planning which results in public confidence and support. This management and operations system will isolate and dispose all legacy and D&D waste while also managing and disposing of newly generated wastes at the same rate it is being generated.*

The goals of the LLW Steering Committee for an integrated LLW management system, as described in the Waste Type Report are as follows:

Short-Term Goals:

- *Approval decisions made on all existing LLW disposal facility PAs.*
- *Maintain adequate disposal capacity.*
- *Eliminate legacy LLW storage (except special-case waste).*
- *Establish adequate storage capacity for special-case waste.*
- *Identify LLW management technology needs.*

- *Implement LLW system consistent with PEIS and FFCAct equity decisions.*
- *Establish effective DOE internal oversight process.*
- *Establish LLW minimization implementation plan.*
- *Implement consistent WAC and certification methodology.*
- *Establish limit of radioactivity for LLW, below which it need not be managed as LLW.*
- *Develop integrated Quality Assurance/Quality Control (QA/QC) Program for LLW management functions.*
- *Establish modular data/information system.*

Long-Term Goals:

- *Establish consistent regulatory framework for all LLW.*
- *Integrate LLW management facilities with other waste-type management facilities.*
- *Require sites to evaluate LLW minimization and/or volume reduction, and implement where feasible.*
- *Manage and dispose of all LLW as it is generated.*

C. Assumptions

In developing the vision and goals of the future state of LLW management, assumptions were made concerning major programmatic issues that the Department could be faced with. These major assumptions are:

- *DOE will continue to be self-regulating for LLW, at least in the near term, for onsite activities not involving mixed LLW.*
- *DOE will continue the policy that LLW generated at a Department-owned and operated site should be disposed at that site to the extent practicable.*

The Department believes the improvements to the management of LLW needed to respond to the issues identified by the Board and the Board staff in issuing Recommendation 94-2 are consistent with the vision and goals of the LLW Steering Committee for an improved LLW management system. In fact, the Department envisions that the ultimate result from

responding to the Board will be achievement of an improved future state in a shorter period of time than originally foreseen by the Steering Committee.

The Department, therefore, has developed commitments in this Recommendation 94-2 Implementation Plan that not only respond to issues identified by the Board, but also respond to weaknesses identified by the Department's own analysis, and address the root causes of the system problems. The commitments detail improvements in the organization and management of the LLW system, implement technical studies to improve the technical basis for LLW management, and develop, issue, and implement new policies, guidance, and standards to improve the regulatory structure for oversight of LLW management. In completing these commitments, the Department expects to achieve the future state of a fully integrated, technically-based, and standardized LLW management system as envisioned by the Board and the DOE LLW Steering Committee.

D. Approach

The approach to improving the LLW management system presented in this Implementation Plan takes multiple paths, which converge into an integrated program. The Department has restructured management of the LLW program at Headquarters, and elevated the priority of LLW management. The new LLW management organization is responsible for integrating the multiple tasks presented in the Implementation Plan into a structured program.

Utilizing existing knowledge and work already underway, the Implementation Plan provides for immediate tasks to move LLW disposal facilities towards compliance with the existing order and to clarify LLW policies to ensure consistent management in the DOE complex.

At the same time, a systems engineering effort is underway to provide a comprehensive, structured technical basis with clearly identified interfaces for the management of the Department's LLW. The end goal of the systems engineering effort is upper-level program documentation describing the program requirements, program strategies, program participants, roles, and responsibilities, and a program plan for LLW management, as well as application of the outcome of systems studies and analyses that ensure the optimum implementation of the program in the field.

The Department is conducting a Complex-Wide Review to identify weaknesses or conditions that could result in unnecessary exposure to the worker or the public, or releases to the environment at specific sites, and rolling them up into complex-wide vulnerabilities which require the attention of Headquarters.

In parallel with the Complex-Wide Review vulnerability assessment, technical studies are in progress to evaluate requirements, standards, and guidance needed to improve the regulatory structure and process for LLW management. These studies form the technical basis for developing LLW management requirements for incorporation into a revision to Order DOE

5820.2A, Radioactive Waste Management. An adjunct to the studies will be the preparation of documents that provide implementing guidance for the requirements. The results of the systems engineering are expected to support the regulatory structure and process activities by identifying areas important to safety that might otherwise have been overlooked.

Efforts to improve the Department's projections of future LLW generation and disposal capacity needs are underway. These tasks will result in better forecasting of future volumes of LLW needing to be disposed, and improved planning for use of existing and new LLW disposal capacity. Guidance will also be issued for minimizing the generation of LLW.

An effort has been started to redefine the LLW management system research and development needs. Actions taken as commitments in this plan are to be coordinated with ongoing technology development programs and initiatives to the extent they affect LLW management. The effort is to culminate in a re-focused research program that takes into account the results of the systems engineering approach, the Complex-Wide Review, the radiological assessments, waste projections, and the studies to determine improved standards, requirements, and guidance to improve the technical basis for LLW management.

When the efforts described in the Implementation Plan are completed, a fully integrated LLW program will be operating within the Department of Energy. Low-level waste disposal facilities will be in compliance with LLW policies and requirements, and the Department will be able to demonstrate with confidence that public health and safety, and the environment are being, and in the future will be, protected in accordance with appropriate standards. A refocused research program will be directing efforts towards acquiring information that addresses technical deficiencies that affect present or long-term protection of the public and environment. The program will rely on a system of self-assessments and independent evaluations to maintain the level of operating practice and compliance that will be achieved by the Implementation Plan initiatives.

III. ORGANIZATION AND MANAGEMENT

The Department recognizes the importance of improving its management of LLW, and makes the following improvements to the organization managing LLW to respond to Recommendation 94-2.

A. Organization and Responsibilities

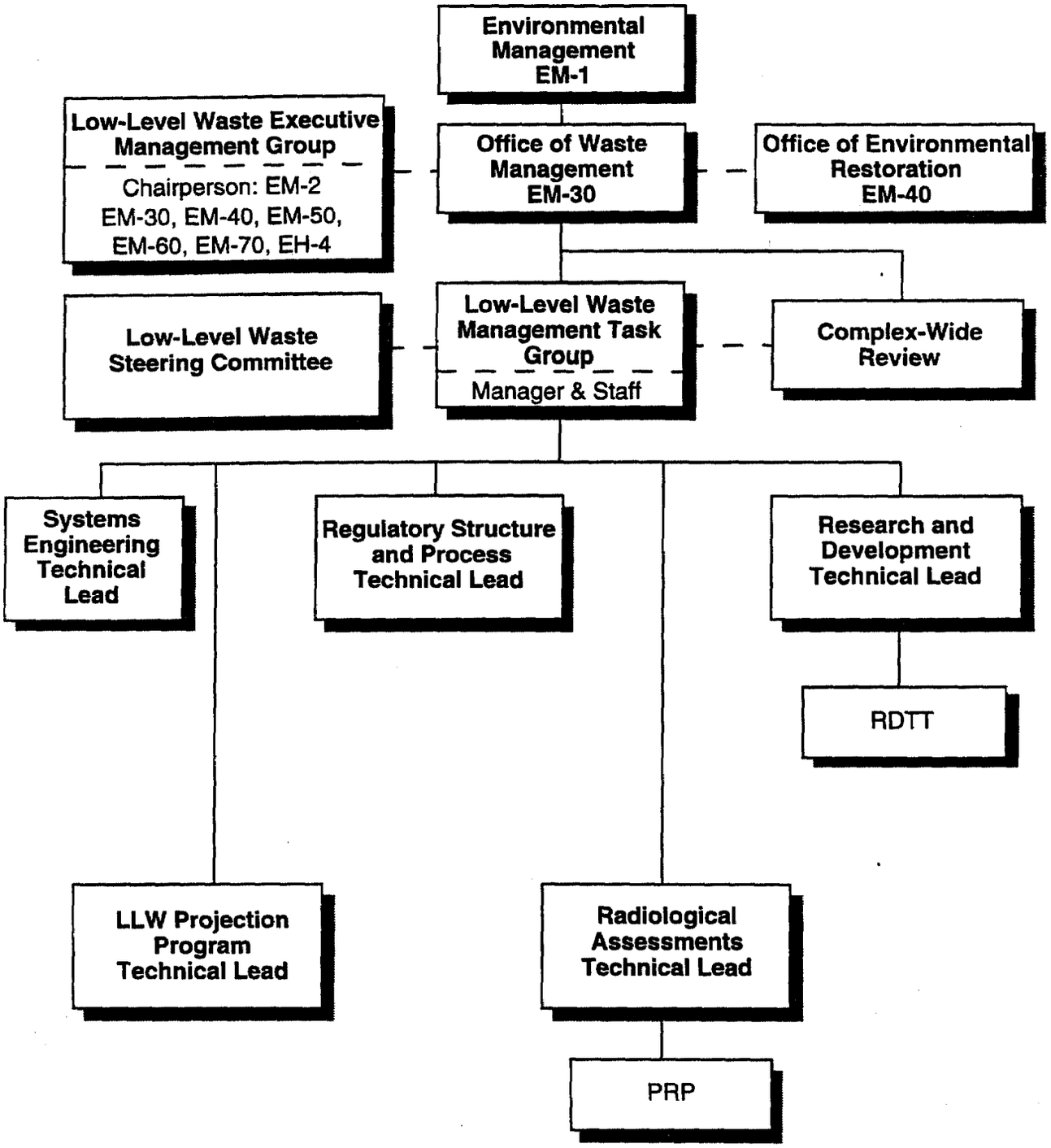
The Department is committed to improving the LLW management system consistent with its acceptance of Recommendation 94-2; to achieving the future state of the program projected by the Low-Level Waste Management Steering Committee, and; to resolving the vulnerabilities identified by the Complex-Wide Review (see Section V). The task group organization shown in Figure III.1 has been established within the Office of Environmental Management (EM) to address the needed improvements to the LLW management system.

1. Deputy Assistant Secretary for Waste Management

The Deputy Assistant Secretary for Waste Management (EM-30) is assigned the overall responsibility for the efforts described in this Implementation Plan. The Deputy Assistant Secretary will ensure that the funding is committed and the required priority is placed on the task initiatives described. The Deputy Assistant Secretary for Waste Management will continue to report within the line management of the Office of Environmental Management (EM) to the Assistant Secretary for Environmental Management.

2. Low-Level Waste Management Task Group

The Low-Level Waste Management Task Group (LLWMTG) has been formed to address the needed improvements in the Department's management of LLW. The leader of the LLWMTG reports to the Deputy Assistant Secretary for Waste Management through the 94-2 Senior Management Officer. The mission of the LLWMTG is to integrate the Department's LLW management system to achieve the program's goals for protecting public safety and health and the environment. The LLWMTG will be responsible for managing the task initiatives described in theImplementation Plan, for reporting the progress and any schedule changes to the Deputy Assistant Secretary, and identifying impacts of schedule changes or any other influences on the commitments in the Implementation Plan. The LLWMTG is



Organizational Lines ———

Interfaces — — —

PRP – PA Peer Review Panel

RDTT – Research & Development Task Team

Figure III.1: DOE Organization to Respond to DNFSB 94-2

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responsible for ensuring that results of the Complex-Wide Review (see Section V), or from the other initiatives when they are completed, are effectively integrated into the LLW management program to result in the greatest possible benefit from the Implementation Plan.

Program managers from the Office of Environmental Management (EM) are assigned to the LLWMTG, and report to the LLWMTG manager relative to Implementation Plan activities on the five major technical areas. Each program manager will have a senior technical lead reporting directly to him/her on the five major technical areas being addressed under this Implementation Plan (see Figure III.1).

The LLWMTG is staffed with Office of Environmental Management (EM) personnel with experience in LLW project management or LLW research and development project management. The technical leads supporting the LLWMTG program managers are senior technical DOE or contractor personnel with multiple years of experience in the technical area in which they are assigned.

The LLWMTG will accomplish many of the task initiatives described in this Implementation Plan by soliciting work group members, work products, or review and comment from the DOE field offices. Technical experts and LLW program managers from the DOE field offices, and their management and operating contractor representatives, will supply much of the knowledge and experience to fulfill the commitments in this Plan.

3. Low-Level Waste Executive Management Group

A Low-Level Waste Executive Management Group has been formed to provide direction to the LLWMTG on major policy issues that are identified as task initiatives in the Implementation Plan are accomplished, or which will be identified later as a result of the Complex-Wide Review or other assessments. The Low-Level Waste Executive Management Group is responsible for ensuring that all programmatic issues that could have some bearing on task initiatives are considered and resolved, and for ensuring that necessary coordination between program offices and programs is identified and carried out. The Low-Level Waste Executive Management Group is composed of:

- The Principal Deputy Assistant Secretary for Environmental Management (EM-2);
- The Deputy Assistant Secretary for Waste Management (EM-30);
- The Deputy Assistant Secretary for Environmental Restoration (EM-40);

- The Deputy Assistant Secretary for Science and Technology (EM-50);
- The Deputy Assistant Secretary for Nuclear Material and Facility Stabilization (EM-60);
- The Deputy Assistant Secretary for Site Operations (EM-70); and
- The Deputy Assistant Secretary for Environment (EH-4);
- Representatives from the Offices of Nuclear Energy (NE), Energy Research (ER), and Defense Programs (DP).

The Principal Deputy Assistant Secretary for Environmental Management serves as the chairperson of the Low-Level Waste Executive Management Group. The Deputy Assistant Secretaries serving on the Executive Management Group provide program direction when needed to their Offices to accomplish task initiatives in this Implementation Plan in accordance with the schedules and directions as determined by the Executive Management Group. The Offices so directed by the Deputy Assistant Secretaries report, as needed, to the LLWMTG on progress on the task initiatives until they are completed.

4. LLW Steering Committee (LLW SC)

The LLW SC will continue to provide coordination and integration activities to guide improving the LLW management system. The LLW SC will report to the LLWMTG, and will continue to have the same membership and draft charter. Headquarters and DOE field office program managers in charge of LLW programs form the membership of the LLW SC. Their efforts will involve technical reviews and field office impact reviews of documents generated by task initiatives and coordination of efforts involved in task initiatives from a field office perspective.

5. Performance Assessment Peer Review Panel (PRP)

The PRP will continue to provide reviews to ensure consistency and technical quality of PAs submitted to DOE Headquarters. The PRP will report to the LLWMTG on PA review progress and results of PA reviews. The current charter for the PRP will remain in effect for completing reviews of PAs. A Standard Review Plan (SRP), and other guidance documents, will be prepared to standardize the PRP reviews of PAs. These changes are discussed in Section VII.

6. Research and Development Task Team (RDTT)

A Low-Level Waste Management Research and Development Task Team (RDTT) has been established reporting to the LLWMTG, under the direction of the Research and Development Technical Lead. The RDTT is responsible for providing analysis, advice, and recommendations for carrying out the R&D task activities described in Section IX of this Implementation Plan. The RDTT includes members with expertise in LLW management and research & development from within and outside of the DOE community. Individuals will be chosen considering the potential for conflicts of interest. The RDTT will identify in its recommended strategies to the LLWMTG, R&D organizations with recognized resources, capabilities, and expertise to meet identified R&D needs. The LLWMTG will negotiate with these organizations for revised or new projects that fulfill LLW management program R&D requirements. The Office of Science and Technology (EM-50) is one organization that is expected to provide, at least in part, the required R&D support.

7. Office of Environment, Safety, and Health

The Office of Environment, Safety and Health (EH) will provide technical assistance to development of requirements and guidance for LLW management through its Office of Environmental Policy and Assistance (EH-41). The Office of Environment, Safety, and Health will continue to provide oversight through the Office of Oversight.

The Office of Oversight in EH will provide independent verification of conformance to established policies and requirements. In particular, it will verify compliance with the safety principles identified in the Department's October 21, 1994 letter to the DNFSB articulating the functions the Department deems necessary for an effective safety management program. The Office of Oversight will not directly support or participate in programmatic activities relating to activities at DOE low-level nuclear waste and disposal sites, nor will it prescribe program solutions to safety issues relating to these sites.

B. Project Management

The Organization shown in Figure III.1 as described above will operate in accordance with the following management initiatives and functions in order to bring about the improvements in LLW management through an integrated program.

1. Change Control

Complex, long-range plans require sufficient flexibility to accommodate changes in commitments, actions, or completion dates that may be necessary due to additional information, improvements, or changes in baseline assumptions. The Department's policy is to (1) bring to the Board's attention any substantive changes to this Implementation Plan as soon as identified and prior to the passing of the milestone date, (2) have the Secretary approve all revisions to the scope and schedule of plan commitments, and (3) clearly identify and describe the revisions, and bases for the revisions. Fundamental changes to plan's strategy, scope, or schedule will be provided to the Board through formal revision of the Implementation Plan. Other changes to the scope or schedule of planned commitments will be formally submitted in appropriate correspondence, along with the basis for the changes and appropriate corrective actions.

2. Quality Assurance

The LLWMTG will assure the quality of technical work and products at the program management level. Improvements to the review procedure for PAs will be implemented in which quality records will be identified and record-keeping procedures explained. Qualifications of personnel are (or will be) addressed in charters (e.g., LLWMTG, LLWSC) or scope documents describing the roles and responsibilities of the Complex-Wide Review, PRP, and the RDTT.

3. National Environmental Policy Act

The initiatives described in this Implementation Plan may result in policies, requirements, technical documents, and program planning documents. These initiatives will improve compliance with DOE directives for existing and planned facilities which are or will be covered under existing or planned National Environmental Policy Act (NEPA) evaluations, as appropriate.

DOE is already evaluating alternative strategies for improving its management of LLW, and the Department is evaluating the environmental impacts of these alternatives in programmatic, site-wide and project-specific Environmental Impacts Statements. The Department intends to coordinate the development of the initiatives described in this plan with these ongoing NEPA analyses and other NEPA analyses, as appropriate.

The implementation of proposed changes in the management of LLW described in the documentation prepared under this Implementation Plan may result in operational

changes or in facilities being built or modified. Such decisions however will not be made until the completion of any required analysis under NEPA.

4. Management Interfaces

Besides the organizational changes and arrangements explained above, some existing management interactions and interfaces will be utilized more effectively through the conduct of task initiatives in response to DNFSB 94-2.

a. Interfaces with DOE Field Office and Laboratories & Management & Operating Contractors

The establishment of the LLWMTG reporting to The Deputy Assistant Secretary for Waste Management will bring higher level management attention to oversee & direct LLW activities. Ultimately, this higher level of management attention is expected to result in more resources being directed to LLW program operations. The DOE field offices will be directly involved in the core processes and organizational elements in policy-making and program direction setting through the activities responding to Recommendation 94-2. DOE field office and M&O contractors may be lead technical staff on the LLWMTG, and will provide the majority of the staff which will conduct the Complex-Wide Review, and the other technical studies described. M&O and laboratory contractors currently serve as the members of the PRP, and will staff most of the RDTT. Headquarters and DOE field office program managers form the membership of the LLW Steering Committee.

b. Interface with Office of Environmental Restoration

The interface between the LLWMTG and the Office of Environmental Restoration (EM-40) has been and will continue to be strengthened as a result of this Implementation Plan. Pursuant to CERCLA and/or RCRA, Environmental Restoration generates LLW in performing cleanup work. Office of Waste Management (EM-30) operations provide waste management services for some of this LLW. In other instances, Environmental Restoration may dispose the waste onsite as part of the CERCLA/RCRA remedial action.

As a result of the task initiatives in this Implementation Plan, Environmental Restoration projects being conducted under CERCLA and/or RCRA may be impacted. Consequently, Environmental Restoration personnel will work closely with the LLWMTG and interact with program managers and DOE field office personnel to ensure programs and projects managed by Environmental Restoration are integrated with Waste Management LLW programs. Also, Environmental

Restoration representation will be increased on the LLW SC to assist in developments that could potentially impact Environmental Restoration projects, and to provide another vehicle through which Environmental Restoration senior management may obtain regular reports on task initiatives and the LLW management program. Environmental Restoration is also represented on teams conducting Site Assessments under the Complex-Wide Review.

c. Interface with Office of Science and Technology

The LLWMTG will use the existing interfaces to interact with the Office of Science and Technology (EM-50) and its Focus Areas. Interactions regarding LLW management program R&D requirements are expected to be greater in both context and frequency than current interactions. Recommended strategies for meeting LLW R&D requirements, whether through the Office of Science and Technology or other organizations, will be coordinated with the Office of Science and Technology by the RDTT. The Office of Science and Technology will provide prompt progress and results reports of its LLW R&D projects for dissemination within the LLW management program.

d. Interface with Office of Nuclear Material and Facility Stabilization

The LLWMTG will interface with the Office of Nuclear Material and Facility Stabilization (EM-60) in the same capacity as present, but with an emphasis on volume/inventory projections of LLW. The interface will ensure that information on facilities being managed by Facility Stabilization that will be scheduled for decommissioning are appropriately considered in development of LLW projection guidance and methodologies.

e. Interface with Offices of Nuclear Energy, Defense Programs, and Energy Research

The LLWMTG will interface with the Offices of Nuclear Energy (NE), Defense Programs (DP), and Energy Research (ER) in the same capacity as present, but with an emphasis on waste generation and volume/inventory projections of LLW. The interface will ensure that any changes to requirements or guidance for LLW waste generators is reviewed by these offices, and information on generation of LLW from programs managed by NE, DP, and ER is appropriately considered in development of LLW projection guidance and methodologies.

f. Interface with Nuclear Regulatory Commission and Environmental Protection Agency

The US Nuclear Regulatory Commission (NRC) and the US Environmental Protection Agency (EPA) are the two most important Federal agencies for the Department to interact with concerning the standards and regulations pertaining to management of LLW. Representatives of NRC and EPA are on the PRP, and an attempt to expand their roles will be made if additional assistance on coordination or review of PAs becomes necessary. The existing interfaces with NRC and EPA on reviews of documents prepared by the two agencies will be continued under the management of the LLWMTG. This includes proposed environmental standards, rules, and regulatory guidance. The LLWMTG will continue to keep abreast of the standards development affecting the disposal of DOE LLW, and developments in regulations and guidance affecting the commercial disposal of LLW through this interface.

C. Task Initiatives

The following task initiatives provide for orderly management and tracking of the commitments made in this Implementation Plan, and for reporting of progress to the Board.

1. Project Management Plan

a. Description: The Project Management Plan (PjMP) will be updated to manage the task initiatives and commitments described in this Implementation Plan. The PjMP will contain: detailed schedules and assignments and responsibilities for tasks; the duties, responsibilities, and qualifications for individuals accomplishing initiatives; reporting requirements for individual tasks; other requirements for effective completion; and a description of progress tracking on tasks.

b. Milestone: Update Project Management Plan (PjMP).

c. Due Date: June 30, 1996.

d. Responsibility: The Low-Level Waste Management Task Group.

2. Quarterly Progress Reports

a. Description: The LLWMTG will establish a regular report format and provide quarterly reports to the Board on progress on the commitments described in this Implementation Plan. The report will also be furnished to the Low-Level Waste Executive Management Group and DOE field organizations.

b. Milestone: Prepare quarterly progress reports.

c. Due Date: 30 days after the end of each calendar year quarter.

d. Responsibility: The Low-Level Waste Management Task Group.

IV. SYSTEMS ENGINEERING FOR THE LOW-LEVEL WASTE PROGRAM

A. Discussion

A systems engineering approach will be used to integrate the low-level waste program across the complex. This approach will ensure improvements to current LLW activities are well-structured and satisfy LLW system requirements.

The approach will document LLW system requirements and functions and identify the need for any additional requirements and functions necessary to integrate the program and accomplish the mission. A system description that fully defines the integrated program will be developed to establish a basis for program planning documents. The systems engineering approach will include site systems engineering activities and processes necessary to measure LLW system performance. A study will be conducted to evaluate the safety merits and demerits of privatizing LLW disposal as one scenario for process improvement.

1. Approach

The systems engineering approach for the low-level waste program follows the process illustrated in Figure IV.1. The mission and program strategies of the LLW program and existing requirements are inputs to the systems engineering process. The process includes analysis of LLW program functions and requirements, identification of any additional functions and requirements needed to integrate the program, and development of program interfaces and performance measures. The resulting system description will provide the scope baseline for the LLW program. The baseline and a strategy for integrating the LLW program will be incorporated in a program management plan. This plan will establish program responsibilities, processes, and milestones necessary to achieve an integrated program. Site participation in this process will be used to integrate system engineering and management activities across the complex. A program for periodic system reassessments to maintain the LLW improvement process will be defined.

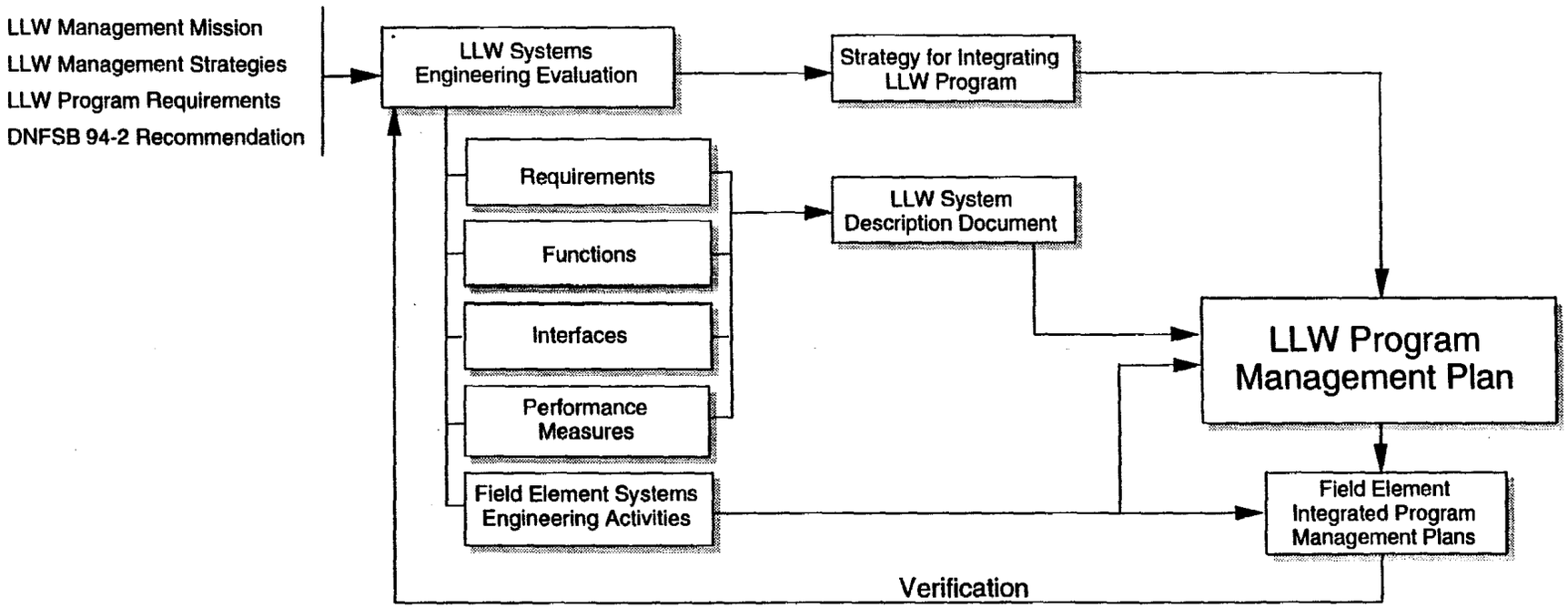

Figure IV.1: Systems Engineering Approach for LLW Management

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B. Task Initiatives

The following documents are products of the systems engineering process and will form the foundation of a newly integrated LLW program.

1. Systems Engineering Evaluation

a. Description: The Department will complete and document a systems engineering evaluation to accomplish the mission of the LLW program by identifying the key technical and programmatic functions of the program, describing the input and output requirements and constraints for these functions, and establishing the criteria for effectively determining system performance. This will provide the technical basis for management of LLW, and the baseline inputs to focus the inquiries to be conducted in the Complex-Wide Review.

b. Milestone: Prepare DOE LLW management system engineering evaluation report.

c. Due Date: June 30, 1995 (completed).

d. Responsibility: Low-Level Waste Management Task Group.

2. Low-Level Waste Program Requirements Document

a. Description: The Department will compile and document LLW program system requirements including goals and assumptions. This will establish the bases for functional analysis which will provide the crosswalk between system requirements and system functions.

b. Milestone: Prepare LLW program requirements document.

c. Due Date: April 30, 1996.

d. Responsibility: Low-Level Waste Management Task Group.

3. Low-Level Waste System Description Document

a. Description: The Department will analyze the requirements to determine what functions (activities) are necessary to accomplish the requirements and identify any additional requirements and functions needed to integrate the program. The focus will be on the major functions and interfaces in the LLW management system: generation, treatment, storage, and disposal. Results of this functional analysis will be documented in the LLW System Description Document.

The functional analysis will:

- establish program functions;
- allocate (assign) the system requirements, goals, and assumptions to the functions;
- establish performance measures for the requirements;
- establish system boundaries (define what is and what is not part of the LLW program system);
- define the interactions between functions within the LLW program and between the LLW program and other Departmental programs; and
- identify program risks.

b. Milestone: Prepare LLW system description document.

c. Due Date: September 30, 1996.

d. Responsibility: Low-Level Waste Management Task Group.

4. Evaluation of Privatization

a. Description: A study will be performed to evaluate the safety merits and demerits of using privately operated (non-LLW compact) facilities for the disposal of DOE LLW. The study will identify the safety issues associated with waste disposal in seven functional areas (siting, design, operations, closure, waste form, performance assessment, and approval and oversight) and establish criteria (e.g., reduced risk to the public) for determining when disposal at a private facility is desirable from a safety perspective. The study will use a systems approach by considering safety issues not only at a facility

level but also at the site and complex-wide levels. The study will also consider significant differences in sites such as hydrology ("dry" versus "wet"). The results of this study will then be used to establish guidelines for sites to use when considering disposal options.

b. Milestone: Prepare privatization guidelines.

c. Due Date: September 30, 1996.

d. Responsibility: Low-Level Waste Management Task Group.

5. Low-Level Waste Program Management Plan

a. Description: The Department will prepare and maintain a Program Management Plan. Based on the programmatic strategies, results of the Complex-Wide Review, and the system description document. The Program Management Plan will:

- establish the programmatic strategies, policy initiatives, and assumptions for achieving the complex-wide integrated LLW program;
- describe the near-term and longer term actions, milestones and responsibilities necessary to achieve the desired future state of the LLW program;
- identify the key management interfaces, organizational structure, and the appropriate divisions of roles and responsibilities between DOE Headquarters and Field Elements; and
- define the process for assessing the LLW program effectiveness.

b. Milestone: Prepare LLW Program Management Plan.

c. Due Date: March 31, 1997.

d. Responsibility: Low-Level Waste Management Task Group.

6. Complex-Wide Review Action Plans

The Complex-Wide Review described in Section V will serve as a baseline for future assessments of site activities. Results from this review that impact the integrated program will be incorporated into the systems engineering process. Action plans to address vulnerabilities identified by the review will be prepared as follows.

a.1 Description: A complex-wide corrective action plan will be prepared to correct the vulnerabilities common across the complex.

b.1 Milestone: Prepare initial complex-wide corrective action plan.

c.1 Due Date: July 31, 1996.

d.1 Responsibility: Low-Level Waste Management Task Group.

a.2 Description: Site-specific corrective action plans will be prepared and constitute the initial site improvement activities.

b.2 Milestone: Prepare initial site-specific corrective action plans.

c.2 Due Date: July 31, 1996.

d.2 Responsibility: Field Office Assistant Managers for Environmental Management.

V. COMPLEX-WIDE REVIEW

A. Discussion

The Department will conduct a complex-wide review to identify vulnerabilities associated with its management of LLW. The review also will include consideration of mixed LLW from the perspective of it being a radioactive waste. The focus of the vulnerability assessment will be on the active and planned LLW treatment, storage, and disposal facilities, programs, and activities at DOE sites. The assessment will also include in its scope the potential for interacting source terms from inactive and closed LLW disposal sites and spills. Inactive LLW management sites that do not have the potential to interact with active or planned LLW facilities and which are currently being characterized for remediation or actively remediated will not be evaluated further. Assessment of these remediation activities is not expected to contribute to the overall understanding of vulnerabilities in DOE's LLW management activities and could interfere with progress of remediation efforts.

1. Organization

Overall guidance for conducting the Complex-Wide Review task is provided by the Office of Waste Management (EM-30). The Complex-Wide Review comprises three sets of individuals that will be directed and coordinated by the Complex-Wide Review Task Manager and Deputy Task Manager: the Assessment Working Group; the Site Assessment Teams; and the Working Group Assessment Teams. Figure V.1 shows the organization for implementing the complex-wide review.

The Assessment Working Group, which consists of DOE Headquarters and Field Office staff knowledgeable of DOE LLW management activities, will develop the assessment methodology and evaluation instruments for the review. This group will establish the concepts, definitions, guidance, procedures, and evaluation criteria for conducting the complex-wide review.

At each site, Site Assessment Teams, or their equivalent, consisting of DOE Field Office and site contractor personnel cognizant of LLW management activities at the site, will be established. These teams will review and collect documents and information, check for accuracy and completeness, and respond to the Site Evaluation Surveys. The Site Assessment Teams will also support the Working Group Assessment Teams that visit and/or assess the sites to facilitate a thorough and accurate review of the site's LLW management activities.

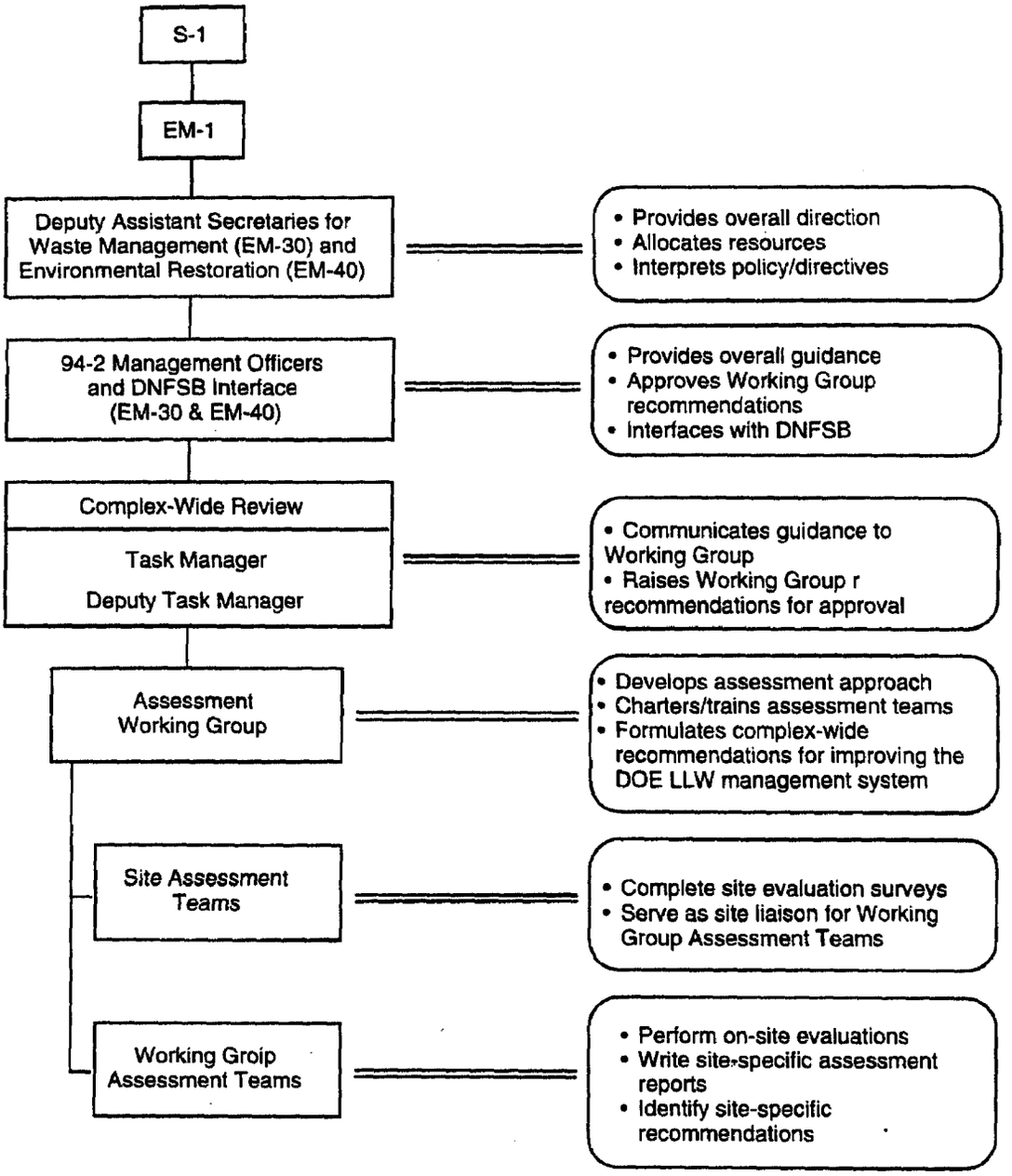

Figure V.1: Complex-Wide Review Organization and Responsibilities

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The Assessment Working Group will select the Working Group Assessment Teams members based on their knowledge of and experience in LLW management. The Working Group Assessment Teams, lead by DOE Headquarters or Field Office personnel, will evaluate the LLW management programs and activities at each site, identify site-specific vulnerabilities, and participate in the identification, categorization, and classification of complex-wide vulnerabilities.

2. Scope

For the purposes of the complex-wide review, the DOE LLW management system has been defined to include programs and activities related to the management of LLW and mixed LLW from the point of its initial generation up to and including its final disposal, and any storage, treatment, or other management activities that could occur along the way. However, transportation will not be addressed. Most transportation is regulated by the Department of Transportation under the same regulations as commercial LLW transportation activities and would not present any findings unique to the DOE LLW management system. Therefore, transportation activities will be specifically excluded from this assessment and are considered outside the scope of the complex-wide review.

3. Objective

In accordance with the recommendations of the DNFSB, DOE's objective for the complex-wide review will be to establish the dimensions of problems within DOE's LLW management system. Key to this objective is identification of the problems in a manner that will support the identification and planning of integrated corrective actions to address safe disposition of past, present, and future volumes of LLW across the DOE complex.

DOE will structure the complex-wide review to identify site-specific vulnerabilities in the LLW management programs at the DOE sites that manage the greatest volume of DOE's LLW, as well as vulnerabilities in the DOE-wide LLW management system. The vulnerability assessment will focus, therefore, on identification of both programmatic and physical vulnerabilities at the site-specific and complex-wide level. A vulnerability, for the purposes of the complex-wide review, is defined as any conditions or weaknesses, or combinations thereof, in the LLW management programs and activities at DOE sites that could lead to unnecessary radiation exposure of workers or the public, or unnecessary release of radioactive material to the environment. Additionally, the review will consider the potential impacts of waste management programs and activities upon the ultimate performance of a LLW disposal facility.

4. Approach

The complex-wide review is to identify both programmatic and physical vulnerabilities at the site-specific and the complex-wide levels. To accomplish this, the two main components of the complex-wide review methodology are: (1) site-specific assessments and identification of site-specific vulnerabilities and (2) review of the site-specific vulnerabilities to identify cross-cutting and programmatic issues either inherent to or endemic in DOE's complex-wide LLW management system.

The site-specific assessment methodology involves a systematic collection and review of existing data and reports concerning each site's LLW management programs and activities. One of the key elements of the site assessment methodology is to maximize the use of existing information concerning the status of each site's LLW management programs and activities. Existing documents that will be used as sources for this information include annual site reports, program overviews, system overview reports, and databases maintained by DOE's Office of Environment, Safety and Health (EH) for tracking occurrence reports, notices of violation, and regulatory compliance audit findings.

A LLW-specific survey instrument, the Site Evaluation Survey, will be completed by each of the sites being assessed. Using the Site Evaluation Survey, Site Assessment Teams will systematically gather and report additional information about each site's LLW active, planned, or inactive treatment, storage, and disposal facilities, and information concerning the generators and waste streams generated at each site.

The collected background and overview information and responses to the Site Evaluation Survey will be combined into an overall description of each site's LLW management programs and activities. These data will then be reviewed by the Sites for factual accuracy and completeness, and used to form the basis of the site-specific assessments.

A Working Group Assessment Team will use the site data along with guidance prepared by the Assessment Working Group concerning scope, lines of inquiry, and vulnerability identification, to develop a site-specific assessment plan. Each of the Working Group Assessment Teams will comprise a DOE employee as team leader and four to seven DOE and contractor personnel who are independent of the site being assessed. The collective knowledge and experience of the members of the Working Group Assessment Team will reflect the areas appropriate to each site's specific LLW management programs and activities, including but not limited to: management and oversight; waste characterization and packaging; performance assessment and site characterization; design and construction; operations and maintenance, including worker radiation protection; and environmental restoration.

Each site-specific assessment will employ a combination of programmatic reviews and walk-down inspections of physical facilities, operations, and LLW management activities. The Working Group Assessment Teams will identify concerns within the LLW management

programs and activities that may constitute weaknesses or conditions that could result in unnecessary radiation exposures or releases, and thus be vulnerabilities. For the purposes of the complex-wide review, a weakness or condition is defined as "any as-found state, whether or not resulting from an event, that may have adverse safety, health, quality assurance, security, operational or environmental implications." In addition, the potential impacts of waste management programs and activities on the ultimate performance of a LLW disposal facility will be evaluated as an intermediary vulnerability target.

Once a weakness or condition is identified, the Working Group Assessment Teams will use Vulnerability Assessment Forms as the basis for determining if a vulnerability exists and to facilitate categorization and classification of the vulnerability. Uniformity and consistency of information collected and evaluated among sites will be enhanced by ensuring that Assessment Working Group and Working Group Assessment Team members and the site being assessed have a clear understanding of the scope and evaluation methodology to be employed during the assessment.

5. Methodology

Site Selection: There are currently 38 DOE-owned or operated facilities (Table V-1) at 36 sites within the DOE complex (Figure V.2) that manage LLW. Currently, LLW is being disposed at 6 DOE sites:

- Hanford Site,
- Idaho National Engineering Laboratory,
- Los Alamos National Laboratory,
- Nevada Test Site,
- Oak Ridge Reservation, and
- Savannah River Site.

These sites also account for the majority of LLW treatment and storage activities within the DOE LLW management system. These six sites, plus the Fernald Environmental Restoration Management Project and Rocky Flats Environmental Technology Site manage about 80% of the LLW currently being managed in the DOE system and expected to be generated over the next 20 years.

The primary scope of the complex-wide review will cover the generation, treatment, storage, and disposal programs, planning, and activities at these eight sites. The remaining 28 identified DOE sites account for approximately 20% of current and future DOE LLW management activities. These remaining 28 sites will initially be evaluated through a review of available site information including occurrence reports, audit and assessment reports, site surveys, and interviews with DOE Headquarters, DOE field and contractor LLW management personnel. However, on-site assessments will not be conducted at these remaining sites unless information identified in the initial reviews warrants further investigation. Table V-1 lists the eight primary sites and the other 28 sites that are included in the complex-wide review.

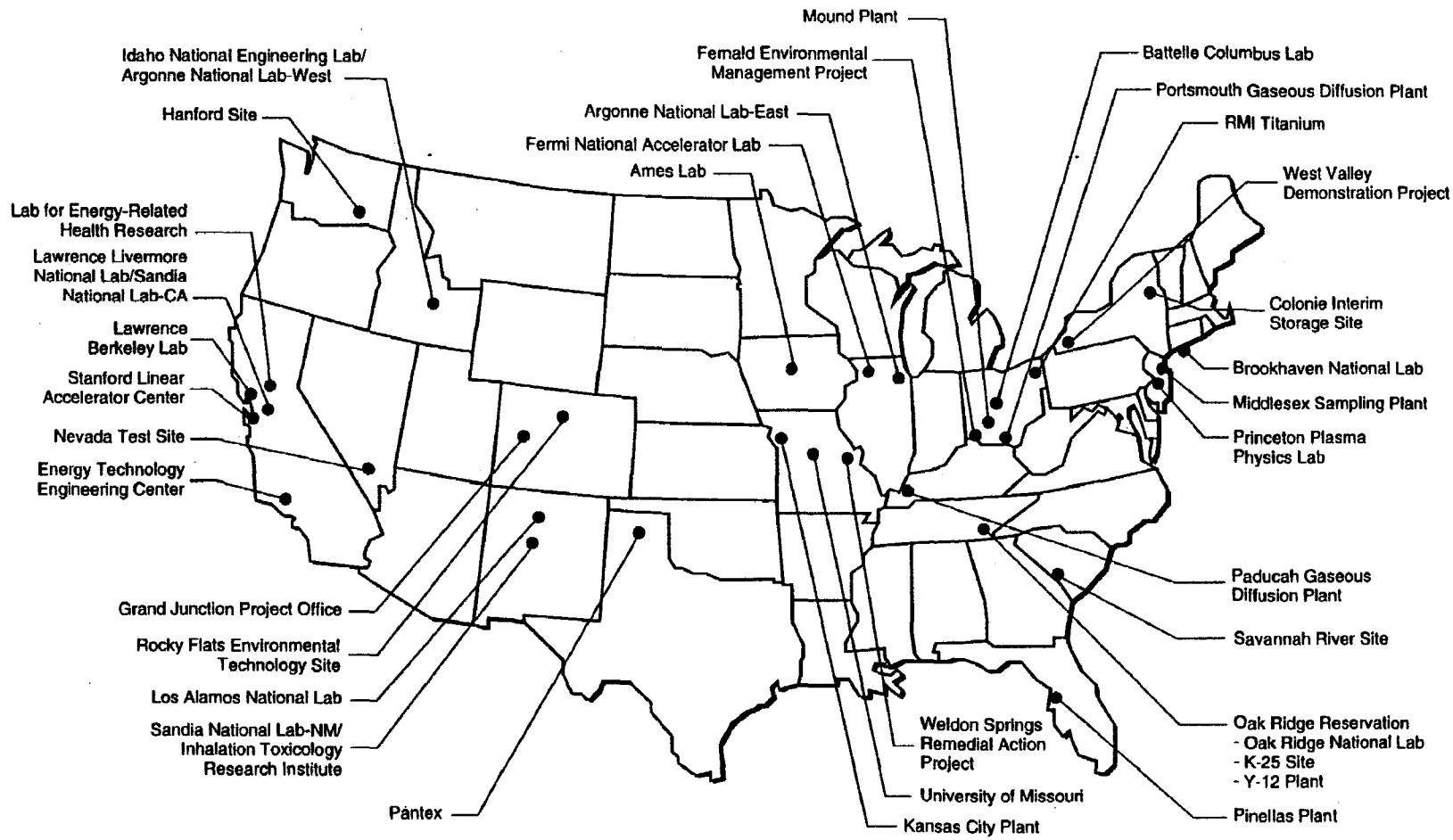

Figure V.2: DOE Sites Involved with Low-Level Waste Management

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Table V-1: Sites Included in the Complex-Wide Review

Primary Waste Management Sites

Fernald Environmental Management Project	Nevada Test Site
Hanford Site	Oak Ridge Reservation
Idaho National Engineering Laboratory	Rocky Flats Environmental Technology Site
Los Alamos National Laboratory	Savannah River Site

Remaining Waste Management Sites

Ames Laboratory	Middlesex Sampling Plant
Argonne National Laboratory-East	Mound Plant
Argonne National Laboratory-West	Pantex
Battelle Columbus Laboratory	Paducah Gaseous Diffusion Plant
Brookhaven National Laboratory	Pinellas Plant
Colonie Interim Storage Site	Portsmouth Gaseous Diff. Plant
Energy Technology Research Center	Princeton Plasma Physics Laboratory
Fermi National Accelerator Laboratory	RMI Titanium
Grand Junction Project Office	Sandia National Laboratory-California
Inhalation Toxicology Research Institute	Sandia National Laboratory-New Mexico
Kansas City Plant	Stanford Linear Accelerator Center
Lab for Energy-Related Health Research	Weldon Spring Remedial Action Project
Lawrence Berkeley Laboratory	West Valley Demonstration Project
Lawrence Livermore National Laboratory	University of Missouri

Assessment Criteria: The initial entry for each Working Group Assessment Team into the site-specific assessments will be at the level of each site's waste program elements and activities. This will be followed by facility walk-downs, inspections, and personnel interviews, as appropriate. The waste program elements and activities that comprise the LLW management system, as used in the complex-wide review, are listed below:

System Component	Waste Program Elements/Activities
Generation	Management/oversight program Waste stream identification Waste minimization Waste characterization Conformance with waste acceptance criteria (WAC) for treatment, storage, or disposal Waste stream certification Waste packaging As low as reasonably achievable (ALARA) considerations Accumulation Tracking of waste in LLW management system Waste Forecasting/Projections Design/Process Modification Activities
Treatment	Management/oversight program

	Storage conditions Facility WAC establishment and maintenance Conformance with WAC for storage or disposal Tracking of waste in LLW management system Waste certification program Waste packaging ALARA considerations Facility closure/decontamination and decommissioning
Storage	Management/oversight program Storage conditions Facility WAC establishment and maintenance Conformance with WAC for treatment or disposal Tracking of waste in LLW management system Waste certification program Waste packaging ALARA considerations Facility closure/decontamination and decommissioning
Disposal	Management/oversight program Performance assessment Definition of disposal system Site characterization Identification of uncertainties/assumptions Interacting source terms Source terms for past, present, and future wastes Facility WAC establishment and maintenance PA basis for WAC PA maintained Waste certification Waste packaging Waste handling conditions Disposal conditions Tracking of waste in LLW management system Conformance with performance objectives Closure requirements identified/planning Post closure verification/maintenance Environmental monitoring ALARA considerations

At the programmatic level, Working Group Assessment Teams will identify weaknesses or conditions by answering a series of questions concerning whether the LLW management programs at the site being assessed are formalized, implemented, and capable of identifying and correcting problems. The following questions were developed as high-level programmatic lines of inquiry for this purpose (See Figure V.3):

- Are there formalized requirements to control the program activities?
- Are the formalized requirements being implemented?
- Is the implementation of the formalized requirements being reviewed on a periodic basis (e.g., audits, inspections, etc)?

- Is there a corrective action program, where appropriate?
- If there is, is the corrective action program effective?
- Are there other weaknesses and conditions or concerns that should be evaluated (e.g., combinations)?

If the results of each line of inquiry for a particular program are favorable, and assessments of relevant facilities, buildings, or operations do not identify any contra-indications, then the relevant program elements may be considered satisfactory. However, if any of the lines of inquiry lead to the discovery of a weakness or condition, then further review may be necessary using the vulnerability categorization and classification process to determine if a vulnerability exists. Additionally, the continued presence of a concern relative to potential radiation exposures or releases, even if all of the lines of inquiry have been adequately addressed, could lead the Working Group Assessment Team to the conclusion that a weakness or condition exists for other programmatic reasons, or that, in conjunction with other weaknesses or conditions, a vulnerability exists.

For both the programmatic and physical concerns identified above, two further considerations will be applied in determining whether or not a weakness or condition exists, and whether a weakness or condition should be classified as a vulnerability. First, could the weakness or condition lead to a serious incident requiring the development and implementation of a mitigative measure? Second, is there adequate and documented justification that the concern has been addressed or otherwise shown to have little or no potential for impacting worker health and safety, the public, the environment, or performance of the disposal facility?

Vulnerability Categorization and Classification: As described above, once a weakness or condition is identified, the Working Group Assessment Teams will use the Vulnerability Assessment Form as the basis for determining if a vulnerability exists and to facilitate categorization and classification of the vulnerability.

The Vulnerability Assessment Form will provide a logical organization of information concerning weaknesses, conditions, or combinations thereof, and will promote understanding of the categories and classification of the vulnerabilities. Data, observations, and descriptions of the conditions or weaknesses will be categorized on the Vulnerability Assessment Form in terms of their:

- Physical nature (material, packaging, barrier, facility)
- Relevant lines of inquiry (requirements, implementation, corrective action)
- Programmatic or discipline basis (management and oversight, waste characterization and packaging, performance assessment and site characterization, design and construction, operations and maintenance, including worker radiation protection, and environmental restoration).

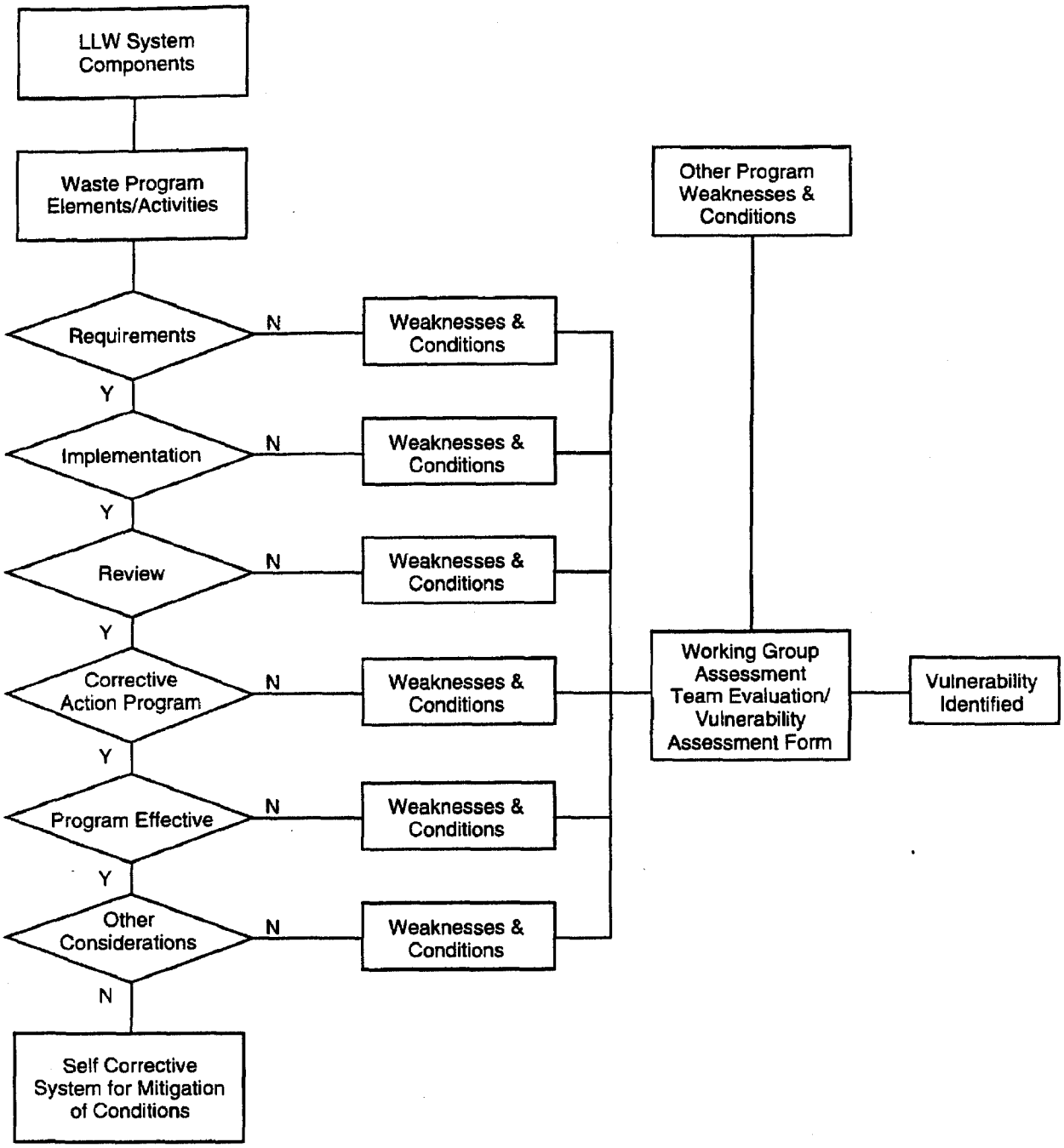

Figure V.3: Complex-Wide Review Programmatic Lines of Inquiry

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Once vulnerabilities are identified, they will be classified on the Vulnerability Assessment Form in accordance with the following three steps:

1) First, the weaknesses or conditions creating the vulnerability will be grouped based on the receptor (i.e., public, worker, environment, and/or disposal facility performance) and a credible scenario will be postulated, describing the logical chain of events that would result in an impact to the target or receptor.

2) Second, the weaknesses or conditions creating the vulnerability will be evaluated based on the likelihood of the potential consequences posed by each weakness or condition.

3) Finally, the weaknesses or conditions creating the vulnerability will be evaluated based on an assessment of their potential impacts to the receptors and targets.

The severity of a potential impact or likelihood of occurrence depends on a number of parameters, including the radionuclides, waste form, volume of the material at risk, and the postulated circumstances of the exposure or release event. Working Group Assessment Teams will document their justifications for critical assumptions or parameters in the estimates on the Vulnerability Assessment Forms. Matrices adapted from the "Risks and Risk Debate: Searching for Common Ground, The First Step," Volume 1 Report, June 1995, will be used to identify a final risk classification (High, Medium, or Low) for each vulnerability.

Identification of Complex-Wide Vulnerabilities: Each of the Working Group Assessment Teams will identify vulnerabilities in DOE's site-specific LLW management activities through the site-specific assessments. Once identified, the site-specific vulnerabilities will be categorized into their functional areas, given a qualitative risk classification, and used as the basis for determining the complex-wide vulnerabilities.

To identify complex-wide vulnerabilities, the Assessment Working Group will group site-specific vulnerabilities from all the assessments by the operation or facility type affected by the vulnerabilities and the program line-of-inquiry which led to identification of the vulnerabilities.

The Assessment Working Group will analyze these groupings of vulnerabilities to identify trends and common causes among the site-specific vulnerabilities. In so doing, the Assessment Working Group will identify complex-wide vulnerabilities based on the contributing causes and programmatic origins of each and trend among the site-specific vulnerabilities.

B. Task Initiatives

1. Establish Review Organization and Management

a. Description: The Assessment Working Group members are selected to develop the complex-wide review process. The Assessment Working Group identifies and selects the Working Group Assessment Teams to perform evaluations of the 38 facilities.

b. Milestone: Individuals to staff the Assessment Working Group and Working Group Assessment Teams are assigned.

c. Due Date: February 29, 1996 (completed).

d. Responsibility: Complex-wide review task manager.

2. Conduct Site Evaluation Surveys

a. Description: LLW sites to be surveyed are identified and a survey instrument is prepared. Individuals are trained on survey contents and survey methods, and perform surveys at their sites, beginning June 1, 1995.

b. Milestone: Site surveys are completed, with any requested additional documentation, and returned to the Assessment Working Group for review.

c. Due Date: November 30, 1995 (completed).

d. Responsibility: Site Assessment Teams or their equivalent.

3. Conduct Independent Assessments

a. Description: The 38 facilities that manage LLW receive an independent evaluation of LLW management activities to identify vulnerabilities.

b. Milestone: Independent evaluations are completed for the 38 facilities and an assessment report for these sites is issued.

c. Due Date: Preliminary Report - April 12, 1996 (completed),
Final Report - May 17, 1996.

d. Responsibility: Assessment Working Group.

VI. DOE REGULATORY STRUCTURE AND PROCESS

A. Discussion

Disposal of low-level radioactive waste is conducted under the requirements in Order DOE 5820.2A Radioactive Waste Management, and other orders and regulations pertaining to the protection of the health and safety of workers, the public, and the environment. The Board has pointed out several problems that can be traced back directly to the regulations and Orders promulgated by DOE to control waste management and to protect the public health and safety, or to lack of effective enforcement of those requirements. Several of these problems were also identified by the DOE Technical Working Group that prepared a draft revision of the Low-Level Waste Chapter of Order DOE 5820.2A. Among the problems identified by the Board and the Technical Working Group were:

- Performance assessments required by Order DOE 5820.2A, issued in 1988 and immediately effective, have not been completed for most DOE disposal sites,
- The applicability of Order DOE 5820.2A performance objectives only to waste disposed of after September 1988,
- Order DOE 5820.2A does not provide adequate coverage of storage,
- Waste packaging requirements in Order DOE 5820.2A are not comparable to commercial requirements, and
- Until the PAs are completed, other requirements of Order DOE 5820.2A, such as development of waste acceptance criteria based on PA results and monitoring to ensure that the PA results are being met, cannot be fully completed.

Solutions to these and other problems are recognized by the Department as being important to the safe management of LLW. The problems may be traced, in part, back to the lack of an effective enforcement system to ensure that requirements are met as well as the general nature of the requirements themselves, the lack of formal guidance that defines acceptable ways to meet the requirements, and the lack of procedures for review and approval of PAs.

These deficiencies were to be addressed in the revision of Order DOE 5820.2A. When the original Implementation Plan was developed, the Order was scheduled to be revised by summer of 1995, and the tasks in the original Implementation Plan were structured around providing immediate short-term policies needed while the Order was being finalized. As noted below, Order revision efforts are still underway with a milestone of February 1997 to

have the draft revised Order prepared for comment. Thus, the task initiatives in this section are now intended and designed to support the Order revision effort and schedule. The initiatives will provide the essential LLW requirements for the Low-Level Waste Chapter of Order DOE 435.1 (the replacement for Order DOE 5820.2A), the technical basis supporting these requirements, and guidance for its implementation.

Improvements in the Department's LLW regulatory process specifically dealing with conducting, reviewing, and approving disposal facility performance assessments and composite analyses, are being undertaken in the near-term. These task initiatives are described in Section VII, "Radiological Assessments," of this Implementation Plan. Section VII also discusses the implementation of the Department's pending requirements contained in 10 CFR 834, Radiation Protection of the Public and the Environment, as it relates to the disposal facilities and the radiological assessments to be conducted. Results of the task initiatives conducted under the Radiological Assessments section are to be appropriately factored into the development of the revised Order and its associated guidance and implementation documentation.

This section describes actions to improve, for the long-term, the regulatory framework that controls LLW management. Task initiatives are described so that improvements will be achieved in all four of the tiers of the hierarchy of the DOE Directives System: Policy, Requirements, Guidance, and Technical Standards. These improvements will become the Low-Level Waste Chapter of Order DOE 435.1 and its associated implementation documentation.

The Department has issued a policy to include pre-1988 LLW and other sources of radioactivity in performance assessments for LLW disposal facilities. The Department has also issued an interim policy defining the roles and responsibilities of various Headquarters and field elements for implementing, overseeing and approving LLW disposal facility performance assessments. A clarification to these two policies will be issued to make them consistent with the conduct of the radiological assessments and composite analyses which are described in Section VII. This Implementation Plan calls for additional policies to address the applicability of Order DOE 5820.2A to operating and planned disposal facilities, including those developed for LLW resulting from actions under CERCLA and RCRA.

The Department will undertake a process, parallel to the process to be undertaken for other radioactive waste types, for identifying, and developing detailed essential requirements for the management of LLW. The essential requirements are to be provided to the effort for revising Order DOE 5820.2A, which will become Order DOE 435.1. A cornerstone of this effort will be development of technical bases for the essential LLW requirements identified.

The Department has initiated a systems engineering analysis and complex-wide review to determine needs and parameters for more comprehensive policies, requirements, and

guidance. A review of commercial LLW requirements has been completed, and a review of selected international LLW requirements will be completed. All of these activities will provide important inputs and data to form the technical bases for the needed improvements in the requirements and guidance for LLW management. As noted above, the approach for conducting radiological assessments and composite analyses described in Section VII will be included in the essential requirements and implementing guidance where appropriate.

Implementation guidance to support the essential LLW requirements will be prepared. The implementation guidance will reference existing technical standards or cite development of new standards, as appropriate.

The Department's regulatory framework for LLW management when the Recommendation 94-2 was issued, the near-term improvements to the framework which will be achieved by task initiatives described in both this section and Section VII, and the regulatory framework which will be implemented when all Recommendation 94-2 Implementation Plan activities are completed is presented in Figure VI.1.

B. Task Initiatives

A series of tasks have been defined to provide a means of organizing and then tracking and controlling activities planned to improve the regulatory framework for LLW management to be more consistent or equivalent with commercial and international standards and requirements, as appropriate. The tasks are organized according to the four tiers of the DOE Directives System to illustrate the levels of improvements that will be made to the Department's LLW regulatory structure and process. In addition, a task initiative describes improvements to the review, approval, and oversight of LLW disposal facility radiological assessments, the results of which will be included in revised Order DOE 435.1.

POLICIES

1. Clarify issued policy on pre-1988 source term and composite plumes;

2. Clarify issued policy to strengthen regulatory structure;

3. Clarify applicability of Order DOE 5820.2A to CERCLA and RCRA disposal sites;

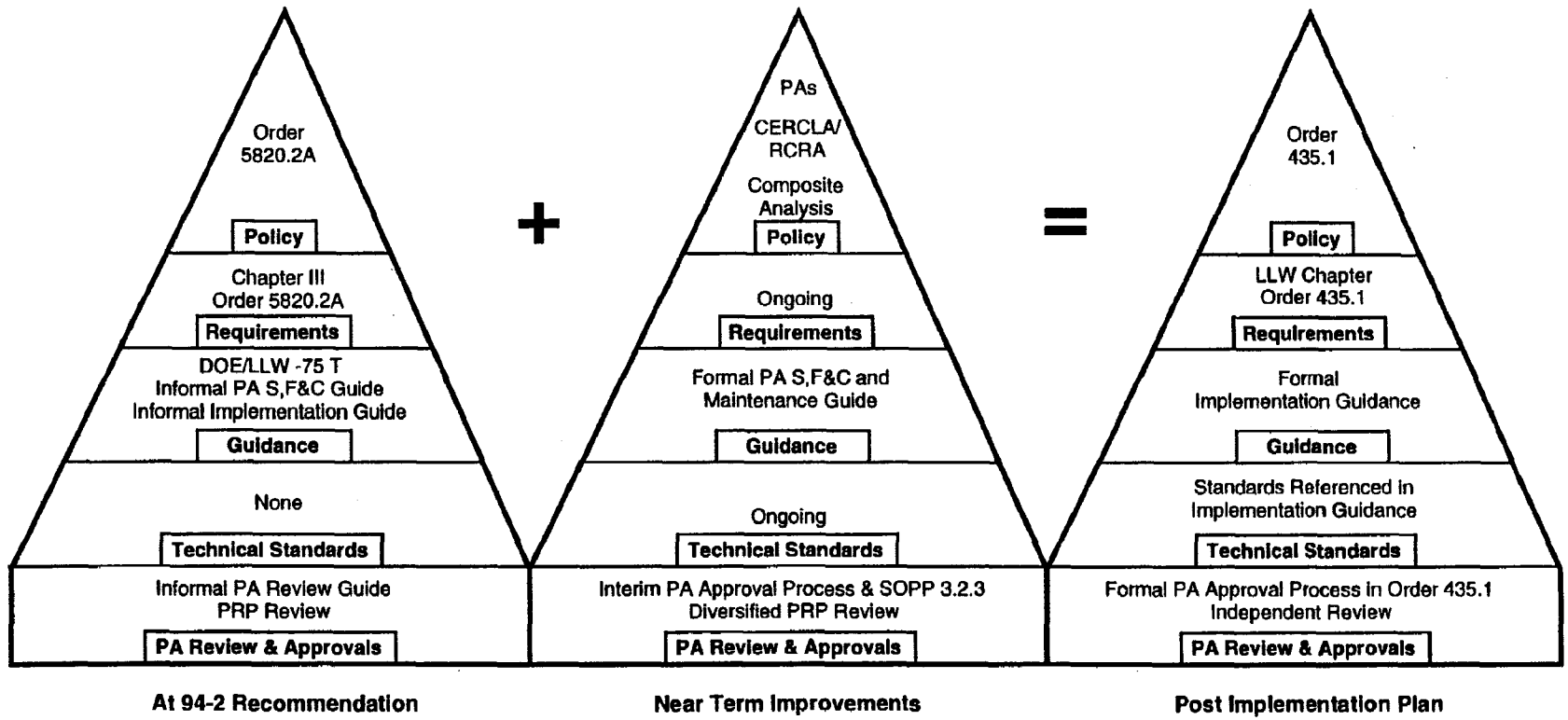

Figure VI.1: DOE Regulatory Framework Improvements

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LLW REQUIREMENTS

4. Review commercial and international standards and requirements and compare to DOE standards and requirements;

5. Identify essential requirements for managing LLW (for Order revision);

IMPLEMENTATION GUIDANCE / TECHNICAL STANDARD DEVELOPMENT

6. Develop implementation guidance for managing LLW (for Order revision);

RADIOLOGICAL ASSESSMENT APPROVAL PROCESS

7. Improve radiological assessment review and approval process; include in Order revision.

For each task, a brief description is provided, along with information on process, decision criteria where needed, and interfaces with other aspects of the Implementation Plan. For each task, a product is identified.

1. Directive to include pre-1988 source term and composite plumes.

a. Description: Issue an Office of Waste Management directive on inclusion of pre-1988 waste and consideration of other sources of radioactive contamination. Require sites to submit revised schedules by April 1996 for revised PAs which will include pre-1988 waste and other sources of contamination. Further discussion of the inclusion of all sources in PAs is in Section VII.

b. Milestone: Issue directive.

c. Due Date: May 31, 1995 (completed).

d. Responsibility: LLW Management Task Group and the Office of Waste Management (EM-30).

2. Develop and issue policy to clarify and strengthen low-level waste management regulatory structure

a.1 Description: The Department will specifically define the roles and responsibilities of various Headquarters and field elements for implementing, overseeing, and approving key LLW management requirements. The responsibilities for regulatory oversight and enforcement within DOE will be identified; these responsibilities are to be independent from the Deputy Assistant Secretary responsible for executing LLW program activities. Field elements will be required to commit to implementation of interim and future implementation guidance and technical standards as they are developed, adopted, and approved, as well as existing DOE LLW management requirements. Consequences for non-compliance with requirements are to be clearly defined, including those conditions that could result in the shut-down of LLW management operations.

b.1 Milestone: Interim policy statement issued.

c.1 Due Date: July 21, 1995 (completed).

d.1 Responsibility: Prepared by the LLW Management Task Group in consultation with the Office of Environmental, Safety, and Health (EH) staff and issued by the Assistant Secretary for Environmental Management and the Assistant Secretary of Environment, Safety, and Health.

a.2 A revision to the interim policy will be issued that clarifies the policy on regulatory structure for LLW management and the policy to include pre-1988 LLW in performance assessments (see discussion above under task initiative 1). This clarification is needed due to the changes from the original IP in the approach being taken on development and review and approval of radiological assessments and composite analyses of contributing source terms (see Section VII).

Final policies and processes for radiological assessment review, approval, and oversight will be incorporated into the revision of the Order DOE on Radioactive Waste Management (See Task VI.B.7).

b.2 Milestone: Revised interim policy statement issued.

c.2 Due Date: July 31, 1996.

d.2 Responsibility: Prepared by the LLW Management Task Group in consultation with the Office of Environmental, Safety, and Health (EH) staff

and issued by the Assistant Secretary for Environmental Management and the Assistant Secretary of Environment, Safety, and Health.

3. Clarify applicability of Order DOE 5820.2A to sites subject to CERCLA and RCRA

a. Description: The Department will clarify the applicability of its LLW requirements to all operations involving LLW managed and disposed at RCRA and CERCLA sites. Recognizing that RCRA and CERCLA disposal and storage sites are also regulated by EPA and in some cases the states, a policy and guidance document will be developed to identify the applicable LLW requirements for such activities and specify actions necessary to demonstrate protection of human health consistent with the requirements of Order DOE 5820.2A. The policy and guidance will remain in effect until they are included in the revised Order DOE 435.1 and its implementation guidance.

b.1 Milestone: Policy and guidance document issued for CERCLA sites.

c.1 Due Date: May 31, 1996.

d.1 Responsibility: The policy and guidance will be developed by the Office of Environmental Restoration (EM-40) in consultation with the Office of Waste Management (EM-30) and the Office of Environment (EH-4). It will be issued by the Assistant Secretary for Environmental Management.

b.2 Milestone: Policy and guidance document issued for RCRA sites.

c.2 Due Date: December 31, 1996.

d.2 Responsibility: The policy and guidance will be developed by the Office of Environmental Restoration (EM-40) in consultation with the Office of Waste Management (EM-30) and the Office of Environment (EH-4). It will be issued by the Assistant Secretary for Environmental Management.

4. Review commercial and international standards and requirements and compare to DOE standards and requirements

a. Description: The Department has initiated a process to compare its requirements and standards for LLW management with similar non-DOE systems. The Department has completed a report comparing 10 CFR 61 and

Agreement State requirements plus license conditions and waste acceptance criteria with those of the Department. International efforts such as the IAEA RADWASS program are being considered, along with information specific to the LLW management programs in Canada, the United Kingdom, France, and Sweden in a second report. These deliverables are designed to provide primary inputs to the process for identifying essential LLW requirements, and guidance to implement the requirements for managing LLW.

b.1 Milestone: Report comparing DOE and non-DOE requirements and standards.

c.1 Due Date: Report completed December 29, 1995.

d.1 Responsibility: LLW Management Task Group.

b.2 Milestone: Report comparing DOE and international requirements and standards.

c.2 Due Date: June 30, 1996.

d.2 Responsibility: LLW Management Task Group.

5. Identify essential requirements for managing LLW

a. Description: The Department will undertake a process to identify essential requirements to be included in the Low-Level Waste Chapter of the revised Order on Radioactive Waste Management. The process that will be used will have the same major components as the process undertaken to revise the Order for the other waste types. Necessary documentation will be developed in time to support the schedule for the revision of the Order. Figure VI.2 illustrates the process to be used to identify essential LLW requirements. As shown, the results of the Complex-Wide Review and the evaluations of U.S. commercial and international requirements and standards are used as major parts of the identification process, as well as the functional analysis developed by the Systems Engineering of LLW. A major component of the process will be the development and documentation of the bases for any essential requirements to be incorporated into the Order revision.

b. Milestone: Report identifying essential LLW management requirements.

c. Due Date: February 28, 1997.

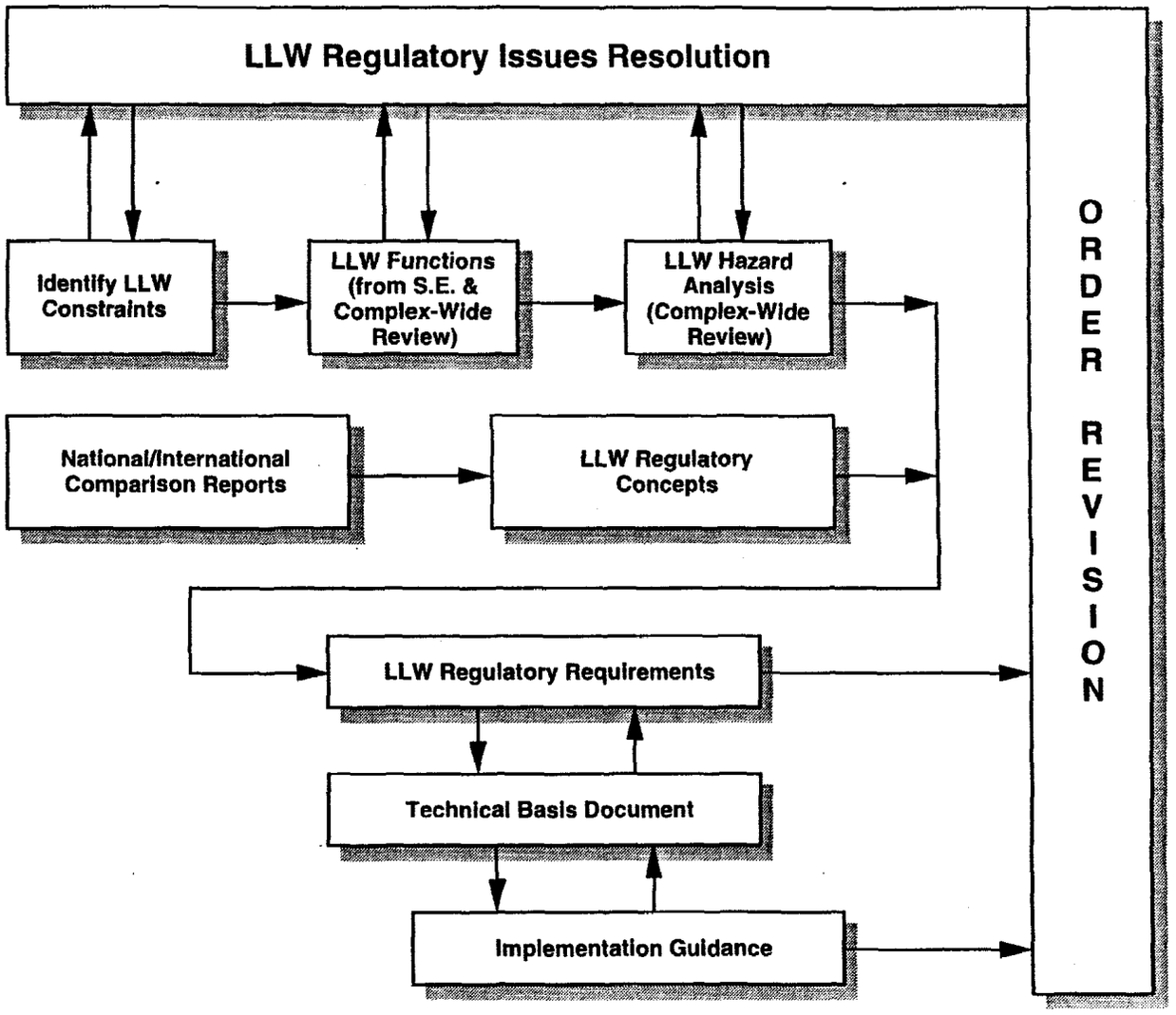

Figure VI.2: Process for Essential LLW Requirements Development

d. Responsibility: LLW Management Task Group in consultation with the Office of Environment (EH-4).

6. Develop implementation guidance for managing LLW

a. Description: As part of the identification and development of requirements for LLW management, implementation guidance will be developed, and necessary documentation will be provided in time to support the Radioactive Waste Management Order revision. Figure VI.2 illustrates the process which will be used to develop essential requirements and implementation guidance for LLW management.

The implementation guidance will reference existing technical standards or cite development of new standards to achieve consistency or equivalency with commercial/international standards, as appropriate. If necessary, any technical area that is judged to require the development of a Department of Energy Technical Standard will be identified as the implementation guidance is prepared.

The Department has identified a critical need for LLW program implementation guidance and technical standards for performance assessments and performance assessment maintenance because of their importance in safe management of DOE's LLW. Therefore, implementation guidance addressing PAs and PA maintenance is being issued in the short term under task initiative VII.4. The performance assessment guidance will be included or referenced as appropriate in the implementation guidance under this task initiative.

b. Milestone: Issue implementation guidance and technical standards to support essential LLW management requirements.

c. Due Date: February 28, 1997.

d. Responsibility: LLW Management Task Group.

7. Improve radiological assessment review and approval process

a. Description: The Department has formalized the LLW disposal facility performance assessment review process in Office of Waste Management (EM-30) Standard Operating Practices and Procedures 3.2.3. The Standard Operating Practices and Procedure defines the responsibilities and establishes the process for the Department's review and approval of performance

assessments. The formalized process described complies with requirements and functions in Order DOE 5820.2A, which authorizes the Deputy Assistant Secretary for Waste Management to approve PAs.

In this task initiative, the approval process for radiological assessments (i.e., performance assessments and composite analyses) will be formalized in order to make the process consistent with the commitments made in this Implementation Plan. This task will also evaluate the current structure of the PRP, evaluate alternatives, and recommend a process for diversification of the panel. This formalization will begin with the revised interim policy established under Task VI.B.2.

The Department will evaluate alternatives to clarify and strengthen the regulatory oversight and enforcement functions for LLW disposal facility performance assessments and composite analyses within DOE. Emphasis will be placed on independence of the oversight function from the Deputy Assistant Secretary for Waste Management, avoiding conflicts of interest, assuring that governmental decision making is not improperly delegated to contractor personnel, and providing adequate technical support to the decision maker. Organizational alternatives which might be considered could include specifying an existing organizational element, forming a new organizational element, or appointing either a permanent or ad hoc board or committee as the regulatory body responsible for approving performance assessments. The appropriate levels of administrative and technical review required of this DOE regulatory body will need to be determined to ensure a sufficiently critical examination of the performance assessments and supporting documentation and Peer Review Panel reports. The Secretarial task force responding to the Advisory Committee on External Regulation's recommendation is developing a response and an implementation plan to accompany their response, which will be completed in the summer of 1996. The formalization of the LLW disposal facility radiological assessment review and approval process will be developed and established to be consistent with the task force's implementation plan, and will become part of the Order revision for Radioactive Waste Management.

b. Milestone: Radiological assessment approval process modified and formally developed for inclusion in Radioactive Waste Management Order revision.

c. Due Date: February 28, 1997.

d. Responsibility: LLW Management Task Group, Office of Waste Management (EM-30), Assistant Secretary for Environmental Management (EM), Assistant Secretary for Environment, Safety, and Health (EH).

VII. RADIOLOGICAL ASSESSMENTS

A. Discussion

The Department of Energy manages LLW disposal facilities under two distinct sets of statutory requirements. Low-level waste disposal facilities constructed and operated for the receipt of laboratory and process facility waste, failed equipment, routinely generated waste material and contamination control waste, etc. are governed by the Order DOE 5820.2A as it implements the Atomic Energy Act (AEA). Low-level waste disposal facilities constructed as part of a remedial action are governed by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or Resource Conservation and Recovery Act (RCRA) and the AEA. Implementing requirements for all three statutes mandate analyses of site-specific conditions and/or evaluation of remedial alternatives against criteria to ensure protection of future members of the public. At many DOE sites, the selected remedy is, or could be, the siting, design, and construction of an on-site disposal cell.

The LLW performance assessment required by Order DOE 5820.2A is a systematic analysis of the potential radiological risks posed to the hypothetical members of the public and environment from a waste disposal facility, and a comparison of those risks to established performance objectives. The Order specifies that PAs are required only for waste disposed of after the effective date of the Order (September 26, 1988). At this time, six PAs for active disposal facilities have been prepared and submitted to Headquarters for review. Headquarters has completed its review and approval of one of the PAs. Headquarters also has reviewed one other performance assessment and notified the site that the documents were technically acceptable; the PA must be revised by the site to reflect removal of wastes that resulted in a calculated exceedence of the radiological performance objectives. Four other PAs are currently in review by Headquarters. No full approval will be given to disposal facilities pending completion of composite analyses that take into account other radioactive source terms. There are an additional three active disposal facilities for which PAs are at various stages of development.

In implementing the CERCLA process for selecting remedies for cleanup of a site, various alternatives are evaluated against nine criteria. The selected alternative, at a minimum, must be protective of human health and the environment and meet applicable or relevant and appropriate requirements (ARARs). In selecting ARARs for proposed disposal cells, performance objectives of Order DOE 5820.2A are to-be-considered since DOE Orders are not promulgated pursuant to the Administrative Procedures Act. However, DOE, to meet its Atomic Energy Act responsibilities, must still demonstrate compliance with the substantive requirements of the Order. Task VI.3 clarifies the applicability of Order DOE 5820.2A to sites subject to CERCLA and/or RCRA.

The DNFSB included in Recommendation 94-2 that the PA process should be expedited for DOE's active LLW disposal facilities, and that the scope of the PAs should include past, present, and future inventories of LLW at a site. The DNFSB further recommended that the Department develop action plans for cases where the performance objectives are predicted to be exceeded.

The Department agrees in principle with the recommendation and recognizes that in authorizing active and planned disposal facilities, DOE needs to account for other possible source terms that contribute to the potential dose to future members of the public from the disposal facility and take action if criteria are exceeded. Department of Energy requirements for public protection are contained in Order DOE 5400.5. Per this Order, DOE sites are required to monitor concentrations of radionuclides in environmental media to ensure that no member of the public receives more than 100 mrem in a year and that doses to the public are reduced to levels as low as reasonably achievable (ALARA). Through this process, which DOE will continue for as long as it maintains the sites for which it is responsible, annual radiological doses to actual members of the public will be reduced to very low levels. Order DOE 5400.5 will be updated and strengthened by a proposed regulation, 10 CFR Part 834, "Radiation Protection of the Public and Environment," which should be promulgated in 1996.

The Department is developing a comprehensive environmental management systems approach to ensure the long-term protection of public health and safety and the environment from all sources of radioactive material left in the ground after remediation and disposal programs are completed. The comprehensive approach would include requirements that integrate DOE's land-use planning, facility decommissioning, environmental restoration, and waste disposal efforts. Integration of these efforts would provide a safe and cost effective site-wide environmental management system.

The Department is using the 94-2 Recommendation to take near-term actions regarding the cumulative impacts of multiple source terms. DOE will use a combination of assessments prepared for active, or planned, LLW disposal facilities to assess the long-term radiological impact of the disposal operations. They include, performance assessments under Order DOE 5820.2A or risk assessments documentation prepared under CERCLA, and a composite analysis of the radiological impacts of other radioactive sources that potentially interact with the LLW facility source-term. As indicated in task initiative VII.B.5 below, the Department commits to completing assessments and composite analyses for all active, or pending, LLW disposal facilities.

Table VII.1 lists the active or pending LLW disposal facilities with which this Implementation Plan is concerned. Sites with active LLW disposal facilities operating under Order DOE 5820.2A have prepared, or will prepare, performance assessments to provide reasonable expectation of meeting the Order's performance objectives. These performance assessments serve as a tool to support design and operation of the facility such that the projected releases to the environment are controlled and doses to hypothetical

future individuals are low, that is, the doses meet the performance objectives. Sites managed through the CERCLA process also complete assessments as part of that process. The process includes selecting measures for facility performance using identified ARARs. For radiological doses to the public, the performance objectives of Order DOE 5820.2A are performance measures "to be considered" through the ARAR process. One pending CERCLA disposal site, the Hanford Environmental Restoration Disposal Facility is listed in Table VII.1. The Department, and its State and Federal regulators, have signed a CERCLA Record of Decision (ROD) authorizing construction and operation of this facility.

For all LLW facilities, DOE will prepare composite analyses that account for other sources of radioactivity that may be left at a DOE site. The composite analyses serve as a long term management planning tool. A future site boundary, based on current land use plans or discussions with state and local stakeholders, provides a point of evaluation for the composite of interacting source terms. This future boundary determines how much land will remain under DOE control, and therefore, the point of public access. The composite analysis guidance and review criteria (task initiatives VII.B.2 and VII.B.3 below) are to include 100 mrem in a year and 30 mrem in a year as criteria for evaluating results of the composite analysis. As shown in Figure VII.1, the location of evaluation for the composite analysis is at a projected future site boundary, whereas the point of compliance with the Order DOE 5820.2A performance objectives is at a point very near the disposal facility.

If doses calculated in the composite analysis are projected to exceed DOE's primary public protection standard of 100 mrem in a year, mitigating measures must be taken to ensure that the public dose limit is not in fact exceeded. If postulated doses exceed 30 mrem in a year, an options analysis will be performed, in accordance with guidance developed under task initiative VII.B.2, to identify and evaluate options for reducing potential doses to ALARA levels. Finally, if postulated doses are less than 30 mrem in a year, an ALARA analysis may still be warranted depending on the magnitude of the postulated dose and its relation to other source terms.

A disposal facility performance assessment and the composite analysis will be the basis for preparation of a disposal authorization statement for those facilities operating under Order DOE 5820.2A. The purpose of the disposal authorization statement is to document any limits on design or operations for the facility. If the performance assessment and composite analysis do not support issuance of a disposal authorization statement, the site will be directed to provide information or take action to resolve the concerns or issues identified in the review of the documents prior to continuing or initiating operation.

For CERCLA LLW disposal facilities, the composite analysis will be performed and documented in parallel with or as part of the CERCLA process leading to a ROD.

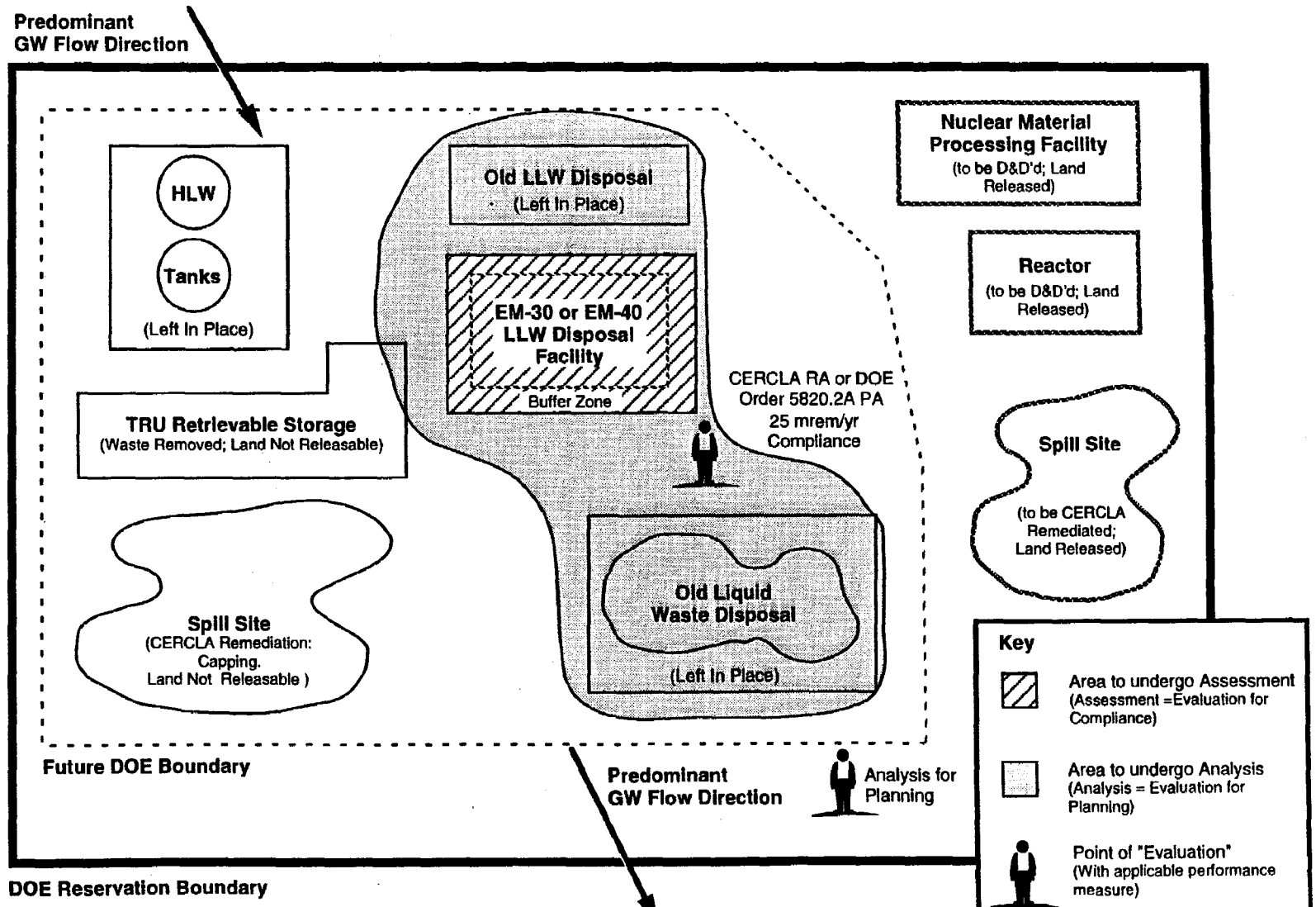

Figure VIII.1: Distinction between "active" facility assessment and composite analysis including other sources

Approval of the ROD by DOE HQ, and applicable external regulators, will constitute the authorization to operate. If a ROD is approved without the substantive features of the composite analysis guidance having been met, separate HQ approval of the composite analysis will be required. The Office of Environmental Restoration (EM-40) "Document Review and Approval Level" matrix (dated May 26, 1994) will be revised to indicate Office Director approval of the composite analysis, which is consistent with the approval level of the ROD. Results of the composite analysis will be incorporated into the LLW disposal facility's remedial action/remedial design phase. This will ensure that the facility's design features are fully effective in protecting human health and the environment.

As part of the internal management of the performance assessment and composite analysis activities, DOE plans on convening workshops. A workshop on the performance assessment process is intended to enhance Headquarters and site program managers knowledge of the details of preparing performance assessments. A workshop on composite analyses is intended to assemble technical staff to discuss problems and determine possible resolution.

B. Task Initiatives

Following are the task initiatives the Department is undertaking to ensure that performance assessments and composite analyses are performed for active, and pending, LLW disposal sites. The final authorization under Order DOE 5820.2A will be the issuance of a disposal authorization statement by Headquarters.

The schedules for completing both the performance assessments and the composite analyses are based on current understanding of the policies and requirements for these analyses. Policies and requirements affecting performance assessments and composite analyses are being developed in some of the following task initiatives and task initiatives under Regulatory Structure and Process (Section VI). Changes resulting from the development of performance assessment policies, the issuance of guidance on the format and content, and maintenance of performance assessments may affect the completion dates of the assessments.

1. Issue performance assessment critical assumptions

a. Description: The timely development and approval of performance assessments and composite analyses are key elements of the LLW management system. The Department will issue interim direction addressing the following critical aspects of conducting a performance assessment:

- time of active institutional control;

- relationship of active and passive institutional periods;
- time(s) of compliance;
- points of compliance for performance objectives;
- ownership and future land use following closure of a disposal facility;
- degree of certainty necessary for compliance demonstration;
- purpose of inadvertent intruder assessments;
- assumptions regarding human activities relative to demonstrations of protection of individuals and inadvertent intruders;
- use of standardized adult dose conversion factors;
- extrapolation to future environmental conditions;
- treatment of radon dose in performance assessments; and
- interpretation of groundwater protection requirements.

The composite analysis guidance (Task VII.B.2) will address these items as they apply to the composite analysis.

b. Milestone: Issue policies addressing critical assumptions and clarifications for performance assessments.

c. Due Date: January 31, 1997.

d. Responsibility: Developed jointly by the Offices of Waste Management (EM-30), Environmental Restoration (EM-40), and the Office of Environment (EH-4), and issued by the Assistant Secretary for Environmental Management (EM-1).

2. Composite analysis guidance

a. Description: DOE will prepare and provide to the sites a document providing guidance on the preparation of the composite analyses. The guidance will address sources of radioactive contamination that are to be considered in the composite analysis, rationale for excluding certain sources, critical assumptions (similar to task VII.B.1) applicable to the composite analyses,

and the preparation of an options analysis if performance criteria are exceeded. The guidance will be developed so that it will be usable for the varied situations that exist at DOE sites.

b. Milestone: Issue guidance for conducting composite analyses.

c. Due Date: May 31, 1996.

d. Responsibility: The Low-Level Waste Management Task Group and the Office of Environmental Restoration (EM-40) are responsible for preparing and issuing the guidance.

3. Composite analysis review criteria and process

a. Description: DOE will prepare a documented description of the process for Headquarter's review of the composite analyses and the criteria for evaluating the acceptability of the analyses.

b. Milestone: Issue a description of the process and criteria for Headquarter's review of composite analyses.

c. Due Date: October 31, 1996.

d. Responsibility: The Low-Level Waste Management Task Group and the Office of Environmental Restoration (EM-40) are responsible for preparing and issuing the guidance.

4. Issue PA development and review and approval guidance

a. Description: The timely development and approval of performance assessments are key elements of the LLW management system. The Department will issue performance assessment guidance that will provide minimum criteria for an acceptable performance assessment, and guidance on the preparation and approval of LLW radiological performance assessments. The guidance will address:

- Performance Assessment Format and Content;
- Standard Review Plan for Performance Assessments;
- Performance Assessment Maintenance Program.

The guidance on performance assessment format and content will provide an annotated outline of the matters to be addressed in a performance assessment, including incorporation of performance assessment results into waste acceptance criteria. The standard format and content and Standard Review Plan will consider existing DOE guidance as well as that developed by NRC. The Standard Review Plan will include technical criteria for the findings that must be made to determine that a performance assessment is technically acceptable. The Standard Review Plan will help provide for consistency of review. The guidance on performance assessment maintenance program will specify criteria for periodic review of the performance assessments to ensure that the waste acceptance criteria and design and operational requirements derived from the performance assessments remain viable, as well as providing criteria for determining when revisions to the performance assessments are necessary. The performance assessment maintenance guidance will also address the need to reduce uncertainties in predictions about the long-term performance of disposal facilities.

b.1 Milestone: Publish PA maintenance guidance document.

c.1 Due Date: September 30, 1996.

d.1 Responsibility: Developed by Office of Waste Management (EM-30) in consultation with the Deputy Assistant Secretary of Environment (EH-4), and issued by Office of Waste Management (EM-30).

b.2 Milestone: Publish PA format and content, and standard review plan documents.

c.2 Due Date: January 31, 1997.

d.2 Responsibility: Developed by Office of Waste Management (EM-30) in consultation with the Deputy Assistant Secretary of Environment (EH-4), and issued by Office of Waste Management (EM-30).

5. Assessments supporting disposal facility operations.

a. Description: The Department will complete assessments for active and pending disposal facilities, whether they are operating under Order DOE 5820.2A or CERCLA. Sites with LLW disposal facilities operating under Order DOE 5820.2A will prepare performance assessments in accordance with the requirements of the Order. In addition, the sites will prepare a companion, composite analysis. Regarding the CERCLA sites, the Hanford Environmental Restoration Disposal Facility will prepare a composite analysis

to be approved by Headquarters. The Fernald CERCLA Disposal Cell composite analysis commitment has been met through their Comprehensive Response Action Risk Evaluation (CRARE), which was developed through the CERCLA process and was approved by DOE, EPA and the State of Ohio.

The complete radiological assessment (e.g., PA and composite analysis) will be reviewed and form the basis for issuance of the disposal authorization statement to document any limits on design or operations for the facility.

b.1 Milestone: Submit performance assessments to Headquarters for review; complete the Headquarters technical review and documentation.

c.1 Due Date: Due dates for completing and submitting performance assessments, and for completing the Headquarters review are shown in Table VII.1.

d.1 Responsibility: The responsible field office Assistant Manager is responsible for ensuring preparation and submittal of performance assessments to Headquarters. The Deputy Assistant Secretary for Waste Management is responsible for ensuring completion of the review.

b.2 Milestone: Submit composite analyses to Headquarters for review; complete the Headquarters technical review and documentation.

c.2 Due Date: Due dates for completing and submitting composite analyses, and for completing the Headquarters review are shown in Table VII.1.

d.2 Responsibility: The responsible field office Assistant Manager is responsible for ensuring preparation of the composite analysis and submittal to Headquarters. The Deputy Assistant Secretaries for Environmental Restoration and Waste Management are responsible for ensuring completion of the review.

b.3 Milestone: Issue disposal authorization statement or direction to resolve issues or concerns.

c.3 Due Date: Due dates for Headquarters issuing disposal authorization statements are shown in Table VII.1.

d.3 Responsibility: The Deputy Assistant Secretary for Waste Management, in consultation with the Office of Environmental Restoration (EM-40) and the Environment, Safety and Health, Office of Environmental Policy and Assistance (EH-41), is responsible for the preparation and issuance of disposal authorization statements for Office of Waste Management facilities.

The Deputy Assistant Secretary for Environmental Restoration will consult with the Office of Waste Management, and the Environment, Safety and Health, Office of Environmental Policy and Assistance in review of the composite analysis. The Deputy Assistant Secretary for Environmental Restoration is responsible for approval of RODs which constitute the authorization to dispose.

Table VII-1: Responsibilities and Commitments for Completion of Assessments and Approvals

Site	Disposal Facility	Responsible Field Office Assistant Manager	Description	Submit to HQ	HQ Action
Los Alamos National Laboratory	TA-54, Area G	William Arthur/AL	Perf. Assessment	03/31/97	12/31/97
			Composite Analysis	12/31/97	03/31/98
			Disp. Auth. Stmt.	na	04/30/98
Idaho National Engineering Laboratory	Radioactive Waste Management Complex	Jerry Lyle/ID	Perf. Assessment	completed	08/31/96
			Composite Analysis	01/31/98	04/30/98
			Disp. Auth. Stmt.	na	05/31/98
Nevada Test Site	Area 5 Radioactive Waste Management Site	Leah Dever/NV	Perf. Assessment	completed	08/31/96
			Composite Analysis	09/30/99	12/31/99
			Disp. Auth. Stmt.	na	01/31/00
Nevada Test Site	Area 3 Radioactive Waste Management Site	Leah Dever/NV	Perf. Assessment	03/31/98	11/30/98
			Composite Analysis	included in PA	
			Disp. Auth. Stmt.	na	02/28/99

Table VII-1: Responsibilities and Commitments for Completion of Assessments and Approvals

Site	Disposal Facility	Responsible Field Office Assistant Manager	Description	Submit to HQ	HQ Action
Oak Ridge National Laboratory	Solid Waste Storage Area-6 (rev. 1)	R. Nelson/OR	Perf. Assessment	09/30/97	01/21/98
			Composite Analysis	09/30/97	12/31/97
			Disp. Auth. Stmt.	na	06/30/98
Hanford	Environmental Restoration Disposal Facility	Linda McClain/RL	CERCLA Assessment	completed	completed
			Composite Analysis	12/31/97	05/31/98
Hanford	200-W Burial Grounds	Charles Hansen/RL	Perf. Assessment	completed	06/30/96
			Composite Analysis	included with ERDF	
			Disp. Auth. Stmt.	na	06/30/98
Hanford	200-E Burial Grounds	Charles Hansen/RL	Perf. Assessment	08/31/96	04/30/97
			Composite Analysis	included with ERDF	
			Disp. Auth. Stmt.	na	07/31/98

Table VII-1: Responsibilities and Commitments for Completion of Assessments and Approvals

Site	Disposal Facility	Responsible Field Office Assistant Manager	Description	Submit to HQ	HQ Action
Savannah River	E-Area Vaults	Tom Heenan/SR	Perf. Assessment	completed	completed
			Composite Analysis	09/30/97	12/31/97
			Disp. Auth. Stmt.	na	03/31/98
Savannah River	Saltstone Disposal Facility	Lee Watkins/SR	Perf. Assessment	completed	07/31/96
			Composite Analysis	included with E-Area Vault	
			Disp. Auth. Stmt.	na	03/31/98

na - Not applicable. The disposal authorization statement is issued by Headquarters.

VIII. LOW-LEVEL WASTE PROJECTIONS

A. Discussion

A number of the Department's currently operating LLW disposal facilities collect projections of future generation of LLW from their generators for budgeting and project planning purposes as part of their waste acceptance programs. These projections capture future expectations of waste generation from programs currently generating LLW. However, the information needed in the projections has been site-specific, depending, in part, on whether the disposal facility was operating on a system of charging generators for disposal of the waste. Capacity was not an issue at Department LLW disposal facilities while the LLW being received was from operating DOE generators. However, now that environmental restoration and facility decommissioning are principal components of DOE's current mission, the Department is faced with a dramatic increase in the expected volume of LLW to be generated and the potential need for increased disposal capacity. Consequently, the current projections of LLW have the following weaknesses:

(1) disposal facilities do not receive the same quality of projections from on- and off-site generators;

(2) only current generators submit projections, therefore future generation of LLW (especially environmental restoration waste) is not captured;

(3) the projections of LLW received by the disposal facilities are not uniformly developed by the generators;

(4) the quality and detail (e.g., radiological characteristics and physical and chemical forms) of data received by the disposal facilities are insufficient,

(5) projections are dramatically impacted by unstable budgets; outyear projections are rapidly outdated as budgets, and thus priorities, change, and

(6) projections, particularly from decontamination and decommissioning, and environmental restoration activities will be dramatically impacted by ongoing land-use discussions.

Issues related to disposal capacity will likely be exacerbated as more environmental restoration projects are undertaken.

The Department has programs and activities underway which begin to address the issue of disposal capacity relative to the amounts of waste requiring disposal. These include a waste minimization program and recent efforts to develop better estimates of future waste volumes. In implementing the initiatives in this section, emphasis will be placed on adding to these programs and activities and making them more responsive to LLW program needs in order to avoid duplicative efforts.

In the area of waste minimization, an evaluation of current waste minimization methods will be undertaken. The purpose of this evaluation will be to identify methods and strategies by which DOE can further reduce the amounts of waste requiring disposal.

In the area of data collection, there are several major data collection efforts related to LLW projections. The Office of Environmental Restoration (EM-40) has developed the Environmental Restoration Core Database. The Environmental Restoration Core Database combines the data elements of the 1993 Environmental Restoration contaminated media/waste data call, baselines, and the requirements of the 1996 Baseline Environmental Management Report (BEMR). Similarly, the Office of Waste Management (EM-30) is developing a waste management core data base using data elements and requirements from the BEMR, site baselines, the Integrated Data Base (IDB) Report, the Mixed Waste Inventory Report (MWIR), and previous LLW data calls.

Additionally, BEMR is providing a life-cycle cost estimate to Congress for all environmental management activities, including waste management, environmental restoration, and decommissioning. For environmental restoration and decommissioning portions of the BEMR, data are being collected on the proposed remediation strategy; contaminated medium and waste type (including LLW); total volume of waste; annual waste volumes requiring treatment, storage, and disposal; and planned site of disposal. These data will comprise current estimates of the future LLW disposal needs for the remediation and decommissioning wastes.

As part of BEMR, the Office of Environmental Restoration (EM-40) and the Office of Nuclear Materials and Facility Stabilization (EM-60) estimated the number of contaminated surplus facilities that will be transferred to EM in the future. Most sites are able to provide their own estimates of decommissioning costs and waste volumes. In the instances when sites were not able to provide these estimates, the Office of Nuclear Materials and Facility Stabilization determined the schedule of these transfers and used a model to calculate the volume of contaminated materials generated by its deactivation activities. The Office of Environmental Restoration used another model, the Automated Remedial Assessment Methodology (ARAM), to calculate the volume of waste generated by its decommissioning activities. For the model, wastes from both the Office of Environmental Restoration and Office of Nuclear Materials and Facility Stabilization activities at these facilities were assumed to be transferred to the Office of Waste Management for management. Actual practices are changing in that Office of Environmental Restoration is now at some sites in the process of designing or constructing disposal cells in accordance with CERCLA records

of decision. The first edition of BEMR, an annual report, was submitted to Congress in March 1995. Plans are to integrate and provide information from the Office of Waste Management and the Office of Environmental Restoration core databases and BEMR to support the development of disposal capacity projections.

B. Task Initiatives

The purpose of the following task initiatives is to build on ongoing DOE programs and activities, to encourage further waste minimization activities, and to develop a routine program for projecting waste volumes and waste characteristics, and disposal capacity. The projections will cover all LLW and mixed LLW.

The Office of Environmental Restoration (EM-40) Core Database, Office of Waste Management (EM-30) Core Database, and BEMR provide DOE with current LLW volume projections for environmental restoration, decommissioning, and current operations. The following two task initiatives will be undertaken to supplement these data for use in developing a routine program for LLW volume projections: (1) report on DOE-wide LLW disposal capacity (both current and planned), and (2) develop and implement a DOE-wide LLW projection program. A third task initiative will be undertaken to develop a LLW minimization strategy.

1. Report on Current and Planned Low-Level Waste Disposal Capacity.

a. Description: A compilation of current and planned capacity for LLW disposal, with field planning assumptions, is needed to determine the long-term capability to dispose of future-generated LLW. A survey will be conducted that will focus on data not currently being collected, such as the availability of waste disposal capacity over time, waste characteristics, permitting restrictions on disposal facilities, as well as on various operational constraints. The survey will take into account and document commercial disposal capacity and its use by DOE generators. The survey will also document DOE field office assumptions regarding the rate of waste generation and disposal.

Capacity, as used in this Implementation Plan, addresses the quantity of both volume and radionuclide inventory that can be accepted at a disposal facility. The initial LLW disposal capacity report will only include information on volumetric capacity. Currently available and planned baseline radiological capacity will be determined by analyzing site environmental data and utilizing pathway analysis modeling techniques. The radiological capacity and

projection will be contained in the first revision, as well as subsequent revisions planned to be issued regularly, of the disposal capacity report as consideration of radiological source terms are reflected in the radiological assessments.

b.1 Milestone: Issue Low-Level Waste Disposal Capacity Report, Revision 0.

c.1 Due Date: July 31, 1996.

d.1 Responsibility: LLW Management Task Group.

b.2 Milestone: Issue Low-Level Waste Disposal Capacity Report, Revision 1.

c.2 Due Date: September 30, 1997.

d.2 Responsibility: LLW Management Task Group.

2. Development and Implementation of DOE-Wide Low-Level Waste Projection Program.

a. Description: Based on LLW inventory and projections information currently collected by operating disposal facilities and generated by the BEMR efforts and the survey of current and planned LLW disposal capacity (Task VIII.B.1), a DOE LLW projections program will be developed. Review of projection data will occur at Headquarters and will support the development of the projections program. This program will include current baseline generation and capacity information, and will specify projection techniques to be used to project future LLW generation and the required frequency of projections. The projections will also take into account LLW resulting from treatment of mixed LLW. The projections program will discuss the importance of waste minimization activities for reducing the amount of waste scheduled for disposal. The projections of LLW generation resulting from this program will be used for the planning, design, and operational activities at existing and planned LLW disposal sites, development of DOE-wide waste projections, BEMR updates, other data collection and baseline information efforts. The program will also have provisions for waste disposal sites to compare past projections to actual receipts, and to critique current projections with the purpose of improving projection techniques and increasing the quality of projections.

The projections program will also describe the interrelation between volume projecting, disposal capacity planning, and project planning. For example, as new projects are identified, project planning activities will include reporting

on the volumes and characteristics of LLW that will be generated, which will be factored into capacity information to determine if existing LLW disposal facilities can accommodate the new waste volumes. A more coordinated planning approach to new LLW disposal capacity will result.

The LLW projections program will result in the issuance of an implementation guide to be developed in coordination with representatives from Offices of Waste Management (EM-30), Environmental Restoration (EM-40), and Nuclear Materials and Facility Stabilization (EM-60), other DOE Program Offices (such as Defense Programs and Energy Research), and field representatives. The program will be implemented at both the field and Headquarters levels. Implementation will be coordinated with the Office of Field Management (FM), and will include integration of LLW projections into life-cycle planning. That is, the volume and characteristics of LLW to be generated and the capacity for disposal will become a consideration in the approval of future DOE projects, including decommissioning and environmental restoration projects. This will ensure that sufficient disposal capacity will be available for LLW projected to be generated in the future.

b. Milestone: Complete DOE Low-Level Waste Projections Program Documentation.

c. Due Date: December 31, 1996.

d. Responsibility: LLW Management Task Group.

3. Develop LLW minimization strategy.

a. Description: While the DOE has established waste minimization and pollution prevention programs at individual sites, an evaluation of current LLW minimization efforts is needed. A survey will be conducted to determine the common LLW generating activities at major DOE sites, and identify practices, procedures, policies and techniques that are effective in reducing LLW. The effectiveness of LLW minimization practices for sites where the primary mission is environmental restoration (or stabilization), will also be identified.

A report of recommended LLW minimization activities for implementation throughout the DOE complex will be developed. Case studies of specific activities will be used to support the recommendations in the report. Where possible, the need for future technology development or administrative changes will be highlighted in the report. The recommended activities will

support the Department-wide waste reduction goals in the draft DOE 1996 Pollution Prevention Program Plan.

b. Milestone: Complete and document an evaluation and strategy for improvements to LLW minimization.

c. Due Date: August 31, 1996.

d. Responsibility: The Office of Pollution Prevention will be responsible to the LLW Management Task Group for developing the report.

IX. RESEARCH AND DEVELOPMENT

A. Discussion

The Department recognizes the need for a defensible technical foundation to support and justify additional data collection, facility radiological assessments, guidance, regulatory, and policy development and other improvements in the LLW management program. This is typically accomplished through a focused and directed effort in applied research and development (R&D) and associated technical analyses and support. This task is designed to provide a strategy to identify, prioritize, and address outstanding R&D needs.

In the review of the Department's LLW management program, the Board identified five technical or R&D needs for improving the program. These include: (1) improving modeling and predictive capabilities of radionuclide migration, (2) enhancing the stability of buried waste forms, (3) enhancing the deterrence of intrusion, (4) inhibiting the migration of radionuclides, and (5) reducing the volume of waste to be disposed.

In addition, within the Department, there currently does not exist a coordinated program to (a) identify, coordinate, guide, and implement LLW R&D projects, and (b) ensure that R&D and other technical needs are met.

To be responsive to the Board's recommendations in this area and improve the technical foundation behind the Department's LLW management program, a Research and Development Task Team (RDTT) (Figure III.1 and Section III.A.6) will be organized to develop an approach that will identify and prioritize LLW R&D needs and develop a strategy for addressing those needs in a time frame to support the LLW program. The RDTT will comprise experienced members of the LLW management community representing the Department's operating disposal sites, the Department's technology development organizations, the regulatory community outside the Department, and the commercial sector.

The R&D task is designed to improve the LLW management program through a focused and directed effort that identifies, evaluates, and prioritizes specific technical needs and then assesses if those needs are already being addressed, either directly or indirectly, within the program. Where outstanding needs exist, a strategy will be developed to prioritize and address these in a timely and efficient manner. Both the areas identified by the Board as well as any others identified by the RDTT will be addressed simultaneously. In the areas noted by the Board, the RDTT will have the responsibility to clarify where technical needs exist.

This effort will be focused on those items that are most important within the DOE LLW management system (e.g., long-term disposal facility performance, regulatory guidance and application, risks to human health and safety) to ensure that the R&D strategy applies to the most significant problems. Then, identified R&D needs will be assessed against existing or past activities, and the two (needs and activities) will be correlated to identify those needs already addressed by existing technology and those that are not addressed. An R&D program strategy for the coordination of existing or initiation of new projects to address the outstanding needs will be developed. Close coordination between the R&D task initiatives and the other Implementation Plan task initiatives will be required to anticipate and react to impending programmatic and policy changes (e.g., changes in regulatory Orders or regulatory authority) as these will probably have a significant impact on the context of the needs evaluation.

The Assistant Secretary for Environmental Management (EM) has mandated in A New Approach to Environmental Research and Technology Development at the U.S. Department of Energy, Action Plan (January, 1994) that a new approach be established to focus EM's Office of Science and Technology environmental research and technology development activities on DOE's most pressing environmental restoration and waste management problems. The new approach has resulted in the formation of the following four focus areas:

- Mixed Waste Characterization, Treatment and Disposal
- High-Level Waste Tank Remediation
- Subsurface Contaminants, and
- Facility Transitioning, Decommissioning and Final Disposition.

Some technology development activities, such as characterization, chemical separations and robotics are being managed by cross-cutting programs that work to fulfill the needs identified by the focus areas.

Strong interfaces will be required between the RDTT and the programs performing or managing technology development. These include Recommendation 94-2 Implementation Plan tasks, Office of Science and Technology (EM-50) and its four focus areas, the Department's Environmental Research and Development Steering Committee, and Office of Waste Management (EM-30) focus area representatives (Figure IX.1). These interfaces will serve to properly evaluate ongoing or completed technical activities; to help prioritize execution of activities; to coordinate LLW needs with focus areas and leverage the focus areas to address needs; and to integrate and coordinate technical activities related to LLW management program improvements.

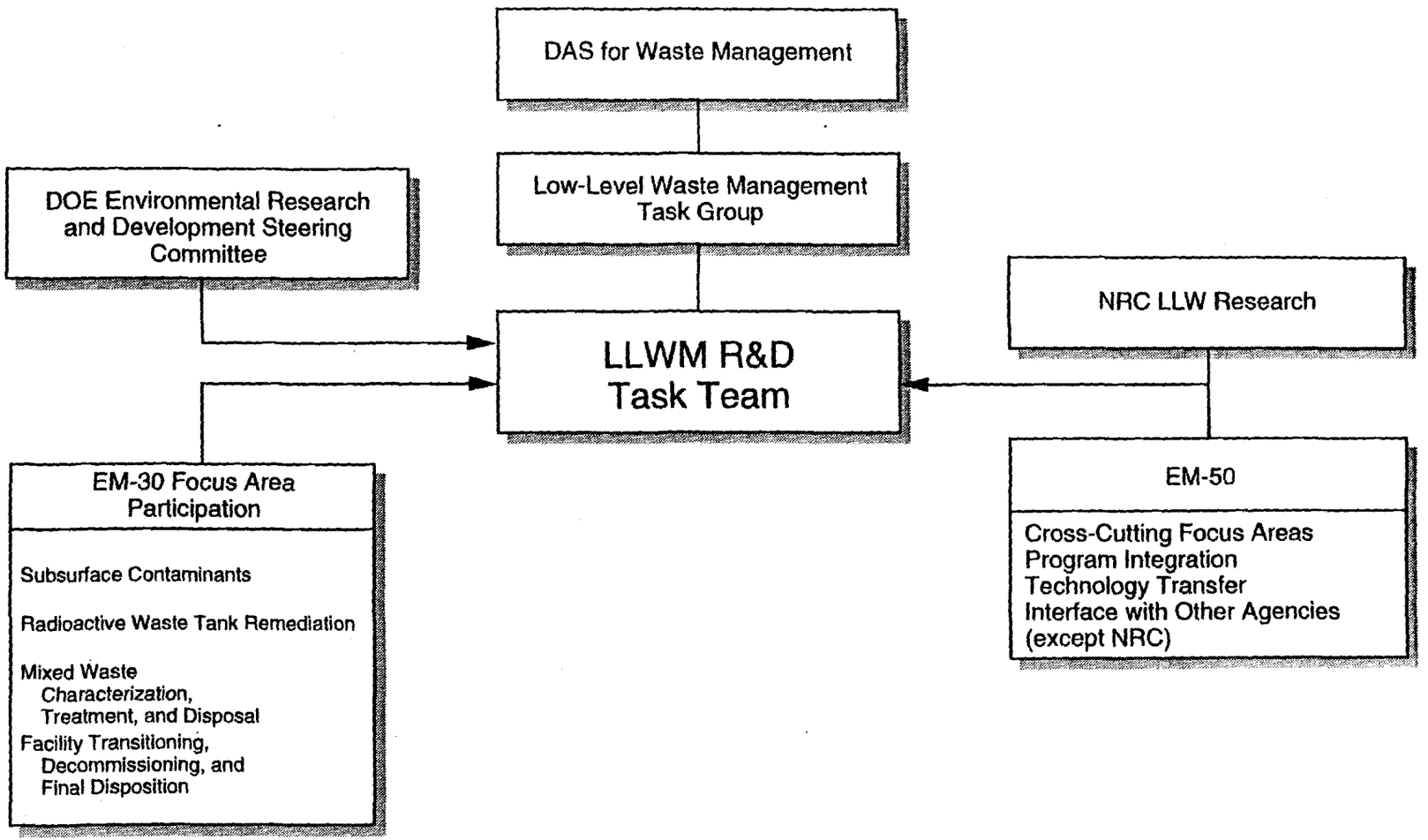

Figure IX-1: Organization for Coordination to Ensure Low-Level Waste Management Needs are Met

In addition to the site representatives on the RDTT, interfaces will exist with LLW facility operators, reviewers, and teams established by the LLW Management Task Group (Figure III.1). Preliminary R&D needs have been identified through these interfaces and incorporated by the RDTT in an R&D needs evaluation. Results from related R&D projects will be integrated in the R&D strategy to support final development and implementation of LLW management program improvements.

B. Task Initiatives

1. Preliminary Catalog of DOE and non-DOE LLW Management R&D Activities

a. Description: A survey will be conducted to identify those R&D activities where results are applicable to LLW management program improvements. Existing technology development database systems will be utilized where available to support this survey.

The scope of this survey includes:

- Past, present and planned R&D projects;
- Offices of Waste Management (EM-30) and Science and Technology (EM-50), other Department, other government, commercial and international supported R&D projects;
- Local site initiatives and activities.

Information and data requirements will be established beforehand in order to expedite the survey. The desired structure and form of the acquired information and data will be defined so that results can be readily compiled and applied to determine which projects meet current or future LLW R&D needs.

A catalog of the research projects identified throughout the survey will be prepared. The cataloging will be conducted in two phases: 1) the preliminary catalog will focus on the five areas of research identified by the Board in Recommendation 94-2; and 2) the context of any further cataloging will be defined by the needs statement definition under task IX.B.2, Identification of LLW Management R&D Needs. The collection of additional information about existing R&D activities/work will occur as an ongoing exercise under tasks IX.B.2 and IX.B.3.

b. Milestone: Preliminary LLW management R&D activities catalog issued for initial needs identified by the Board.

c. Due Date: June 30, 1995 (completed).

d. Responsibility: RDTT.

2. Identification of LLW Management R&D Needs

a. Description: LLW R&D needs will be identified by the RDTT, other Recommendation 94-2 Implementation Plan task groups, and with input from other DOE-wide R&D or technology development programs. The categories of needs identified by the Board in Recommendation 94-2 will be evaluated and verified by the RDTT, the LLW Steering Committee, and other knowledgeable parties. Any changes or additions to the list of R&D needs identified by the Board will be justified by the RDTT.

Research and development needs identification will utilize the LLW management program complex-wide review, the systems engineering evaluation of the program, Office of Science and Technology (EM-50) need statements, and needs analyses and assessments conducted within the LLW Management Task Group. In addition, if needs arise through evaluations conducted by the radiological assessments, the regulatory analysis task, or the waste projections task initiatives, they will be included in the final needs list. These R&D needs will be evaluated and categorized by the RDTT to ensure that the need is correctly formulated and properly focused to resolve a LLW management program deficiency or uncertainty. The RDTT will produce a comprehensive list of these categorized LLW R&D needs.

b. Milestone: Issue LLW R&D needs statement.

c. Due Date: March 31, 1997.

d. Responsibility: RDTT.

3. Determination of Outstanding LLW R&D Needs

a. Description: The RDTT will work with the representatives from other technology development programs such as the technology development focus areas, to assess the activities that are occurring under other Recommendation 94-2 Implementation Plan task initiatives, assess the LLW management program drivers and requirements, and evaluate the R&D activities identified

under task IX.B.1 (Catalog of LLW R&D Activities) and with the needs identified in task IX.B.2 (R&D Needs Statement). The comparison of existing R&D activities with identified needs has two purposes: (1) to identify R&D and technical support activities that address identified LLW technical deficiencies, and (2) to identify LLW needs that are not being addressed and consequently, remain outstanding.

To evaluate outstanding needs, DOE intends to perform a systematic crosswalk between needs and activities (gap analysis) and use this as a screen of the needs identified in task IX.B.2. In order to validate the methodology and results, the screening results are to be subject to a review by DOE field offices and the groups interfacing with this R&D effort.

In cases where R&D needs are being addressed, these will be documented and provided to the LLW management program with recommendations on how to assimilate their results. Also, a recommendation for improved reporting procedures will be made to improve future activity tracking. In cases where R&D needs are not being addressed, recommended strategies will be developed for meeting these R&D needs (IX.B.4).

b. Milestone: Identification of outstanding R&D needs.

c. Due Date: June 30, 1997.

d. Responsibility: RDTT.

4. Develop and Recommend a Strategy for Addressing Outstanding LLW R&D Needs

a. Description: A comprehensive strategy for meeting outstanding LLW R&D needs will be developed for the LLW Management Task Group. The strategy will be based upon an identification of LLW R&D needs that are not addressed by current or completed R&D activities, and demonstrated technical capabilities and resources, DOE and non-DOE, that can be applied to meet these needs. The development of a recommended strategy to meet these needs is a four-step process:

(1) Identify pertinent R&D resource and approach options for meeting the currently unaddressed R&D needs;

(2) Develop a preliminary strategy for applying these resources and/or implementing these approaches to meet unaddressed LLW R&D needs;

(3) Coordinate the preliminary strategy with appropriate field elements, elements within the LLW Management Task Group or Office of Science and Technology (EM-50), and finalize strategies with the LLW Management Task Group; and

(4) Present the strategy to the LLW Management Task Group for action.

The strategy will be developed for inclusion, as appropriate, in a revision to the LLW Program Management Plan. The LLW Management Task Group is responsible for promoting strategy acceptance and obtaining commitments for the required technical support to implement the plan.

b. Milestone: Strategy to address outstanding LLW technical and R&D needs.

c. Due Date: September 30, 1997.

d. Responsibility: RDTT.

X. GLOSSARY

This glossary is intended to provide clarity to the Implementation Plan. It is recognized that some of the terms listed below may be defined in other ways. The definitions provided below reflect the meaning of the term as used in this plan.

10 CFR Part 61: Licensing Requirements for Land Disposal of Radioactive Waste - Established for land disposal of radioactive waste, the procedures, criteria, and terms and conditions upon which the NRC issues licenses for the disposal of low-level radioactive waste containing byproduct, source and special nuclear material received from other persons.

Active DOE LLW Disposal Facilities: The DOE currently has active facilities, i.e., facilities that are used for LLW disposal at the present. These sites are the Hanford Site (near Richland, Washington), Idaho National Engineering Laboratory (near Idaho Falls, Idaho), Nevada Test Site (Mercury, Nevada), Los Alamos National Laboratory (Los Alamos, New Mexico), Oak Ridge Reservation (Oak Ridge, Tennessee), and the Savannah River Site (Aiken, South Carolina).

Baseline Environmental Management Report (BEMR): A life-cycle cost estimate being provided to Congress for all environmental cleanup activities, including waste management, environmental restoration, and Decommissioning. Data collection efforts for the BEMR are currently obtaining information on a number of areas including proposed remediation strategy; contaminated medium and waste type (including LLW); total volume of waste; annual waste volumes requiring treatment, storage, and disposal; and planned site of disposal. BEMR provides volume and cost estimates from 1995 until the completion of cleanup activities, approximately 2080.

Capacity: As used in this document relative to waste volume projections, it is the quantity in terms of both volume or radionuclide inventory that can be accepted at a disposal facility.

Complex-Wide Review: A criteria-based assessment of DOE LLW management facilities to identify environmental, safety and health vulnerabilities.

Order DOE 5820.2A, Radioactive Waste Management: This DOE Order, issued in 1988, established policies, guidelines, and minimum requirements by which DOE manages its radioactive wastes. The Order mandates that all radioactive wastes be managed in a manner that ensures the health and safety of the public, DOE and contractor employees, and the environment.

Federal Facility Compliance Act (FFCAct) Disposal Working Group Report: The DOE is required to prepare and submit Site Treatment Plans pursuant to the FFCAct. Although the FFCAct does not require that disposal be addressed in the Site Treatment Plans, DOE and the states recognize that treatment of mixed LLW will result in treatment residues that will require disposal in either LLW or MLLW disposal facilities. As a result, DOE established the DOE FFCAct Disposal Working Group in June 1993 to work with the states to define and develop a disposal-site suitability process in concert with the FFCAct and development of the Site Treatment Plans. This site-suitability process and its findings are contained in the report.

Inactive DOE LLW Disposal Facilities: The DOE has many locations where disposal of solid LLW has taken place and the facilities no longer receive waste. Most of these inactive LLW disposal facilities are at the same DOE sites as the six active facilities for the disposal of LLW. A few of the DOE inactive LLW disposal facilities are located at sites that do not have active disposal facilities.

Inadvertent Intruder: A hypothetical person, for the purpose of analysis, who temporarily occupies a disposal site after closure and engages in normal activities, such as agriculture, dwelling construction, and/or drilling in which the person might be unknowingly exposed to radiation from buried LLW. Inadvertent intrusion analyses have been included in radiological performance assessments to define general categories or classes of LLW and for deriving waste acceptance criteria and facility design and operations parameters.

Low-Level Waste (LLW): Waste that contains radioactivity and is not classified as high-level waste, transuranic waste, or spent nuclear fuel, or 11e(2) byproduct material as defined in Order DOE 5820.2A [the tailings or waste produced by the extraction or concentration of uranium or thorium from any ore

processed primarily for its source material content]. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as low-level waste, provided the concentration of transuranic [isotopes] is less than 100nCi/g.

Mixed Low-Level Waste (MLLW): Waste that satisfies the definition of LLW in the Low-Level Radioactive Waste Policy Amendments Act of 1985 and contains hazardous waste as defined under RCRA. Generally, radioactive wastes also containing polychlorinated biphenyl (PCB) wastes subject to regulation under the Toxic Substances Control Act and 40 CFR Parts 702-799 are also managed as mixed LLW.

Performance Assessment (PA): A systematic analysis of a LLW management disposal facility and its environs for the purpose of demonstrating compliance with specific radiological performance objectives.

Peer Review Panel (PRP): The PRP has the responsibility of reviewing each LLW disposal facility performance assessment that DOE submits to the PRP. This review by the PRP is mandated by Order DOE 5820.2A.

Programmatic Environmental Impact Statement (PEIS): This analysis will provide DOE with management alternatives for the LLW it generates. Because LLW has widely varying characteristics which depend on how the waste is generated, the PEIS has developed representative waste management technologies which can be applied to representative LLW streams for use in determining emissions and resource requirements which may result from consolidation alternatives considered in the document.

Radionuclide Migration: The movement of radioactive substances from a disposal site by means of air, surface water, or ground water.

Stabilization: Creation of a waste form or disposal by a method intended to ensure that waste degradation does not affect overall stability of the disposal site through slumping, collapse, or other types of failures that will lead to water infiltration into the waste. Stabilization will also limit exposure to an

inadvertent intruder since it provides a recognizable and nondispersible waste.

Systems Engineering Approach:

A process applied to a system to provide a technical basis for management with clearly identified interfaces. This process is designed and applied to ensure that improvements to a management system are well-structured within an integrated program and are prioritized appropriately.

XI. LIST OF ACRONYMS AND ABBREVIATIONS

5820.2A	Department of Energy Order, 5820.2A, Radioactive Waste Management (1988)
AEA	Atomic Energy Act
ARAR	Applicable or Reasonable and Appropriate Requirement
BEMR	Baseline Environmental Management Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
DP	Office of Defense Program
EH	Office of Environment, Safety, and Health
EH-4	Office of Environmental Guidance
EM	Office of Environmental Management
EM-1	Assistant Secretary for Environmental Management
EM-2	Principal Deputy Assistant Secretary for Environmental Management
EM-30	Deputy Assistant Secretary for Waste Management
EM-40	Deputy Assistant Secretary for Environmental Restoration
EM-50	Deputy Assistant Secretary for Science and Technology
EM-60	Deputy Assistant Secretary for Nuclear Material and Facility Stabilization
EM-70	Deputy Assistant Secretary for Site Operations
EPA	Environmental Protection Agency
ER	Office of Energy Research
ERDF	Environmental Restoration Disposal Facility
FFCAct	Federal Facility Compliance Act
FM	Office of Field Management
g	gram
GTCC	Greater-than-Class C Low Level Waste
HQ	Headquarters
IAEA	International Atomic Energy Agency
LLW	Low-Level Waste
LLW SC	Low-Level Waste Steering Committee
LLWMTG	Low-Level Waste Management Task Group
mrem	millirem
M&O	Management and Operating (Contractor)

MLLW	Mixed Low-Level Waste
nCi	nanocurie
NE	Office of Nuclear Energy
NEPA	National Environmental Policy Act
NRC	Nuclear Regulatory Commission
PA	Performance Assessment
PEIS	Programmatic Environmental Impact Statement
PjMP	Project Management Plan
PRP	Performance Assessment Peer Review Panel
QA/QC	Quality Assurance/Quality Control
RADWASS	RAdioactive WAste Safety Series
RCRA	Resource Conservation and Recovery Act
RDTT	Research & Development Task Team
WAC	Waste Acceptance Criteria

XII. REFERENCES

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14. DOE 1996 Pollution Prevention Program Plan, Department of Energy, March 1996, (DRAFT).