



Department of Energy

Washington, DC 20585

July 31, 1996

The Honorable John T. Conway
 Chairman
 Defense Nuclear Facilities Safety Board
 625 Indiana Avenue, NW
 Suite 700
 Washington, D.C. 20004

Dear Mr. Chairman:

Enclosed is the initial Corrective Action Plan for Complex-Wide Vulnerabilities which addresses low-level waste management vulnerabilities and concerns common across the Department of Energy (DOE) complex. This plan is a deliverable pursuant to the commitment in Task Initiative IV.B.6.b.1 identified in the DOE's Implementation Plan, Revision I, for the Defense Nuclear Safety Board Recommendation 94-2. The complex-wide vulnerabilities and concerns were identified in the *Final Report Complex-Wide Review of DOE's Low-Level Waste Management ES&H Vulnerabilities*, of May 1996.

This Corrective Action Plan was prepared to identify and allow tracking of actions necessary to address these complex-wide vulnerabilities and concerns, including their time-lines, milestones, and their relative resource impacts. The Corrective Action Plan establishes the Task Initiatives of the Implementation Plan through which the resolution of the six complex-wide vulnerabilities and three concerns will be accomplished.

The Department has completed the actions identified under this commitment and proposes closure of the commitment.

Sincerely,

Alvin L. Alm
 Assistant Secretary for
 Environmental Management

Enclosure

RECEIVED
 AUG 1 1996
 OFFICE OF ENVIRONMENTAL MANAGEMENT



**U.S. Department of Energy
Office of Environmental
Management**

94-2 Complex-Wide Review

**Corrective Action Plan
Complex-Wide Vulnerabilities**

July, 1996

RECEIVED
1996 JUL 31 PM 5:14
DNF SAFETY BOARD



U. S. DEPARTMENT OF ENERGY

**Low-Level Waste Management Task Group
Deputy Assistant Secretary for Waste Management
Office of Environmental Management**

Title Page

Document Page: 94-2 Complex-Wide Review Corrective Action Plan
Complex-Wide Vulnerabilities

Publication Date: July 1996

Prepared by: Martin Letourneau, Manager
Low-Level Waste Management Task Group

Approval: Mark W. Frei
Mark Frei
DNFSB Recommendation 94-2
Senior Management Officer

RECEIVED
JUL 21 20 54
DNFSB OFFICE

U.S. DEPARTMENT OF ENERGY

Low-Level Waste Management Task Group
Deputy Assistant Secretary for Waste Management
Office of Environmental Management

**U.S. Department of Energy
Office of Environmental
Management**

94-2 Complex-Wide Review

**Corrective Action Plan
Complex-Wide Vulnerabilities**

July, 1996



U. S. DEPARTMENT OF ENERGY

**Low-Level Waste Management Task Group
Deputy Assistant Secretary for Waste Management
Office of Environmental Management**

TABLE OF CONTENTS

1.0	Executive Summary	1
2.0	Introduction	2
3.0	Organization and Management Structure to Implement the Corrective Action Plan	3
4.0	Findings, Responses/recommendations, and Planned Actions	5

COMPLEX-WIDE VULNERABILITIES

1	Inadequate LLW Generation Forecasting and Capacity Planning on a Complex-wide Basis.	6
2	Inadequacies in the Characterization of LLW Complicate Treatment, Storage, and Disposal	10
3	Storage of LLW for Which There Is an Identified Path Forward for Disposal	15
4	Storage of LLW under Inadequate Conditions	20
5	LLW for Which There Is No Identified or Technical Path Forward for Disposition	24
6	Performance Assessments Not Approved and Lacking Adequate Requirements	28

COMPLEX-WIDE CONCERNS

1	Inadequate Groundwater Monitoring for Radiological Constituents Associated with LLW Management Activities	33
2	Lack of National Environmental Policy Act Documentation for LLW Management Activities	37
3	Inadequate Emergency Response for LLW Management Activities	40

ENVIRONMENTAL MANAGEMENT CORRECTIVE ACTION PLAN FOR COMPLEX-WIDE VULNERABILITIES

1.0 EXECUTIVE SUMMARY

The Department of Energy (DOE), Office of Environmental Management (EM) completed an assessment of the low-level waste (LLW) management system for generation, treatment, storage, and disposal activities and programs at its sites which manage LLW. Forty-five site-specific vulnerabilities were identified across the 36 sites which were assessed. The primary purpose for and use of the site-specific vulnerabilities was to identify complex-wide vulnerabilities which were determined to be either inherent in or endemic across DOE's LLW management system and for which programmatic or complex-wide solutions would need to be developed. This analysis of the site-specific vulnerabilities was key to DOE's objective of establishing the dimensions of problems within DOE's LLW management system.

From this analysis, six complex-wide vulnerabilities were identified which capture the programmatic, technical, and institutional issues requiring DOE Headquarters and Field management attention. These six complex-wide vulnerabilities were identified by the Assessment Working Group (AWG) and Working Group Assessment Teams (WGATs) as representing the issues requiring the most urgent attention from DOE management across the LLW management system. These six complex-wide vulnerabilities were also determined by the AWG and WGATs to be an effective synthesis of the underlying issues, problems, and causes identified across the 45 site-specific vulnerabilities. The six complex-wide vulnerabilities are:

- Inadequate LLW forecasting and capacity planning;
- Ineffective characterization of LLW;
- Continued storage of LLW that has a path forward for disposal;
- Inadequate storage conditions for LLW;
- LLW for which there is no identified or technical path forward for disposition; and
- Performance assessments not approved and lacking adequate requirements.

In addition to the six complex-wide vulnerabilities, three complex-wide concerns were identified. While not determined to constitute complex-wide vulnerabilities, these concerns were determined to warrant discussion from the complex-wide LLW management perspective and to fall under the following topics:

- Inadequate groundwater monitoring for radiological constituents associated with LLW management activities;
- Lack of National Environmental Policy Act documentation for LLW management activities; and
- Inadequate emergency response for LLW management activities.

In response to these complex-wide vulnerabilities and concerns, the Office of Environmental Management has developed this Corrective Action Plan (CAP) to resolve these programmatic or complex-wide problems. DOE's 94-2 Team Leader and the Low Level Waste Management Group have the responsibility to ensure these issues are addressed under the current 94-2 task statements. Each issue will be addressed by actions under one or more 94-2 task initiatives. The milestones will be tracked through quarterly reports.

2.0 INTRODUCTION

The complex-wide review involved an evaluation of LLW management activities at 38 DOE facilities at 36 sites that actively manage LLW and MLLW. The evaluations were conducted as follows:

- 1) Working Group Assessment Teams (WGATs) visited eight sites (10 facilities) which account for over 77 percent of all LLW currently managed and expected to be generated across the DOE complex over the next 20 years: Fernald Environmental Management Project, Hanford Site, Idaho National Engineering Laboratory, Los Alamos National Laboratory, Nevada Test Site, Oak Ridge Reservation (Oak Ridge National Laboratory, K-25 Site, Y-12 Plant), Rocky Flats Environmental Technology Site, and Savannah River Site. Other sites were evaluated through document reviews and interviews with cognizant DOE Headquarters, Field Office, and site personnel.
- 2) The site-specific vulnerabilities identified by the assessment teams were analyzed to identify complex-wide vulnerabilities.
- 3) Complex-wide vulnerabilities were analyzed to identify underlying causal factors, contributing causes, and inherent programmatic, technical, and institutional issues.

The assessment has been documented and the results published in the Final Report, Complex-Wide Review of DOE's Low-Level Waste Management ES&H Vulnerabilities (DOE/EM-0280), May 1996.

This CAP was prepared to identify and allow tracking of the actions necessary to address these complex-wide vulnerabilities/concerns, including their time-lines, milestones, and the relative resource impacts thereof. The actions described in this CAP are intended to resolve the findings

described in Volume I of the Final Report and will be tracked by the Office of Environmental Management until closure of all issues is attained.

This CAP is also a deliverable identified in task initiative IV.B.6.b.1, *Milestone: Prepare initial complex-wide corrective action plan*, in the Implementation Plan responding to DNFSB Recommendation 94-2.

3.0 ORGANIZATION AND MANAGEMENT STRUCTURE TO IMPLEMENT THE CORRECTIVE ACTION PLAN

The Office of Waste Management (EM-30) has the lead for ensuring that this CAP for the complex-wide vulnerabilities is developed and implemented. As noted, this CAP has been prepared and is being implemented in accordance with DOE's Implementation Plan for DNFSB Recommendation 94-2, Revision 1 (April 1996). DOE's 94-2 Team Leader and the Low-Level Waste Management Task Group will ensure that the complex-wide vulnerability issues are effectively addressed under the current 94-2 task statements. As indicated in DOE's Implementation Plan, a commitment was made from the start of the Complex-Wide Review that the identified complex-wide vulnerabilities would be cross-walked to, and integrated within, the existing task commitments under 94-2.

The Complex-Wide Review Team and the Low-Level Waste Management Task Group have both reviewed these complex-wide vulnerabilities/concerns and have determined that the appropriate corrective actions can and will be addressed within the context of the existing 94-2 tasks. This CAP summarizes each complex-wide vulnerability/concern and provides a cross-walk from each vulnerability to the appropriate 94-2 task initiative(s). As corrective actions are identified and addressed, the results which impact the integrated program will be incorporated into the systems engineering process. The summary below for each complex-wide vulnerability/concern explains how each will be addressed and the 94-2 task initiatives that establish the methodology and schedule for resolving each issue.

The following personnel are the points of contact:

Role	Name	Org.	Responsibility
Deputy Assistant Secretary for Waste Management	Steve Cowan (202) 586-0370	EM-30	Overall responsibility for efforts described in the CAP. Ensures that funding is committed and the required priority is placed on the task initiatives.

Role	Name	Org.	Responsibility
94-2 Implementation Senior Management Officer	Mark Frei (301) 903-7201	EM-34	Provides senior management direction to implementation of the CAP. Serves as the point of contact for raising issues to management attention and for securing needed resources.
Team Leader - Low-Level Waste Management Task Group	Martin Letourneau (301) 903-7656	EM-35	Manages and coordinates overall effort on a day-to-day basis, including allocation and use of resources. Resolves issues among technical areas of the CAP. Identifies and requests resources necessary to accomplish complex-wide CAP commitments. Communicates with DNFSB staff on a regular basis.
Task Managers	Warren Black (Systems Engineering) Julie Ayres (Regulatory Structure and Process; also Research and Development) Virgil Lowery (Radiological Assessments) Matt Zenkovich (LLW Projections)	EM-35 EM-32 EM-35 EM-35	Manage day-to-day technical efforts associated with implementation of task (activities for and resolution of complex-wide vulnerabilities).

4.0 FINDINGS, RESPONSES/RECOMMENDATIONS, AND PLANNED ACTIONS

Provided below is a summary for each complex-wide vulnerability/concern including the finding, the response/recommendations, and the planned actions for each of the six complex-wide vulnerabilities and three concerns from Volume I of the CWR Final Report. In the discussions below, the term LLW is used to include both LLW [without hazardous (regulated constituents)] and mixed LLW unless specifically noted otherwise. Since the tracking mechanism and references are the same for all vulnerabilities and concerns, they are provided here rather than repeated for each.

Tracking Mechanism:

All DNFSB milestones are tracked by the Office of the Departmental Representative (S-3.1) through the Safety Issues Management System (SIMS). EM-30 will track the 94-2 milestones through its 94-2 Project Management Plan. The EM-30 Management Officer and LLW Management Task Group Team Leader receive monthly updates on 94-2 task status and will receive quarterly updates on CWR CAPs. Quarterly reports are subsequently prepared and provided to the DNFSB by EM-30 detailing progress in addressing the 94-2 actions. Implementation of each corrective action will be subject to verification through these mechanisms prior to submission of task deliverables to the DNFSB.

References:

- a) CWR Final Report, DOE/EM-0280, May 1996
- b) Implementation Plan for DNFSB 94-2, Revision 1, April 1996
- c) 94-2 Implementation Plan, Project Management Plan, Revision 1, June 1996

COMPLEX-WIDE VULNERABILITIES

Finding No.: CWV 1

Finding Description: **Inadequate LLW generation forecasting and capacity planning on a complex-wide basis.**

Two (2) site-specific vulnerabilities at two sites were identified by the WGATs which contributed to the identification and development of this complex-wide vulnerability. A concern was also identified at Nevada Test Site related to LLW generation forecasting and capacity planning. The site-specific vulnerabilities were identified at Los Alamos National Laboratory (LANL-6) and Rocky Flats Environmental Technology Site (RFETS-WHR-01). In addition to being identified as a site-specific vulnerability, inadequate forecasting was found to contribute significantly to other vulnerabilities (e.g., storage of waste with a path forward; storage of waste under inadequate conditions). As a contributing cause to other vulnerabilities, inadequate forecasting and capacity planning is characterized as an inherent vulnerability.

The primary impact of this complex-wide vulnerability was determined to be in the area of generation. Unexpected changes in waste quantity or type can cause waste management capacity difficulties, not the least of which is that generator facilities may be required to store waste for extended periods of time in facilities that are not designed or intended for that purpose. Holding wastes in ad hoc accumulation and storage locations increases risks for releases to the environment and exposures to workers. Other LLW management facilities (e.g., treatment) could also be affected to the extent that inadequate or inaccurate waste forecasting affects planning and sizing of facilities.

The primary cause of this complex-wide vulnerability is programmatic. Effective management and oversight relies on planning of waste management capacities for treatment, storage, and disposal based on the best available information. In order to enhance the likelihood that appropriate (neither too much nor too little) capacity for the types of waste generated is available when needed, generator forecasts need to be reasonably accurate both in terms of quantity and waste type. Inadequate or inaccurate waste generation forecasts can result in (1) adequate management capacity not being available when needed and (2) appropriate capability not being available for special types of waste.

Conditions and weaknesses were identified at other sites related to LLW generation forecasting and capacity planning. However, the two site-specific vulnerabilities identified by the WGATs which led to this complex-wide vulnerability were related to the environmental restoration and decontamination and decommissioning programs. These two programs are of particular concern because of the inherent difficulty with estimating the quantities and types of waste that may be generated prior to conducting cleanup activities. In the past, for environmental restoration, projected LLW volume generation generally exceeded existing disposal capacities, however, as projections have become more refined and restoration waste undergoes volume reduction or

other treatment it is likely that disposal capacities will be adequate. For decommissioning projects, new policies are being developed which will further define future LLW volume projections. As a result, potential treatment, storage, and disposal problems may arise and complex-wide optimization of capacity would be hindered.

This complex-wide vulnerability is further exacerbated by a lack of incentives for generators to provide better forecasts. Often in the DOE complex, waste management is provided as a no cost or artificially low cost service to generators.

Risk Ranking:

The risks associated with this complex-wide vulnerability are low for both the worker and the environment receptors based on the two related site-specific vulnerabilities.

Response/Recommendation:

Requirements for comprehensive waste generation forecasting and capacity planning supported by detailed guidance are needed to enhance consistency in the information developed by generators and to promote timely development of adequate LLW management capabilities and capacities across the DOE complex. Specific forecasting aspects that need attention at the complex-wide level include collection of information (frequency of collection, sources of information, precision) and understanding of the limits and caveats relevant to its use.

Optimization of LLW management strategies and practices can be strengthened by improvements in coordinating, planning, and integrating complex-wide treatment, storage, and disposal needs with capacities. Better understanding is needed of current capacity, plans for additional capacity, and capabilities.

DOE should also incorporate effective accountability features into its waste management programs to encourage generators to provide reliable waste forecasts. However, it should be noted that such mechanisms may not be sufficient for activities such as environmental restoration and decontamination and decommissioning. Environmental restoration and decontamination and decommissioning projects present special difficulty in estimating waste quantities and generation rates because of the uncertainties in the extent, type, and severity of contamination that will be found.

The focus of the corrective actions to address this vulnerability should be on improving DOE's complex-wide waste forecasting to promote timely development of adequate LLW management capabilities and capacities. The approaches for achieving this goal will include development of an understanding of present and future disposal availability and detailed guidance on acceptable methods to project future waste streams with constantly improving accuracy. These actions that will be taken towards timely development of LLW capabilities and capacities will reduce indefinite storage of wastes, storage of wastes in ad hoc accumulation areas, and generally reduce opportunities for releases to the environment and exposures to workers.

Planned Corrective Action:

Correction of this complex-wide vulnerability will be addressed under the LLW Projections task initiative of DOE's 94-2 response effort. The scope of the applicable task initiative builds on current DOE programs and activities to develop a routine program for projecting waste volumes that will be generated; identifying existing waste inventories; establishing the characteristics of the wastes; and identifying existing and needed waste treatment, storage, and disposal capacities. The task initiative will be accomplished and documented through the following activities:

Generation of the Report on Current and Planned Low-Level Waste Disposal Capacity.

A survey has been conducted to obtain data that DOE has not routinely collected, such as field office assumptions for LLW generation and disposal rates, the future availability of LLW disposal capacity at DOE sites, LLW characteristics (including radionuclide content and concentrations), and permitting/operational restrictions at DOE's disposal facilities. Additionally, the survey looks at commercial disposal capacity and its potential use by DOE generators. The information collected on LLW disposal capacity will be documented in a report detailing the complex-wide volumetric disposal capacities for and generation of LLW.

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

Based on information currently collected on LLW and the additional information collected through the survey discussed above, DOE will develop a complex-wide LLW Projections Program. This program will identify the information needs and the methodologies that will be used by DOE Headquarters and the Field Offices in managing LLW. The program will be used to establish baseline information reflecting the current LLW management status and to project future LLW management information and needs. The program will also have provisions which will require the comparison of projections to actuals and to critique the program with the purpose of improving the methods and accuracy of the information collected and generated. This effort will expand the current site-specific approaches for projecting future LLW generation rates and corresponding disposal needs into a DOE-wide approach that can address the increases in LLW volumes expected from environmental restoration and facility decommissioning activities.

While a major benefit of developing a LLW Projections Program will be in improving overall management of LLW treatment, storage, and disposal operations from the top-down perspective, another benefit will be enhancement of specific operations that contribute significantly to other complex-wide vulnerabilities. As discussed in the planned corrective actions for other vulnerabilities that have a waste storage component, fixing the problems with inadequate LLW generation forecasting and capacity planning is a crucial step in determining the size of the waste storage, treatment, and disposal problems DOE is working to correct.

For this complex-wide vulnerability, the issues and recommendations are directly addressed by the activities described above and completing these 94-2 task initiatives will complete the

corrective actions for this finding. No additional activities outside of the planned 94-2 task initiatives were identified as needed to address this vulnerability. Implementation of these corrective actions will involve participation of and coordination with DOE field offices and site operations in order to utilize the valuable expertise available and ensure development of a comprehensive and robust program to address this particular vulnerability and support resolution of related vulnerabilities.

Schedule and Costs:

Milestone: Issue Low-Level Waste Disposal Capacity Report, Revision 0.
Due Date: July 31, 1996.

Milestone: Complete DOE Low-Level Waste Projections Program Guidance.
Due Date: December 31, 1996.

Milestone: Issue Low-Level Waste Disposal Capacity Report, Revision 1.
Due Date: September 30, 1997.

Costs are discussed in DOE's Project Management Plan for implementation of DNFSB Recommendation 94-2. No additional cost or schedule impacts are expected under this CAP.

Responsibility:

The LLW Management Task Group is responsible for these two LLW projection tasks. The key personnel are:

Task Manager - LLW Projections: Matt Zenkovich, EM-35
Technical Lead - LLW Projections: Robert Fleming, EM-43

Finding No: CWV 2

Finding Description: **Inadequacies in the characterization of LLW complicate treatment, storage, and disposal.**

Six (6) site-specific vulnerabilities were identified by the WGATs which contributed to the identification and development of this complex-wide vulnerability. A concern was also identified at Hanford related to waste characterization. Site-specific vulnerabilities were identified at four sites including: Idaho National Engineering Laboratory (INEL-006), Los Alamos National Laboratory (LANL-1, LANL-2), Oak Ridge Reservation (ORR-ORNL-MO-DS1, ORR-WC-DT1), and Rocky Flats Environmental Technology Center (RFETS-AAF/HLP/DPH/WHR-01). Due to the number of sites at which supporting site-specific vulnerabilities were identified, this complex-wide vulnerability was classified as an endemic vulnerability.

The primary impacts of this complex-wide vulnerability were determined to be in the areas of LLW and MLLW generation and storage. Inadequacies in waste characterization limit the usefulness of characterization information to support treatment, storage, or disposal activities. As a result, generator facilities are faced with: (1) trying to prove with inconclusive information that the waste material meets waste acceptance criteria for waste management facilities, (2) undertaking additional analysis (at some cost) of the material to obtain adequate characterization information, or (3) inferring the waste characteristics from limited available information ("process knowledge") which may be unreliable. Inadequate characterization of MLLW and LLW, therefore, also contributes to increased storage of wastes, consuming available storage capacity more quickly than anticipated. Indefinite and ad hoc storage at locations not intended for storage increases risks for releases to the environment and exposure to workers. Risks to workers are also increased during waste generation and handling because inadequate characterization information may impact the identification and implementation of proper personnel protection and handling measures.

The primary causes of this complex-wide vulnerability are both programmatic and technical. From a management and oversight perspective, inadequate characterization can result in too little information to make appropriate decisions on options for treatment, storage, and disposal. DOE's waste characterization requirements are not always adequate to promote comprehensive and effective program direction. Additionally, they do not provide appropriate linkages among waste characterization, waste acceptance criteria, and performance assessments. From a waste characterization and packaging perspective, inadequately characterized waste is also a result of certain technical limitations.

The site-specific vulnerabilities identified by the WGATs which led to this complex-wide vulnerability were related to inadequate radionuclide characterization, accuracy and completeness of characterization, inconsistencies with the use of "acceptable knowledge," and

high-activity special case waste for which characterization was technically difficult. As a result, waste may be stored for long periods of time instead of moving forward for disposition.

This complex-wide vulnerability is also exacerbated by a lack of clear organizational accountability for satisfying storage, treatment, and disposal criteria. In the absence of accountability, generators are released from a primary responsibility for satisfying LLW and MLLW management requirements.

Risk Ranking:

The risks associated with this complex-wide vulnerability are medium to low for the public, workers, environment, and disposal facility performance receptors based on the six related site-specific vulnerabilities.

Response/Recommendation:

A comprehensive and integrated approach to waste characterization is needed to promote effective and consistent program elements. However, necessary site-specific requirements should be retained to support unique site operations. The goals of such an approach should be to develop waste characterization information to the level of detail necessary for the required treatment, storage, and disposal and to account for potential site-to-site and complex-wide linkages. An important complement to characterization is a complex-wide waste certification program, and the AWG recommended that effective guidance be developed to support a strong waste characterization program to achieve implementation of the existing provision in DOE Order 5820.2A. A program based on the identification of high level needs and data quality objectives for all characterization would promote consistency while allowing site-specific developments as necessary.

The focus of corrective actions to address this vulnerability should be on improving DOE's characterization programs and requirements by identifying and constructing a level of program consistency that will promote more efficient planning and LLW management activities. The approaches for achieving this goal will include identifying the functions/activities that are a necessary part of waste characterization within the DOE LLW management system, determining the requirements that are needed to control waste characterization activities, and providing guidance on acceptable methods to implement the functions/activities and requirements to adequately and cost-effectively characterize each waste stream. The guidance will need to address and allow for the fact that there is a wide range of types and associated hazards for DOE's LLW. Increased compatibility between data collected at generation and subsequent treatment, storage, and disposal needs regarding characterization information will reduce indefinite and ad hoc storage of waste and increase the ability to quickly and properly apply the correct LLW management techniques. This would minimize opportunities for releases to the environment and exposures to the workers and the public.

Planned Corrective Action:

Correction of this complex-wide vulnerability will be addressed under the Systems Engineering for the LLW Program and the Regulatory Structure and Process tasks initiatives of DOE's 94-2 response effort. The applicable tasks initiatives are to compile and document the functions/activities of a LLW program that are necessary to demonstrate protectiveness of workers, members of the public, and the environment; identify the essential requirements of these functions; and develop implementing guidance for these essential requirements. The initiatives will be accomplished and documented through the following activities:

Low-Level Waste System Description Document.

The Department will analyze LLW management systems to determine what functions/activities are necessary to demonstrate protectiveness of workers, members of the public, and the environment. Waste characterization will be one the areas reviewed during the analysis to establish the program functions/activities that are necessary to demonstrate protectiveness.

The analysis of the LLW characterization area will: 1) include determining what functions/activities are necessary to identify the appropriate level of characterization needed for the management of a waste stream, including data quality objectives; 2) identify the characterization information required for management of a waste stream; and 3) evaluate the adequacy of the waste characterization data provided, including a determination that data quality objectives have been met. Waste characterization information can be obtained from a wide variety of functions/activities including for example: recording process knowledge, weighing containers, analyzing samples, and gamma scans. These functions/activities result in providing attributes of each waste stream such as: types and forms of materials, radionuclides present and associated amounts/concentrations, types and amounts/concentrations of hazardous and regulated constituents, and waste confinement and packaging configurations. Additionally, this analysis will identify the functions/activities that can generate data on waste streams, the functions/activities that need data before being performed, and the minimum level of waste characterization necessary to support waste management activities.

The results of the LLW System Description Document, including the waste characterization functions/activities, and the output of the Research and Development Task Team (see Complex-Wide Vulnerability CWV 5 planned corrective action discussion) will be used in the Regulatory Structure and Process task initiative to develop policies, requirements, and guidance to implement the functions/activities necessary to demonstrate protectiveness of workers, members of the public, and the environment under the following tasks:

Identify Essential Requirements for Managing LLW

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 results

of the Complex-Wide Review and the evaluations of U.S. commercial and international requirements and standards will be used as major parts of the identification process, as well as the functional analysis developed by the Systems Engineering for the LLW Program task.

The existing requirements of the waste characterization functions/activities will be evaluated to identify additional requirements that are needed to prevent the continued mismatch between data historically collected on waste streams and the data needed to achieve safe and appropriate treatment, storage, and disposal of LLW. From the inconsistencies between data available and the set of essential data requirements, new data requirements will be identified and developed to ensure consistency between waste generator characterization functions/activities and waste management (through to disposal) data needs.

Develop Implementation Guidance for Managing LLW.

As part of the identification and development of policies and requirements for LLW management functions/activities, implementation guidance will be developed, and necessary documentation will be provided in time to support the Radioactive Waste Management Order revision. 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. All guidance will consider and address the fact that there is a wide range of types and associated hazards for DOE's LLW.

Additional guidance will be developed for waste characterization functions/activities' requirements to address the lack of sufficient guidance for existing requirements and/or new requirements, as appropriate. Guidance will be developed with consideration of options for cost-effective implementation. The many possible activities that generate data of potential use in waste characterization should provide a sufficient number of implementation alternatives to satisfy the essential requirements.

The issues identified by and recommendations made for correcting this complex-wide vulnerability are addressed by the activities described above as subparts of broader 94-2 task initiatives. These three tasks will complete the corrective action for this finding. No additional activities outside of the planned 94-2 task initiatives were identified as needed to address this vulnerability. The DOE field office and site operations support for waste characterization expertise will be especially invaluable in ensuring a detailed description of the LLW management system in this area is developed, the set of essential requirements are identified, and the options for cost-effective implementation are provided DOE system-wide.

Schedule and Costs:

Milestone: Prepare LLW System Description Document.

Due Date: September 30, 1996.

Milestone: Report identifying Essential LLW Management Requirements.

Due Date: February 28, 1997.

Milestone: Issue Implementation Guidance and Technical Standards to support Essential LLW Management Requirements.

Due Date: February 28, 1997.

Costs are discussed in DOE's Project Management Plan for implementation of DNFSB Recommendation 94-2. No additional cost or schedule impacts are expected under this CAP.

Responsibility:

The LLW Management Task Group is responsible for the Systems Engineering task. The key personnel are:

Task Manager - Systems Engineering: Warren Black, EM-35

Technical Lead - Systems Engineering: Bob Harris, LMIT

The LLW Management Task Group is responsible, in consultation with the Office of Environment (EH-4), for the Regulatory Structure and Process tasks. The key personnel are:

Task Manager - Regulatory Structure and Process: Julie Ayres, EM-32

Technical Lead - Regulatory Structure and Process: Ed Regnier, EH-412

Finding No: CWV 3

Finding Description: Storage of LLW for which there is an identified path forward for disposal.

Five (5) site-specific vulnerabilities were identified by the WGATs which contributed to the identification and development of this complex-wide vulnerability. Site-specific vulnerabilities were identified at Fernald Environmental Management Project (FEMP-Plant1-01, FEMP Recycle-04), Idaho National Engineering Laboratory (INEL-004) and Rocky Flats Environmental Technology Site (RFETS-JMC-01, RFETS-HLP-01). While supporting site-specific vulnerabilities were only identified at three sites, storage of LLW for which there is an identified path forward was identified as a concern at four other sites (Hanford, Los Alamos, Savannah River, Oak Ridge), and as such was determined to be an endemic vulnerability.

The primary impact of this complex-wide vulnerability was determined to be in the area of storage. The impact on storage is that lack of shipping waste to disposal areas results in larger accumulations of waste at storage areas than were expected. Excessive accumulations of waste present many complications, including overflow of waste into areas not intended for waste storage, subjecting waste packages to longer and potentially more deleterious conditions than those for which the packages were designed. The potential risks for releases to the environment and exposures to workers are thus increased.

The primary cause of this complex-wide vulnerability is programmatic. From a management and oversight perspective, lack of demonstrated commitment to a higher priority and commensurate funding results in delayed clean-up progress and increased storage of waste. Without management emphasis and direction, implementation of appropriate disposal options proceed slowly. DOE and M&O priorities are significantly influenced by regulatory requirements, especially those requirements that include civil or criminal penalties. Management of hazardous materials and waste is an example of an activity with regulatory drivers that generally takes precedence over LLW management. In the absence of comparable regulatory requirements for timely management of LLW, these activities tend to receive lower priorities and, therefore, receive less management attention than activities with regulatory drivers.

The site-specific vulnerabilities identified by the WGATs which led to this complex-wide vulnerability were related to identified options for disposal of stored waste; however, demonstrated progress to disposition waste was lacking or slow. Contributing conditions to these vulnerabilities included lack of specific requirements to dispose of LLW, competing management priorities and funding, management of materials as LLW that could be recycled and an absence of radiological de minimus values for release of scrap/recyclable materials that may be occupying storage space needed for higher risk materials.

Risk Ranking:

The risks associated with this complex-wide vulnerability are low for the workers and environment receptors based on the five related site-specific vulnerabilities.

Response/Recommendation:

The scope and extent of storage in the DOE complex of LLW and material that has an identified path forward for disposal is not well known but the information developed under the complex-wide review suggests that the quantities are excessive (approximately one million cubic feet) and should be better understood. If further investigation confirms the suspected scale of the problem, plans and actions appropriate for reducing risk and reducing the LLW management mortgage should be developed and the resources necessary to effect waste disposition should be prioritized.

The focus of the corrective actions to address this vulnerability should be on developing, adopting, and enforcing requirements that promote timely management of wastes for which there is an identified path forward for disposal, particularly in cases where protracted storage increases the potential for unnecessary exposures and/or releases. The approaches for achieving this goal will include identifying LLW in the storage inventory and projecting future amounts that have a path forward for disposal; determining the functions/activities presently associated with DOE's LLW storage systems; and developing the requirements that are appropriate to control the ad-hoc, long-term storage of wastes that can be disposed of in a straightforward manner. Identifying the missing requirements to remove LLW from storage within some limit (e.g., after a reasonable duration or after accumulating an amount that allows cost-effective shipment or treatment) and incorporating these timely management requirements into the goals of the DOE LLW management program, with enforcement provisions as appropriate.

Planned Corrective Action:

Corrective actions to address this complex-wide vulnerability will be addressed under the LLW Projections, Systems Engineering, and Regulatory Structure and Process task initiatives of DOE's 94-2 response effort. These initiatives will address the timely management of wastes for which there is an identified path forward for disposal and result in the development of appropriate requirements through the following tasks:

The LLW Projections task initiative will help by providing an estimate of the scope of the problem.

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

Based on information currently collected on LLW and on additional information to be collected on current and planned disposal capacity, DOE will develop a complex-wide LLW Projections Program. This program will identify the information needs and the methodologies that will be

used by DOE Headquarters and the Field Offices in managing LLW. The program will be used to establish baseline information reflecting the current LLW management status and to project future LLW management information and needs. This effort will expand the current site-specific approaches for projecting future LLW generation rates and corresponding disposal needs into a DOE-wide approach that can address the increases in LLW volumes expected from environmental restoration and facility decommissioning activities.

Included in the LLW inventory information will be characteristics of LLW sufficient to identify waste which has a path forward for disposal. The inventory and projections information will be used to provide the basis for determining if the present and/or future inventories are or will become excessive and provide the potential for increased risks to workers, members of the public, and/or the environment.

The Systems Engineering task initiative will help by identifying the LLW management functions/activities that apply to LLW storage as part of the following task.

Low-Level Waste System Description Document.

The Department will analyze LLW management systems to determine what functions/activities are necessary to demonstrate protectiveness of workers, members of the public, and the environment. Waste storage will be one the areas reviewed during the analysis to establish the program functions/activities that are necessary to demonstrate protectiveness.

The functions/activities currently in use for the storage of LLW will be identified and existing interfaces and requirements evaluated to see when allowing storage under present conditions increases the potential for unnecessary exposures and/or releases. This will facilitate the identification of additional functions/activities that may be needed to ensure safe and secure storage and to achieve timely disposition of LLW that has a path forward for disposal.

The Regulatory Structure and Process task initiative will tie together the effort to scope out the magnitude of the storage problem and the parallel effort to describe the LLW storage systems into a set of essential requirements for limits on LLW storage as part of the following task.

Identify Essential Requirements for Managing LLW.

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 results of the Complex-Wide Review and the evaluations of U.S. commercial and international requirements and standards will be used as major parts of the identification process, as well as the functional analysis developed by the Systems Engineering of LLW.

Once the necessary waste storage functions/activities have been identified during the analysis described above, requirements that are appropriate to control the storage of wastes that have an

identified path forward can be developed. These requirements will be designed to enhance LLW management by moving LLW from storage through to disposal in a timely manner (i.e., before a predetermined time duration or LLW degradation occurs, or after a sufficient amount is collected to minimize costs of shipment, treatment, or disposal). The requirements that are developed will provide for the flexibility to account for the benefits of efficient use of existing LLW storage capabilities and yet establish a set of enforcement provisions that appropriately minimize unnecessary risks.

The planned activities in DOE's 94-2 responses will lead to a thorough review of the timely management issue and be sufficient for correction of the causes for this vulnerability. The use of the results from three different task initiatives for resolution of this complex-wide vulnerability demonstrates the degree to which these initiatives are interrelated and highlights the need for intense and continuous support from the DOE field office and site operations groups in these efforts.

Schedule and Costs:

Milestone: Prepare LLW System Description Document
Due Date: September 30, 1996.

Milestone: Complete DOE Low-Level Waste Projections Program Guidance.
Due Date: December 31, 1996.

Milestone: Report identifying Essential LLW Management Requirements.
Due Date: February 28, 1997.

Costs are discussed in DOE's Project Management Plan for implementation of DNFSB Recommendation 94-2. No additional cost or schedule impacts are expected under this CAP.

Responsibility:

The LLW Management Task Group is responsible for the LLW projection task. The key personnel are:

Task Manager - LLW Projections: Matt Zenkovich, EM-35
Technical Lead - LLW Projections: Robert Fleming, EM-43

The LLW Management Task Group is responsible for the Systems Engineering task. The key personnel are:

Task Manager - Systems Engineering: Warren Black, EM-35
Technical Lead - Systems Engineering: Bob Harris, LMIT

The LLW Management Task Group is responsible for the Regulatory Structure and Process task.
The key personnel are:

Task Manager - Regulatory Structure and Process:	Julie Ayres , EM-32
Technical Lead - Regulatory Structure and Process:	Ed Regnier, EH-412

Finding No: CWV 4

Finding Description: Storage of LLW under inadequate conditions.

Ten (10) site-specific vulnerabilities were identified by the WGATs which contributed to the development of this complex-wide vulnerability. Site-specific vulnerabilities were identified at the following five sites: Fernald Environmental Management Project (FEMP-Bldg. 65-03, FEMP-Plant 1-01, FEMP- Silos-02), Hanford (HAN-JYB-01 HAN-DAO-2), Idaho National Engineering Laboratory (INEL-004), Los Alamos National Laboratory (LANL-1), Oak Ridge Reservation (ORR-ER-DL1, ORR-OM-WT1) and the West Valley Demonstration Project (WVDP-LSA-1). Due to the number of sites at which supporting site-specific vulnerabilities were identified, this complex-wide vulnerability was classified as an endemic vulnerability.

The primary impact of this complex-wide vulnerability was determined to be in the area of storage. Conditions to which stored waste is subjected are harsher than the containers can be expected to endure without significantly increasing the possibility of damage. The increased stress can lead to storage conditions that are not acceptable and can result in increased potential for releases of radioactive waste to the environment and exposures to workers and the public.

The primary causes of this complex-wide vulnerability are programmatic, technical, and implementation. From a programmatic perspective, lack of requirements and implementation of requirements related to the storage conditions for LLW result in storage conditions that are not acceptable and can lead to releases of radioactive material and to worker exposures.

From a design and construction perspective, the conditions under which waste packages are stored were found to be inconsistent with a number of parameters such as the resistance of the packaging material to deterioration by corrosion, heat, light, and other stresses. Also, volatility of the contained waste was not always considered in evaluating the potential for pressurization.

From an operations and maintenance perspective, inadequate storage conditions were determined to be a result of ad hoc storage planning. In most cases, another contributing cause was found to have resulted in an inability to further disposition the waste. However, adequate contingencies had not been identified, resulting in inadequate storage conditions.

In each of the supporting site-specific vulnerabilities, inadequate storage conditions that were identified were due primarily to: the lack of requirements addressing storage conditions including engineering controls (e.g., cover, temperature controls, etc.); prolonged exposure of waste packages to the elements; lack of secondary containment or container design; or ad hoc storage planning. Often storage facility deficiencies result from storing waste in generator accumulation areas not intended for long term storage. Inadequate storage conditions, at some sites, could lead to potential releases to the environment and increased worker exposures.

Risk Ranking:

The risks associated with this complex-wide vulnerability are medium to low for the public, workers, environment, and disposal facility performance receptors based on the ten related site-specific vulnerabilities.

Response/Recommendation:

Requirements should be developed identifying proper conditions for storage of waste including limits on storage time, protection from the elements, secondary containment, and appropriate protection from natural events and phenomena. Additionally, optimization of LLW management strategies and practices can strengthen coordination, planning, and integrating complex-wide treatment, storage, and disposal needs with capacities.

The focus of corrective actions to address this vulnerability should be on developing requirements for adequate LLW storage conditions and to identify waste streams that do not meet proper waste management conditions (i.e., do not satisfy criteria for treatment, storage, and/or disposal facilities). The approach would include determining the functions/activities presently associated with DOE's LLW storage systems to identify when storage under present conditions is inadequate, identifying the set of integrated LLW management functions/activities that would constitute adequate storage conditions, developing the requirements that are appropriate to adequate storage of wastes at each LLW management facility, and providing guidance on implementation of the functions/activities and requirements. The issue of including enforcement provisions will also be evaluated. One LLW storage requirement would necessarily be for each site to identify LLW not stored under adequate conditions and timely corrective action to minimize the potential for unnecessary exposures or releases.

Planned Corrective Action:

Corrective actions to address this complex-wide vulnerability will be addressed under the Systems Engineering and Regulatory Structure and Process task initiatives of DOE's 94-2 response effort. Systems Engineering is responsible for identifying and integrating all necessary planning and management activities under the following task and will address waste storage as a major subpart of this effort.

Low-Level Waste System Description Document

The Department will analyze LLW management systems to determine what functions (activities) are necessary to integrate the LLW program and allocate existing requirements to identify where additional requirements are needed. 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.

For waste storage, the analysis of the overall LLW management program will identify the functions/activities that are presently used. This set of current functions/activities will be evaluated and integrated into a system with storage functions/activities necessary to achieve adequate storage conditions. The associated requirements, goals, and assumptions can then be assigned to the functions/activities that should be in an effective LLW management system. New requirements and goals applicable to adequate conditions would include such topics as allowable packaging configurations and storage locations, limits on storage time, protection from environmental stresses (sunlight, precipitation, severe weather, and other natural phenomena), and provisions for secondary containment.

The Regulatory Structure and Process task initiative is responsible for taking the enhanced system description for overall LLW management and developing the set of essential requirements and implementation guidance under the following tasks. One significant part of the effort will be to evaluate the many LLW storage functions/activities, and their corresponding requirements, goals, and assumptions, and develop a concise and useful set of essential requirements.

Identify Essential Requirements for Managing LLW

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 results of the Complex-Wide Review and the evaluations of U.S. commercial and international requirements and standards will be used as major parts of the identification process, as well as the functional analysis developed by the Systems Engineering of LLW.

From this overall effort, the essential requirements for adequate storage conditions will be identified, including an implementation requirement to eliminate storage under inadequate conditions. This effort will identify a set of requirements for safe storage that provides suitable flexibility to efficiently use existing LLW storage capabilities while establishing enforcement provisions that minimize unnecessary risks. A goal will be to ensure wastes placed into storage in the future are stored only under adequate conditions and wastes presently stored under inadequate conditions are addressed in a timely manner.

Develop Implementation Guidance for Managing LLW.

As part of the identification and development of policies and requirements for LLW management functions/activities, implementation guidance will be developed, and necessary documentation will be provided in time to support the Radioactive Waste Management Order revision. 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. All guidance will consider and address the fact that there is a wide range of types and associated hazards for DOE's LLW.

Additional guidance will be developed for waste storage functions/activities' requirements to address the lack of sufficient guidance for existing requirements and/or new requirements, as appropriate. Guidance will be developed with consideration of options for cost-effective implementation.

This issue is one of the broadest that needs resolution since storage is a part of most LLW management operations as well as a function/activity in and of itself. The concerns and recommendations for this complex-wide vulnerability will be addressed by the tasks (only briefly summarized) above and will correct this finding. Although no additional tasks outside of DOE's 94-2 response effort are proposed to address this complex-wide vulnerability, the breadth of the effort ensures that all DOE field offices and site operations will participate in the details of developing the description of adequate LLW storage conditions and converging on the set of essential requirements.

Schedule and Costs:

Milestone: Prepare LLW System Description Document
Due Date: September 30, 1996.

Milestone: Report identifying Essential LLW Management Requirements.
Due Date: February 28, 1997.

Milestone: Issue Implementation Guidance and Technical Standards to support Essential LLW Management Requirements.
Due Date: February 28, 1997.

Costs are discussed in DOE's Project Management Plan for implementation of DNFSB Recommendation 94-2. No additional cost or schedule impacts are expected under this CAP.

Responsibility:

The LLW Management Task Group is responsible for the Regulatory Structure and Process task described above. The key personnel are:

Task Manager - Regulatory Structure and Process: Julie Ayres , EM-32
Technical Lead - Regulatory Structure and Process: Ed Regnier, EH-412

The LLW Management Task Group is responsible for the Systems Engineering task described above. The key personnel are:

Task Manager - Systems Engineering: Warren Black, EM-35
Technical Lead - Systems Engineering: Bob Harris, LMIT

Finding No: CWV 5

Finding Description: LLW and other materials for which there is no identified or technical path forward for disposition.

Eight (8) site-specific vulnerabilities were identified by the WGATs which contributed to the development of this complex-wide vulnerability. Site-specific vulnerabilities were identified at the following seven sites: Fernald Environmental Management Project (FEMP-Recycle-04), Hanford (HAN-CJB-2), Idaho National Engineering Laboratory (INEL-004), Oak Ridge Reservation (ORR-MO-JA1) Rocky Flats Environmental Test Site (RFETS-WHR-01, RFETS-HLP-01), Sandia National Laboratory - New Mexico (SNL-M01), and the Savannah River Site (SRS-V-96-03). Due to the number of sites at which supporting site-specific vulnerabilities were identified, this complex-wide vulnerability was classified as an endemic vulnerability.

The primary impact of this complex-wide vulnerability was determined to be in the areas of storage and disposal. This vulnerability results in the inability of sites to properly manage large volumes of waste for which there is no identified or technical path forward for disposition. As a result, this waste and some potentially excess material is stored indefinitely at the sites where it has been generated. In some cases, the specific radionuclides in the waste result in an inability to transport the waste to an appropriate disposal facility. The continued storage of this waste increases the risk of eventual release to the environment or worker exposures.

The primary causes of this complex-wide vulnerability are programmatic and technical. The programmatic causes associated with the vulnerability revolve around the lack of development of alternatives and current management and oversight practices associated with the generation of wastes for which there is no path forward for disposal. The technical issues associated with this vulnerability include lack of technical alternatives for waste characterization and packaging, and a lack of safe disposal alternatives.

The site-specific vulnerabilities identified by the WGATs which led to this complex-wide vulnerability were related to waste or other materials which did not have an identified disposal path forward, including mixed waste disposal, waste that can not be disposed on-site due to performance assessment constraints, waste that exceeds Greater than Class C criteria defined in 10 CFR 61, waste that cannot meet an existing on-site or off-site WAC for disposal, excess material in storage not classified as waste, classified mixed waste, and uncharacterized legacy waste.

Risk Ranking:

The risks associated with this complex-wide vulnerability are low for the public, workers, and environment receptors based on the eight related site-specific vulnerabilities.

Response/Recommendation:

Senior management support is required to focus effort on developing complex-wide plans for management of waste for which there is no identified or technical path forward; for developing approaches for characterization of high-activity waste; and for developing alternatives to the continued generation of such wastes.

The focus of corrective actions to address this vulnerability should be on prioritizing resources and efforts to identify and develop solutions for disposal of these wastes. Additionally, continued generation of waste streams with no path forward should be reviewed and justified. The approach should include identifying and quantifying waste streams that do not satisfy waste acceptance criteria for existing treatment, storage, and disposal facilities. This information should be used in developing an integrated LLW management program which contains the functions/activities and associated requirements, goals, and assumptions which facilitate research and development of paths forward for wastes that do not satisfy existing treatment, storage, and disposal criteria. The information should also be reviewed for development of requirements prohibiting generation of waste streams with no path forward.

Planned Corrective Action:

Corrective actions to address this complex-wide vulnerability will be addressed under several of the task initiatives in DOE's 94-2 response effort. As discussed above under planned corrective actions for other complex-wide vulnerabilities, the LLW Projections task initiative will provide the means to identify waste streams. This provide baseline information and a mechanism for identifying the LLW streams for which there is no disposal path forward. The LLW projections effort will not only identify the specific waste streams, it will also provide the basis for estimating the magnitude of the problem for these wastes.

Likewise, the Systems Engineering task initiative will provide the means to identify LLW management functions/activities that apply to DOE's current system and will integrate these into an enhanced future system. This effort will also help to identify waste streams with no path forward for disposal .

The DOE Regulatory Structure and Process task initiative will identify essential requirements for the LLW management system and will provide for a review of waste streams that are generated but have no path forward for disposal .

The Research and Development task initiative will ultimately provide significant support for resolution of this complex wide vulnerability. The Research and Development Task Team (RDTT) has recently completed identifying research and development (R&D) activities where results are applicable to LLW management program improvements (known as the catalog of LLW R&D activities). The RDTT is now responsible for identifying, prioritizing, and addressing outstanding needs under the following tasks:

Identification of LLW Management R&D Needs

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. R&D 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. The RDTT will produce a comprehensive list of these categorized LLW R&D needs.

The waste streams that do not satisfy waste acceptance criteria for existing treatment, storage, and disposal facilities will be a bountiful source for identifying R&D needs. As noted above, two of the 94-2 initiatives should identify all of these waste streams from differing perspectives. The LLW Projections effort should show the most difficult waste streams in terms of inventories and projections. The LLW Systems Description should show which waste streams pose the greatest difficulty in getting through the LLW management system and into disposal.

Determination of Outstanding LLW R&D Needs

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 recently identified R&D activities applicable to LLW program improvements (the catalog of LLW R&D activities) and the needs identified in the above task (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.

Waste streams identified above that do not satisfy waste acceptance criteria for existing treatment, storage, and disposal facilities will be reviewed to determine if their LLW R&D needs are already addressed or not. This cross-check will ensure ongoing R&D is applied if applicable to these wastes, and will help identify the outstanding R&D needs for these wastes.

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

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 strategy will be developed for inclusion, as appropriate, in a revision to the LLW Program Management Plan.

Waste streams with no path forward and for which technology is not yet being developed will be included as a problem area in determining outstanding LLW R&D needs.

This complex-wide vulnerability will also be addressed by the activities being performed under several task initiatives under DOE's 94-2 response effort. The sequence as described above constitutes the corrective action for this finding and no additional activities outside of these initiatives are proposed to address this vulnerability. The DOE field office and site operations with these difficult waste streams will be included in developing the waste projections, the LLW management system description for this area, and the requirements to minimize future generation of these streams. Several sites will also likely provide R&D support as the identified needs are addressed DOE system-wide.

Schedule and Costs:

Milestone: Issue LLW R&D Needs Statement.

Due Date: March 31, 1997.

Milestone: Identification of Outstanding R&D Needs.

Due Date: June 30, 1997.

Milestone: Strategy to address Outstanding LLW Technical and R&D Needs.

Due Date: September 30, 1997.

Costs are discussed in DOE's Project Management Plan for implementation of DNFSB Recommendation 94-2. No additional cost or schedule impacts are expected under this CAP.

Responsibility:

The RDTT is responsible for these R&D tasks. The key personnel are:

Task Manager - Research and Development: Julie Ayres, EM-32
Technical Lead - Research and Development: David Gallegos, SNL

Finding No: CWV 6

Finding Description: Performance Assessments are generally not approved and technical guidance is inadequate.

Eleven (11) site-specific vulnerabilities were identified by the WGATs which contributed to the identification and development of this complex-wide vulnerability. Site-specific vulnerabilities were identified at six sites including: Fernald Environmental Management Project (FEMP-NTS-Disp-06), Hanford Site (HAN-TRS-2, HAN-TRS-3), Idaho National Engineering Laboratory (INEL-007, INEL-008), Los Alamos National Laboratory (LANL-2, LANL-3, LANL-6), Oak Ridge Reservation (ORR-SWSA6-PA-ML1), and Savannah River Site (SRS-V-96-01, SRS-V-96-02). Due to the number of sites at which supporting site-specific vulnerabilities were identified, this complex-wide vulnerability was classified as an endemic vulnerability.

The primary impact of this complex-wide vulnerability was determined to be in the area of disposal. Because of uncertainties in disposal facility performance assessments and lack of approval of the performance assessments, there is uncertainty concerning the long-term ability of a site to isolate waste to the degree necessary to satisfy the performance objectives outlined in DOE Order 5820.2A. Insufficient guidance on the preparation of performance assessments as well as failure to link properly performance assessment results to waste acceptance criteria creates further uncertainty concerning whether radionuclide loadings will be limited to levels consistent with established performance objectives. Current performance assessment requirements and implementation do not clearly demonstrate an effective documented safety basis for disposal and assurance of long-term protectiveness.

The primary causes of this complex-wide vulnerability are programmatic and technical. DOE's performance assessment process suffers from several problems including: an unwieldy and poorly defined approval process, lack of explicit requirements to integrate performance assessment results into other program elements such as waste acceptance criteria and environmental monitoring programs, and lack of provisions for interim approval. Analysis of specific site conditions to establish limitations and the integration of performance assessment results into operational requirements are necessary to fully support successful waste containment.

The site-specific vulnerabilities identified by the WGATs which led to this complex-wide vulnerability can be grouped into five general areas of deficiencies with performance assessments. The examples include: incomplete identification of interactive source terms; inadequate or lack of closure plans; incomplete inclusion or omission of LLW disposed before 1988; lack of a DOE-approval for performance assessments; and inadequate integration of the waste acceptance criteria and performance assessment.

Risk Ranking:

The risks associated with this complex-wide vulnerability are medium to low for the

environment and disposal facility performance receptors, and low for the public and worker receptors based on the eleven related site-specific vulnerabilities.

Response/Recommendation:

The DOE performance assessment program should be supported by comprehensive guidance for development and use of performance assessment results. More detailed written guidance for integration of performance assessments and their results into LLW management activities should be developed and implemented. Topics that should be addressed by the guidance include waste certification, use of process knowledge (or acceptable knowledge) as a basis for waste characterization, performance assessment maintenance, incorporation of interactive source terms, incorporation of pre-1988 wastes, closure plans, integration with waste acceptance criteria, the performance assessment approval process, and procedures for interim approval of performance assessments. More management attention to effectively carrying out this guidance both at HQ and in the field is critical to the resolution of this issue.

The focus of corrective actions to address this vulnerability should be on better definition of the specific approval responsibilities for performance assessments and the development of adequate, comprehensive performance assessment requirements and guidance. The approach should include the identification of the various components of a performance assessment and the appropriate level(s) of approval for each of the components.

Planned Corrective Action:

Corrective actions to address this complex-wide vulnerability will be addressed under the Radiological Assessments task initiative of DOE's 94-2 response effort. The Radiological Assessments task initiative has recently issued guidance for conducting composite analyses (that addresses sources of radioactive contamination to be considered in a composite analysis, assumptions applicable to the composite analyses, and preparation of an options analysis if performance criteria are exceeded) and is responsible for developing performance assessments requirements and guidance, and defining specific approval authorizations, under the following tasks:

Issue Performance Assessment Critical Assumptions

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 a dozen specific critical aspects of conducting a performance assessment including active/passive institutional control periods, compliance with performance objectives, ownership and future land use, purpose of inadvertent intruder assessments, standardized adult dose conversion factors, treatment of radon dose, and interpretation of groundwater protection requirements.

Composite Analysis Review Criteria and Process

DOE will prepare a documented description of the process for Headquarters' review of the composite analyses and the criteria for evaluating the acceptability of the analyses.

Issue PA Development and Review and Approval Guidance

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, a standard review plan for performance assessments, and 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 performance assessment maintenance guidance will address the need to reduce uncertainties in predictions about the long-term performance of disposal facilities.

Assessments Supporting Disposal Facility Operations

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 composite analysis. 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.

The LLW disposal issues identified in this complex-wide vulnerability are addressed directly and entirely by the task initiatives of DOE's 94-2 response effort for Radiological Assessments. These corrective actions will require continuing support from specific experts in the DOE field office and site operations groups. Based on recent successes in starting to resolve these long-standing issues, this part of DOE's LLW management system stands as an example of system-wide integration of available resources to implement cost-effective solutions to a backlog of LLW problems.

Schedule and Costs:

- Milestone: Issue Policies Addressing Critical Assumptions and Clarifications for Performance Assessments.
Due Date: January 31, 1997.
- Milestone: Issue a Description of the Process and Criteria for Headquarter's Review of Composite Analyses.
Due Date: October 31, 1996.
- Milestone: Publish PA Maintenance Guidance Document.
Due Date: September 30, 1996.
- Milestone: Publish PA Format and Content, and Standard Review Plan Documents.
Due Date: January 31, 1997.
- Milestone: Submit Site-specific Performance Assessment to Headquarters for Review; Complete the Headquarters Technical Review and Documentation.
Due Date: Site-specific Due Dates for Completing and Submitting Performance Assessments, and for Completing the Headquarters Review Are Shown in Table VII.1 of the Implementation Plan.
- Milestone: Submit Site-specific Composite Analysis to Headquarters for Review; Complete the Headquarters Technical Review and Documentation.
Due Date: Site-specific Due Dates for Completing and Submitting Composite Analyses, and for Completing the Headquarters Review Are Shown in Table VII.1 of the Implementation Plan.
- Milestone: As Applicable for Each Site, Issue Disposal Authorization Statement or Direction to Resolve Issues or Concerns.
Due Date: Site-specific Due Dates for Headquarters Issuing Disposal Authorization Statements Are Shown in Table VII.1 of the Implementation Plan.

Costs are discussed in DOE's Project Management Plan for implementation of DNFSB Recommendation 94-2. No additional cost or schedule impacts are expected under this CAP.

Responsibility:

The Offices of Waste Management (EM-30), Environmental Restoration (EM-40), and the Office of Environment (EH-4) will jointly develop policies addressing critical assumptions and clarifications for performance assessments. Specific policy statements will be issued by the Assistant Secretary for Environmental Management (EM-1).

The Low-Level Waste Management Task Group and the Office of Environmental Restoration (EM-40) are responsible for preparing and issuing guidance with a description of the process and criteria for Headquarter's review of composite analyses.

The Office of Waste Management (EM-30), in consultation with the Deputy Assistant Secretary of Environment (EH-4), will develop a PA maintenance guidance document.

The Office of Waste Management (EM-30), in consultation with the Deputy Assistant Secretary of Environment (EH-4), will develop the PA format and content guidance and standard review plan documents.

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.

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.

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 is responsible for approval of Record of Decisions (RODs) which constitute the authorization to dispose in Office of Environmental Restoration facilities.

The key LLW Management Task Group personnel responsible for the Radiological Assessments tasks are:

Task Manager - Radiological Assessments:	Virgil Lowery, EM-35
Technical Lead - Radiological Assessments:	Elmer Wilhite, WSRC

COMPLEX-WIDE CONCERNS

Finding No: CWC 1

Finding Description: **Inadequate groundwater monitoring for radiological constituents associated with LLW management activities.**

Environmental monitoring programs usually include air, surface water, soil, biota, and groundwater monitoring. Groundwater monitoring is conducted for specified radiological constituents. However, the specific radiological constituents for which monitoring is conducted may not be consistent with the radiological constituents of concern associated with LLW management activities. This inconsistency could result in a potential for releases from disposal facilities to not be adequately identified in a timely manner. This concern was identified as a site-specific vulnerability at only the Idaho National Engineering Laboratory (INEL-003). The AWG/WGAT team determined that further attention to this issue is warranted.

Risk Ranking:

The risks associated with this complex-wide concern are low for the environment and disposal facility performance receptors at the site which had the identified site-specific vulnerability.

Response/Recommendation:

The focus of corrective actions to address this concern should be on integrating and the sharing/exchange of information related to monitoring performed under the environmental monitoring programs, groundwater monitoring programs, and LLW management programs at DOE facilities. The approach should include the identification of the various monitoring components of the applicable programs at the facility and identifying and establishing the mechanisms required to ensure the integration of these programs and information sharing/exchange between these programs.

Planned Corrective Action:

Corrective actions to address this complex-wide concern will be addressed under the Radiological Assessments, Regulatory Structure and Process, and Systems Engineering task initiatives of DOE's 94-2 response effort. Radiological Assessments is responsible for developing performance assessment maintenance guidance under the following task.

Issue PA Development and Review and Approval Guidance

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, a standard review plan for performance assessments, and 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 the inclusion of the need for the identification of the various monitoring components of other applicable programs at the facility and identifying and establishing the mechanisms required to ensure the integration of these programs and information sharing/exchange between these programs.

Systems Engineering is responsible for identifying and integrating all necessary planning and management activities under the following task.

Low-Level Waste System Description Document.

The Department will analyze LLW management systems to determine what functions/activities are necessary to integrate the LLW program and allocate existing requirements to identify where additional requirements are needed. 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. Specifically for this waste disposal monitoring issue, the analysis will establish the program functions for waste disposal monitoring and assign the system requirements, goals, and assumptions to these functions. To insure that facility programs are integrated part of this system will identify and establish mechanisms for exchange of information among programs.

Regulatory Structure and Process is responsible for developing and codifying the requirements under the following task.

Identify Essential Requirements for Managing LLW.

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 results of the Complex-Wide Review and the evaluations of U.S. commercial and international requirements and standards will be used as major parts of the identification process, as well as the functional analysis developed by the Systems Engineering of LLW. The need for requirements governing the function/activity covering the identification of the various monitoring components of applicable programs at the facility and identifying and establishing the mechanisms required to ensure the integration of these programs and information sharing/exchange between these programs will be reviewed and requirements developed as necessary.

Develop Implementation Guidance for Managing LLW.

As part of the identification and development of policies and requirements for LLW management functions/activities, implementation guidance will be developed, and necessary documentation will be provided in time to support the Radioactive Waste Management Order revision. 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. All guidance will consider and address the fact that there is a wide range of types and associated hazards for DOE's LLW.

Additional guidance will be developed for integration of the environmental monitoring components of the various programs at facilities to address the lack of sufficient guidance for existing requirements and/or new requirements, as appropriate. Guidance will be developed with consideration of options for cost-effective implementation.

For this complex-wide concern, the issues and recommendations are directly addressed by the activities described above and completing these 94-2 task initiatives will complete the corrective action for this finding. Implementation of these corrective actions will involve participation of and coordination with DOE field offices and site operations.

Schedule and Costs:

Milestone: Publish PA Maintenance Guidance Document.

Due Date: September 30, 1996.

Milestone: Prepare LLW System Description Document

Due Date: September 30, 1996.

Milestone: Report identifying Essential LLW Management Requirements.

Due Date: February 28, 1997.

Costs are discussed in DOE's Project Management Plan for implementation of DNFSB Recommendation 94-2. No additional cost or schedule impacts are expected under this CAP.

Responsibility:

The Office of Waste Management (EM-30), in consultation with the Deputy Assistant Secretary of Environment (EH-4), will develop a PA maintenance guidance document to be issued by

Office of Waste Management (EM-30). The key LLW Management Task Group personnel responsible for the Radiological Assessments task are:

Task Manager - Radiological Assessments: Virgil Lowery, EM-35
Technical Lead - Radiological Assessments: Elmer Wilhite, WSRC

The LLW Management Task Group is responsible for the Regulatory Structure and Process task described above. The key personnel are:

Task Manager - Regulatory Structure and Process: Julie Ayres , EM-32
Technical Lead - Regulatory Structure and Process: Ed Regnier, EH-412

The LLW Management Task Group is responsible for the Systems Engineering task described above. The key personnel are:

Task Manager - Systems Engineering: Warren Black, EM-35
Technical Lead - Systems Engineering: Bob Harris, LMIT

Finding No: CWC 2

Finding Description: Lack of National Environmental Policy Act documentation for specific LLW management activities.

While no site-specific vulnerabilities were identified with respect to the adequacy of coverage under the National Environmental Policy Act (NEPA) as required by 10 CFR 1021, the AWG/WGAT team determined that there is a programmatic concern with respect to NEPA coverage. The primary concern was that a lack of current and adequate NEPA analyses and documentation could result in impacts upon LLW management activities.

The AWG/WGAT team determined that delays in actions to treat and dispose of LLW could occur, primarily at the complex-wide level, if waste is moved from the site at which it is generated without adequate NEPA coverage for the intended management activities at the site which receives the waste. The AWG/WGAT team determined that further attention to this issue is warranted.

Risk Ranking:

Not applicable, no site-specific vulnerabilities were identified.

Response/Recommendation:

The focus of corrective actions to address this concern should be on determining if current mechanisms in place for evaluating LLW management activities and determining the adequacy of coverage under the National Environmental Policy Act (NEPA) as required by 10 CFR 1021. The approach should be to evaluate existing functions/activities and associated requirements to determine if they are adequate and if not develop and establish new functions/activities and the associated requirements as appropriate.

Planned Corrective Action:

Corrective actions to address this complex-wide concern will be addressed under the Regulatory Structure and Process and the Systems Engineering task initiatives of DOE's 94-2 response effort. Regulatory Structure and Process is the lead and is responsible for developing and codifying the requirements under the following task.

Identify Essential Requirements for Managing LLW.

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 results of the Complex-Wide Review and the evaluations of U.S. commercial and international requirements and standards will be used as major parts of the identification process, as well as

the functional analysis developed by the Systems Engineering task of LLW Program. Existing requirements will be reviewed to determine if they are adequate and if not, new requirements will be developed and established.

Systems Engineering is responsible for identifying and integrating all necessary planning and management activities under the following task.

Low-Level Waste System Description Document.

The Department will analyze LLW management systems to determine what functions/activities are necessary to integrate the LLW program and allocate existing requirements to identify where additional requirements are needed. 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. Specifically for determining the adequacy of coverage under the National Environmental Policy Act (NEPA) as required by 10 CFR 1021 of LLW management activities, the analysis will establish the program functions for and assign the system requirements, goals, and assumptions to these functions. Existing functions/activities will then be evaluated to determine if they are adequate and, if not, develop and establish new functions/activities as appropriate. Discussions will then be held with representatives of the Offices of Environment, Safety and Health (EH) and General Counsel (GC) to assess if NEPA coverage is adequate.

For this complex-wide concern, the issues and recommendations are directly addressed by the activities described above and completing these 94-2 task initiatives will complete the corrective action for this finding. Implementation of these corrective actions will involve participation of and coordination with DOE field offices and site operations.

Schedule and Costs:

Milestone: Prepare LLW System Description Document
Due Date: September 30, 1996.

Milestone: Report identifying Essential LLW Management Requirements.
Due Date: February 28, 1997.

Costs are discussed in DOE's Project Management Plan for implementation of DNFSB Recommendation 94-2. No additional cost or schedule impacts are expected under this CAP.

Responsibility:

The LLW Management Task Group is responsible for the Regulatory Structure and Process task described above. The key personnel are:

Task Manager - Regulatory Structure and Process: Julie Ayres , EM-32
Technical Lead - Regulatory Structure and Process: Ed Regnier, EH-412

The LLW Management Task Group is responsible for the Systems Engineering task described above. The key personnel are:

Task Manager - Systems Engineering: Warren Black, EM-35
Technical Lead - Systems Engineering: Bob Harris, LMIT

Finding No: CWC 3

Finding Description: Inadequate emergency response for LLW management activities.

Site-specific vulnerabilities were identified at three sites related to adequacy of emergency response capabilities. Emergency response and preparedness may not be fully adequate in all cases due to deficiencies in the design, construction, and operations of waste management facilities. However, the isolated site-specific vulnerabilities identified represent areas where much DOE effort has been focused in recent years to correct past deficiencies. While there was no identifiable trend or correlation among the three identified site-specific vulnerabilities, the AWG/WGAT team determined that continued management attention is warranted.

Risk Ranking:

The risks associated with this complex-wide concern are low for the environment and disposal facility performance receptors at the site which had the identified site-specific vulnerability.

Response/Recommendation:

The focus of corrective actions to address this concern should be on determining if current mechanisms in place for evaluating emergency response and preparedness of LLW management activities are adequate to address and identify deficiencies in the design, construction, and operations of waste management facilities. The approach should be to evaluate existing functions/activities and associated requirements to determine if they are adequate and if not develop and establish new functions/activities and the associated requirements as appropriate.

Planned Corrective Action:

Corrective actions to address this complex-wide concern will be addressed under the Regulatory Structure and Process and the Systems Engineering task initiatives of DOE's 94-2 response effort. Regulatory Structure and Process is the lead and is responsible for developing and codifying the requirements under the following task.

Identify Essential Requirements for Managing LLW.

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 results of the Complex-Wide Review and the evaluations of U.S. commercial and international requirements and standards will be used as major parts of the identification process, as well as the functional analysis developed by the Systems Engineering of LLW Program task. Existing requirements associated with identifying deficiencies in the design, construction, and operations of waste management facilities as they relate to evaluating emergency response and preparedness

of LLW management activities will be evaluated to determine if they are adequate and if not, new requirements will be identified and developed as appropriate.

Systems Engineering is responsible for identifying and integrating all necessary planning and management activities under the following task.

Low-Level Waste System Description Document.

The Department will analyze LLW management systems to determine what functions/activities are necessary to integrate the LLW program and allocate existing requirements to identify where additional requirements are needed. 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. Specifically for this waste facility emergency response issue, the analysis will establish the program functions for waste facility emergency response and assign the system requirements, goals, and assumptions to these functions. The existing functions/activities associated with evaluating emergency response and preparedness of LLW management activities will be evaluated to determine if they are adequate and if not new functions/activities will be identified and developed as appropriate.

For this complex-wide concern, the issues and recommendations are directly addressed by the activities described above and completing these 94-2 task initiatives will complete the corrective action for this finding. Implementation of these corrective actions will involve participation of and coordination with DOE field offices and site operations.

Schedule and Costs:

Milestone: Report identifying Essential LLW Management Requirements.
Due Date: February 28, 1997.

Milestone: Prepare LLW System Description Document
Due Date: September 30, 1996.

Costs are discussed in DOE's Project Management Plan for implementation of DNFSB Recommendation 94-2. No additional cost or schedule impacts are expected under this CAP.

Tracking Mechanism:

The LLW Management Task Group is responsible for the Regulatory Structure and Process task described above. The key personnel are:

Task Manager - Regulatory Structure and Process: Julie Ayres , EM-32
Technical Lead - Regulatory Structure and Process: Ed Regnier, EH-412

The LLW Management Task Group is responsible for the Systems Engineering task described above. The key personnel are:

Task Manager - Systems Engineering: Warren Black, EM-35

Technical Lead - Systems Engineering: Bob Harris, LMIT

