



## Department of Energy

Washington, DC 20585

September 17, 1998

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

Dear Mr. Chairman:

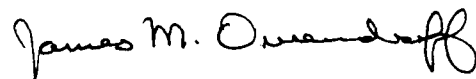
Enclosed is the *Low-Level Waste Disposal Facility Federal Review Group Manual*. The Department has developed this guide pursuant to its commitments in the "Defense Nuclear Facilities Safety Board Recommendation 94-2 Implementation Plan, Revision 1" and the "Quarterly Progress Report for DNFSB Recommendation 94-2, January through March 1998." The guide is for the use of the Low-Level Waste Disposal Facilities Federal Review Group (LFRG), convened by the Deputy Assistant Secretaries for Waste Management and Environmental Restoration to ensure the comprehensive review of radiological assessments and make recommendations on approval of the assessments and conditions for authorizing disposal facility operations.

The document is being issued in support of reviews being conducted under the current set of requirements for conduct of radiological assessments. Current requirements for performance assessments are contained in DOE Order 5820.2A, *Radioactive Waste Management*. Current requirements and guidance for composite analyses are contained in the *Guidance for a Composite Analysis of the Impact of Interacting Source Terms on the Radiological Protection of the Public from Department of Energy (DOE) Low-Level Waste Disposal Facilities* which was prepared in response to Recommendation 94-2. It is our intent to update the guide as needed to reflect the experience gained through the LFRG's conduct of reviews. In addition, the guide will be revised to correspond to and reflect changes in requirements in the revised order on *Radioactive Waste Management*, DOE O 435.1, when issued.



The Department has completed the actions related to commitment VII.B.3 and the commitment in the quarterly report and proposes closure of these commitments. If you have any questions concerning this information, please contact me at (202) 586-7710 or Mark Frei at (202) 586-0370.

Sincerely,

A handwritten signature in black ink that reads "James M. Owendoff". The signature is written in a cursive style with a large, stylized initial "J".

James M. Owendoff  
Acting Assistant Secretary for  
Environmental Management

Enclosure

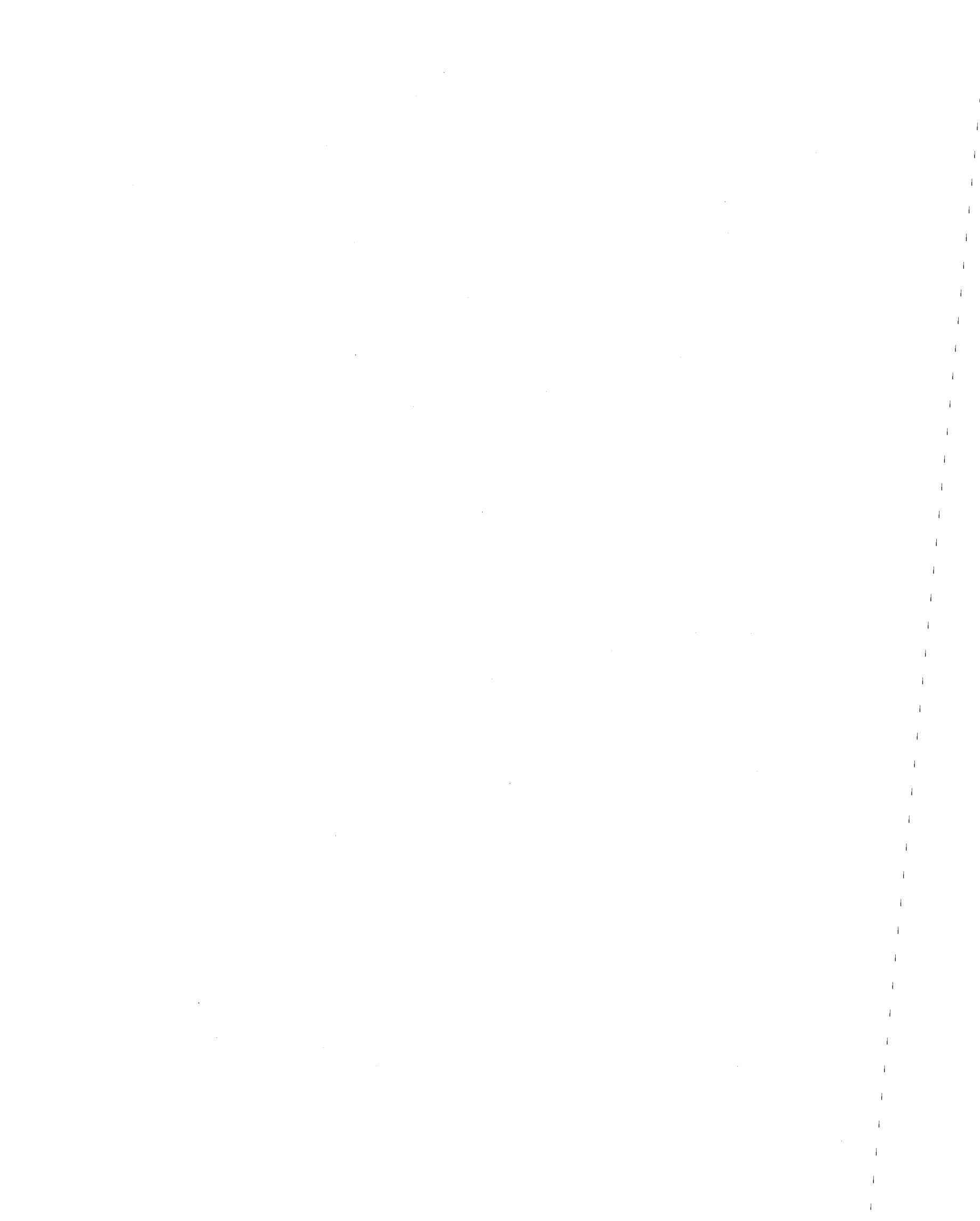
cc:  
Mark B. Whitaker, Jr., S-3.1  
Carol Peabody, EM-4

**LOW-LEVEL WASTE  
DISPOSAL FACILITY  
FEDERAL REVIEW GROUP MANUAL**

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Revision 0

September 1998



**LOW-LEVEL WASTE DISPOSAL FACILITY  
FEDERAL REVIEW GROUP MANUAL - Revision 0**

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## List of Acronyms

ALARA	As Low As Reasonably Achievable
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DOE O	U.S. Department of Energy Order
DQO	Data Quality Objectives
D&D	Decontamination and Decommissioning
EM-30	Deputy Assistant Secretary for Waste Management
EM-40	Deputy Assistant Secretary for Environmental Restoration
ER	Office of Environmental Restoration
FUSRAP	Formerly Utilized Sites Remedial Action Program
LFRG	Low-Level Waste Disposal Facilities Federal Review Group
LLW	Low-Level Waste
NRC	U.S. Nuclear Regulatory Commission
ORR	Operational Readiness Review
OSHA	Occupational Safety and Health Act
QA	Quality Assurance
ROD	Record of Decision
SAR	Safety Analysis Report
WAC	Waste Acceptance Criteria
WM	Office of Waste Management

# 1. INTRODUCTION

The Department of Energy (DOE) is responsible for designing, operating, and closing low-level waste (LLW) disposal facilities in a manner that is protective of workers, the public, and the environment. In order to provide a reasonable assurance that disposal of LLW will not result in unacceptable impacts to the public and the environment in the long term, disposal facility operators prepare two types of radiological assessments. Performance assessments, required by DOE Order 5820.2A, are prepared to help establish design features and operating constraints that promote compliance with the Order's performance objectives and related performance measures. Composite analyses, prepared in accordance with DOE's *Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 94-2*, are used as a planning tool to analyze the potential offsite impact of a low-level waste disposal facility in combination with other radioactive source terms that are expected to remain at the site. The Department also has the responsibility for reviewing and approving these radiological assessments. The review and approval function is performed by DOE Headquarters.

## 1.1 Low-Level Waste Disposal Facility Federal Review Group

On December 19, 1996, the Deputy Assistant Secretaries for Waste Management and Environmental Restoration in the Office of Environmental Management (EM) established the Low-Level Waste Disposal Facility Federal Review Group (LFRG) to develop and implement a review process for LLW disposal facility performance assessments and composite analyses. The LFRG was chartered with providing EM management the information necessary to determine that low-level waste disposal facilities are designed, constructed, operated, maintained, and closed in a manner that protects the public and environment.

The establishment of the LFRG is an important element of DOE's response to the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-2 and meeting the requirements of DOE Order 5820.2A, *Radioactive Waste Management* (and eventually its revision, DOE O 435.1, *Radioactive Waste Management*, when finalized). Senior DOE management officials are responsible for the approval of performance assessments and composite analyses in accordance with DOE Order 5820.2A and deliverables prepared in accordance with DOE Regulatory Structure and Process Tasks and Radiological Assessments Tasks of the DOE Implementation Plan in response to DNFSB 94-2. The establishment of the LFRG assigns responsibility to Federal employees for reviewing performance assessments and composite analysis, determining whether they comply with performance objectives and measures, and recommending the approval of performance assessments and composite analyses. Establishing the LFRG also centralizes the LLW disposal facility performance assessment and composite analysis review process.

The LFRG consists of Federal employees from Headquarters and Field organizations. Members are selected to ensure the LFRG reflects the policy, technical, regulatory, and programmatic perspectives necessary to conduct effective performance assessment and composite analysis



reviews. The LFRG is co-chaired by representatives from the Offices of Waste Management (WM) and Environmental Restoration (ER), and reports to the Deputy Assistant Secretaries for WM (EM-30) and ER (EM-40). A copy of the December 19, 1996 establishing the LFRG and the draft LFRG Charter is provided in Appendix A.

## **1.2 Purpose and Organization of this Guidance Manual**

This manual provides guidance for conducting reviews of DOE LLW disposal facilities' performance assessments and composite analyses in accordance with DOE Order 5820.2A, Chapter III, Low-Level Waste, and deliverables prepared in accordance with DOE Regulatory Structure and Process and Radiological Assessments Tasks of the DOE Implementation Plan in response to DNFSB Recommendation 94-2. Performance assessment and composite analysis reviews should be performed in accordance with the procedures and guidance provided by this manual. The LFRG is responsible for conducting reviews of the performance assessments and composite analyses for DOE LLW disposal facilities of different designs and with varying potential for impacting public safety and health, and the environment. The guidance provided by this manual is intended to be sufficient to ensure a high degree of consistency in the conduct and products of the reviews. Procedures and formats may be modified, as appropriate, to address specific site conditions. Modifications to the procedures and formats contained in the guidance manual should be documented in the site-specific performance assessment and/or composite analysis review plans described in Chapter 2.

This manual is also intended to aid DOE Program Offices, DOE Field Offices, and the site contractors in understanding and preparing for the review of their performance assessments and composite analyses, as well as participating in the performance assessment and composite analysis review processes. The manual may also serve as a means of informing other interested agencies and parties of DOE's processes for reviewing performance assessments and composite analyses.

This manual includes three chapters and appendices that provide procedures, guidance, and criteria for planning, conducting, and documenting the performance assessment and composite analysis reviews. This chapter provides an introduction to the LFRG and to the performance assessment and composite analysis reviews. Chapter 2 describes the process for performing the performance assessment and composite analysis reviews. Chapter 3 contains the criteria that are to be used by the reviewers for evaluating the technical adequacy of the performance assessments and composite analyses.

## **1.3 Purpose of Performance Assessments and Composite Analyses**

Performance assessments are conducted to demonstrate that there is a reasonable expectation that LLW disposed of at DOE LLW facilities will not result in exceeding the performance objectives contained in DOE Order 5820.2A, *Radioactive Waste Management*, and related measures associated with protection of the public from the management of LLW. Composite analyses are

conducted to assess possible impacts of multiple sources, including the disposal facility, on long-term compliance with DOE environmental and public radiation protection requirements contained in DOE Order 5400.5, *Radiation Protection of the Public and the Environment*. The purpose of the analysis is to help assure that the authorization of the disposal facility is not likely to result in long-term compliance problems, and should potential problems be identified, to determine management alternatives and corrective action or assessment needs. The composite analysis is not a document prepared for the purpose of demonstrating compliance with DOE's primary dose limit for protection of the public. The analysis is a planning tool intended to provide a reasonable expectation that current LLW disposal activities will not result in the need for future corrective or remedial actions to protect the public and environment.

#### **1.4 Purpose of Performance Assessment and Composite Analysis Review**

The performance assessments and composite analyses are reviewed to determine that they are complete; comprehensive; reflective of site- and facility-specific conditions; supported by appropriate rationale; and, therefore, defensible. These reviews are performed to provide the Deputy Assistant Secretary for Waste Management or the Deputy Assistant Secretary for Environmental Restoration with the reasonable assurance that the applicable performance objectives and measures will be met. The reviews provide the basis for accepting the performance assessment and/or composite analysis and for issuing a Disposal Authorization Statement. The Disposal Authorization Statement represents Headquarters approval of the performance assessment and/or composite analysis, and includes conditions deemed necessary to provide long-term protection of the public and environment from the LLW disposal facility.

#### **1.5 Scope of the Reviews**

Performance assessment and composite analysis reviews will be conducted for the LLW disposal facilities identified in the DOE's *Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 94-2* and any future LLW disposal facilities. The *94-2 Implementation Plan*, as modified, establishes a schedule for completion and approval of the performance assessments and composite analyses for the following LLW disposal facilities:

- Los Alamos National Laboratory, TA-54, Area G Disposal Facility;
- Idaho National Engineering and Environmental Laboratory Radioactive Waste Management Complex;
- Nevada Test Site Area 3 and Area 5 Radioactive Waste Management Sites;
- Oak Ridge National Laboratory Solid Waste Storage Area-6;
- Hanford Environmental Restoration Disposal Facility, 200-W Burial Grounds, 200-E Burial Grounds, and Immobilized Low-Activity Tank Waste; and
- Savannah River E-Area Vaults and Saltstone Disposal Facility.

Each performance assessment and/or composite analysis review will be organized to conduct a focused, site-specific review of the technical, regulatory, and programmatic adequacy of a

performance assessment and composite analysis. The complex-wide representation of Federal staff enhances DOE's LLW line management capabilities by providing a mechanism for transferring lessons learned from site to site. Participants can then directly incorporate improvements in their site's performance assessments and composite analyses.

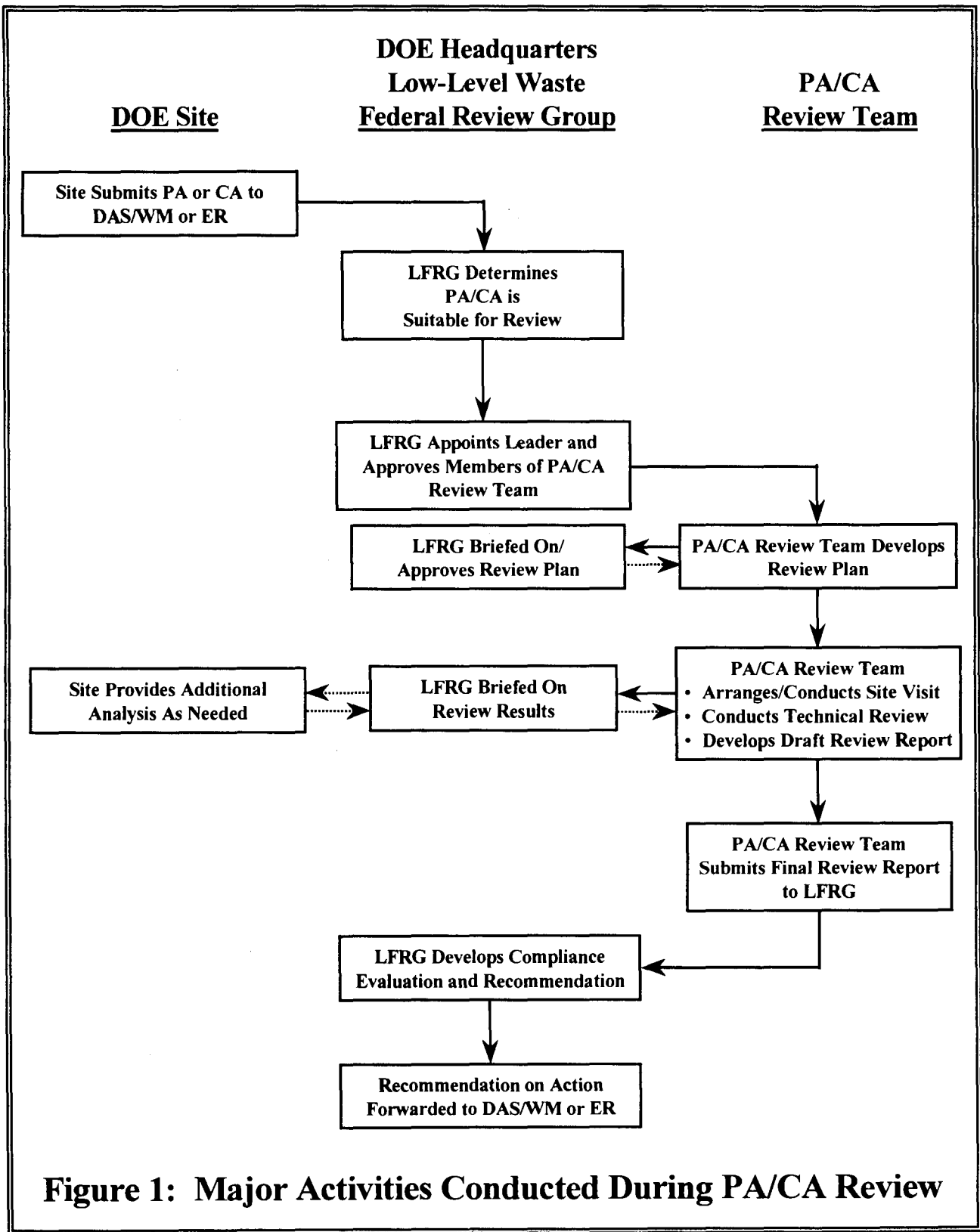
## **1.6 Performance Assessment / Composite Analysis Review Process**

Review Teams, reporting to the LFRG, should be convened to conduct reviews in a manner conceptually similar to DOE's processes for review of Safety Analysis Reports and for conducting Operational Readiness Reviews. Each review should be led by a DOE employee and be conducted by Federal employees. The performance assessment and composite analysis Review Teams may be supplemented with qualified consulting contractors as appropriate (i.e., to provide technical assistance, or expertise not readily available in DOE) that are approved by the LFRG.

The principal activities and products comprising a performance assessment and composite analysis review are:

- Acknowledge suitability of performance assessment/composite analysis for review,
- Assemble a performance assessment/composite analysis Review Team,
- Develop a performance assessment/composite analysis Review Plan,
- Conduct site visits and meetings,
- Review LLW disposal facility performance assessment and composite analyses,
- Compile a performance assessment/composite analysis Review Report, and
- Develop a Compliance Evaluation.

Figure 1 shows the major activities comprising the performance assessment and composite analysis review process. The performance assessment and composite analysis review process begins with a determination by the LFRG that the performance assessment or composite analysis is complete and suitable for review. If this determination is affirmative, the LFRG selects a performance assessment and/or composite analysis Review Team Leader. The Review Team Leader, after a concise review of the performance assessment and/or composite analysis, recommends candidate team members and areas of responsibility for the review to the LFRG for approval. Following team selection, the Review Team prepares a Review Plan for conducting the specific performance assessment and/or composite analysis review for which it has been formed.



**Figure 1: Major Activities Conducted During PA/CA Review**

The performance assessment/composite analysis Review Team should conduct the technical review of the performance assessment and/or composite analysis by evaluating the performance assessment and/or composite analysis against the criteria contained in Chapter 3 of this guidance manual. The review should include a site visit and review of other site documentation, if necessary. Following completion of its review, the Review Team should prepare a Review Report and recommend to the LFRG that the performance assessment and/or composite analysis be accepted, accepted with conditions, or not accepted.

Following a review of the report and recommendations, the LFRG prepares a Compliance Evaluation which includes either accepting the Review Team's recommendation or providing justification for making different recommendations. The Deputy Assistant Secretary for Waste Management or Environmental Restoration should consider the LFRG Compliance Evaluation in approving the Disposal Authorization Statement.

The time elapsed in conducting performance assessment and/or composite analysis reviews, issuing final performance assessment and/or composite analysis Review Reports, and developing and issuing Compliance Evaluations to the Deputy Assistant Secretary should be expected to range from four to seven months. The duration of the review will be affected by the lines of inquiry pursued by the Review Team. In the course of the review, additional information may be requested from the performance assessment or composite analysis preparers to support the assessment and its conclusions. The LFRG may have a continuing involvement with other activities associated with the performance assessment and composite analysis, such as reviews of the performance assessment and composite analysis following performance assessment maintenance updates by the sites, and records maintenance.

## **2. PERFORMANCE ASSESSMENT/COMPOSITE ANALYSIS REVIEW PROCESS**

This Chapter describes the administrative process and the basic technical framework under which the LFRG administers the reviews of radiological assessments (performance assessments and composite analyses) and formulates conclusions on them. Key planning steps, basic duties, and responsible individuals are identified. The administrative procedures, the basic technical framework, and the examples provided in the Appendices, will help ensure consistency among Review Teams in conducting and documenting the reviews of radiological assessments.

### **2.1 Establishing Suitability for Review**

Upon receipt of a radiological assessment, the LFRG evaluates the document to determine that it is suitable for review. This evaluation is not to determine that the information is complete with respect to the review criteria presented in Chapter 3, but to ensure that sufficient information is present to avoid wasting Review Team time or resources. To expedite the review process, this initial evaluation can take place concurrently with the establishment of the Review Team.

### **2.2 Establishing a Review Team**

The LFRG begins the establishment of a Review Team by selecting a Review Team Leader. Potential Team Leaders may come from a list of technically qualified DOE personnel maintained by the LFRG or may be nominated by a member of the LFRG. In selecting a Review Team Leader, the LFRG considers the type of review (i.e., performance assessment only, or composite analysis only, or both), the site- or facility- specific conditions and characteristics, and the capabilities of the candidates.

Once identified, the Team Leader performs a concise review of the radiological assessment. The Team Leader also reviews the LFRG list of candidates for Review Team members. Considering the type of review, the site- or facility-specific conditions and characteristics, and the capabilities and availability of candidates, the Team Leader proposes the Review Team members to the LFRG for approval. When proposing a Review Team, the Team Leader is to also identify any contractor technical specialists or consultants that he/she anticipates using in the review.

#### **2.2.1 Team Membership**

Each Review Team includes the Leader, members, and any necessary technical specialists. Review Team members are Federal personnel selected for their technical qualifications and their knowledge and experience related to radiological assessment reviews; their knowledge of the important technical and regulatory disciplines underpinning the specific performance assessment and/or composite analysis to be reviewed; their technical and programmatic review experience; their demonstrated technical and managerial leadership skills; and their communication skills.

At least one staff member from the DOE Field Office with responsibility over the performance assessment and/or composite analysis being reviewed is to serve as a liaison to the Review Team to provide first hand knowledge of the site being evaluated. As a liaison, this person is to provide the necessary contacts to arrange site visits, provide documents if requested, and answer questions about the radiological assessment. The liaison also it to be available to answer questions of Review Team members during their site visits and meetings without participating in the determinations on specific review criteria or findings.

Contractor personnel are to be identified on an as-needed basis as technical specialists or consultants to provide technical assistance. However, they are not to substitute for or replace DOE Review Team members. The skill mix of expertise needed from technical specialists will depend on the type of review and the site- and facility-specific conditions and characteristics or unique circumstances. Generally, the areas of expertise to be represented on a Review Team include hydrology, geology, hydrogeology, health physics, radiological exposure analysis (e.g., pathways analysis, conceptual modeling, computer code evaluation, dose effects), chemistry, civil engineering (e.g., concrete degradation, evaluations of disposal facility engineering features), and waste form release. Therefore, contractor technical specialists or consultants may be needed to provide expertise in any of these disciplines for which the Review Team members themselves may not have sufficient qualifications or review experience.

### **2.2.2 Conflicts of Interest**

Conflicts of interest are to be identified and addressed in assigning personnel to specific radiological assessment Review Teams. This ensures that persons are not asked to review their own work or work for which the independence of their judgment might be adversely influenced. In evaluating potential Review Team members, the Team Leader considers the following questions at a minimum:

- Has the person ever been employed, directly or indirectly (e.g., through subcontract) at the site under review? If yes, what is/was the timing and nature of that employment?
- Is the person involved in waste management at a facility or site that has a generator-disposer relationship with the site under review? What are the person's relevant responsibilities?
- Has the person been involved in development of any models that are used for performing performance assessment or composite analysis modeling? If yes, what models and are those models used in the radiological assessment under review?
- Was the person materially involved in the preparation of any part of the analysis under review (e.g., providing data, developing models, performing analyses, writing, reviewing)? If yes, what was the nature of the persons involvement?

All Federal employee members of the Review Teams are reminded that they remain subject to the conflicts of interest statutes and regulations that apply to all Department employees.

The Team Leader is responsible for ensuring conflicts of interest are identified and addressed for all prospective Review Team members and contractor technical specialists or consultants. The Team Leader must assign review responsibilities to mitigate any conflicts of interest that are identified. For example, a potential conflict of interest exists if a prospective Review Team member has contributed to the development of the performance assessment and/or composite analysis to be reviewed. This individual is not necessarily prohibited from consulting on the Review Team, however, this individual cannot review his or her own work.

The Team Leader is to apprise the LFRG of the assignments and the determination that conflicts of interest have been identified and addressed.

## **2.3 Review Team Responsibilities**

The responsibilities of each person supporting a Review Team are discussed in this section.

### **2.3.1 Team Leader**

The Team Leader manages the Review Team and serves as the primary contact point with the LFRG and the site representatives. The Team Leader's principal responsibilities are to:

- (1) Obtain commitment of time and travel funds, as necessary, from his/her manager to support the review effort.
- (2) Select and familiarize Review Team staff including identifying and recruiting qualified DOE personnel as members and contractors as supplemental technical consultants, as necessary to meet the objectives of the review.
- (3) Identify and address any conflict of interest issues for Review Team members and technical consultants.
- (4) Manage and provide guidance to the Review Team staff concerning the overall review process and methodology, documentation requirements, draft and final Review Reports, Review Team meetings, and schedules.
- (5) Develop a Review Plan that describes site visits, review approach, review products, and review milestones and schedules.
- (6) Coordinate and manage Review Team discussions, site visits, and meetings.



- (7) Coordinate communications among the Team Leader, Review Team members and consultants, and the LFRG. Coordinate activities of Review Team members and consultants so the results of the review are integrated.
- (8) Serve as the point of contact for information requests regarding Review Team activities and reports.
- (9) Inform Review Team staff of any DOE/HQ policy and/or program changes and other pertinent information that could affect the review process or schedule.
- (10) Compile the Review Report. Ensure the Report is accurate, objective, and thorough. Ensure that sufficient copies of the final Review Reports are printed and delivered to the LFRG, appropriate DOE Offices, and others.
- (11) Ensure that all pertinent documentation is placed into the administrative record during the review. Maintain the administrative record and any other records and files associated with Review Team activities, and provide them to the LFRG with the Review Report.
- (12) Ensure that progress on completion of any follow up commitments (e.g., review of a report required by a condition contained in a Disposal Authorization Statement), LFRG recommendations, or other planned actions are tracked and reported to the LFRG until completed.

If desired, the Review Team Leader may appoint another individual to act as a Review Team coordinator and delegate responsibilities to the coordinator. If appointed, the coordinator reports directly to the Team Leader throughout the review.

### **2.3.2 Team Members**

The Review Team member's responsibilities are to:

- (1) Obtain commitment of time and travel funds, as necessary, from his/her manager to support the review effort to ensure continuity in Review Team membership.
- (2) Confirm the review assignments with the Team Leader.
- (3) Evaluate the radiological assessment against the criteria applicable to his/her assignment and the scope of the review contained in Chapter 3 of this manual.
- (4) Provide the results of the radiological assessment review to the Team Leader. Ensure that the results are accurately reflected in the Review Report.

- (5) Review any follow-up documentation as requested by the Team Leader or the LFRG.

### **2.3.3 Team Consultants**

The Review Team consultant's responsibilities are to:

- (1) Obtain commitment of time and travel funds, as necessary, from his/her manager or sponsor to support the review effort to ensure continuity in Review Team membership.
- (2) Confirm the review assignments with the Team Leader.
- (3) Evaluate the technical area(s) of the radiological assessment for technical adequacy consistent with his/her assignment and the scope of the review.
- (4) Provide the results of the radiological assessment technical area review to the Team Leader.
- (5) Review any follow-up documentation as requested by the Team Leader or the LFRG.

### **2.3.4 Interaction with Regulatory Agencies and Others**

External regulatory agencies, such as state environmental protection agencies, or other interested parties, such as DNFSB staff, may express an interest in the review of a radiological assessment for a specific DOE site or LLW disposal facility. Recognizing the Department's commitment to open interactions with external entities, the LFRG, the Review Team Leader, and site management are responsible for determining the best means of establishing an effective interface. Options for interfacing with external entities include providing progress reports, either written or oral, and extending an opportunity to participate with the Review Team as an observer.

If any member of the Review Team is contacted by an individual from a Federal, state, local regulatory agency, the media, or public interest group for information about a specific radiological assessment review, the member should refer that individual to the Team Leader. The Team Leader should inform the DOE Field Office and the LFRG of the request in order for a response to be initiated.

## **2.4 Review Administrative Process**

The following describes the administrative process to be followed in the conduct of a radiological assessment review. Following these administrative steps will: coordinate the

activities of the LFRG and a Review Team; facilitate the interactions of the Review Team and the site and facility being evaluated; and establish a complete record of the review.

#### **2.4.1 Performance Assessment / Composite Analysis Review Plan**

Before the review, the Review Team prepares a Review Plan to coordinate the activities of the Review Team. The Plan outlines the general approach, specific activities, and schedule for the subject radiological assessment review. The Plan identifies the Review Team Leader, the DOE Review Team Members, and any technical specialists who are required to assist in the review and the specific technical subjects they will be reviewing. The plan also establishes the requirements for the administrative record of the review (see Section 2.4.2), including a list of supporting data and documents that Review Team members intend to review. The Plan is to describe the application of the EM Quality Assurance Program to the review process; orient Review Team members on specific aspects of the review; and discuss any special topics requiring review. The Plan is to also discuss modifications or additions to review criteria provided in this manual. The Review Plan also addresses the Review Team's planning for their protection from risks (e.g., Health & Safety Plan, or contact with the administrator of the Health and Safety Plan for the site to be visited). An example Review Plan is included as Appendix B.

#### **2.4.2 Administrative Record**

The Review Team Leader establishes an administrative record for documenting the review and the review's results. This administrative record is similar to a docket file that is established for licensing actions by the U.S. Nuclear Regulatory Commission (NRC). All records associated with the review, including the Review Plan, site visit interactions and results, correspondence, technical documents, meeting minutes, briefing packages, Review Team member qualifications, and conflict of interest avoidance information become part of the administrative record. The administrative record is subject to, and administered under, the EM Quality Assurance Program protocols. If possible, the administrative record should contain the originals of all documents. If copies are used as official records, they must be clearly marked as copies.

The administrative record is assembled and maintained by the Review Team leader as the review is underway, and then turned over to the LFRG when the Review Report is submitted.

#### **2.4.3 Quality Assurance**

All radiological assessment review activities are to be performed in conformance with the requirements of the EM Quality Assurance Program, as defined on the Office of Environmental Management World Wide Web Server (<http://www.em.doe.gov/em30/>). The implementing protocols for the EM Quality Assurance Program guide the development and maintenance of the administrative record prepared for each radiological assessment review. [This Internet site is restricted access, therefore, the LFRG will ensure that Review Team leaders are provided with access to the site, or the relevant instructions for following the EM Quality Assurance Program.]

## **2.5 Site Visit**

All members and consultants of the Review Team are to visit the site under review if necessary for them to perform their assigned duties. At a minimum, this visit should include an orientation of the site and facility evaluated, and the radiological assessment under review, a tour of the site and facility, and meetings with knowledgeable site and facility personnel to exchange information about the facility, performance assessment and/or composite analysis.

### **2.5.1 Pre-Site Visit Activities**

Prior to the initial site visit, the Review Team is to perform a preliminary review of the radiological assessment. The preliminary review is intended to: 1) confirm that the document is complete and ready for a comprehensive review, 2) determine if the Review Team has the collective expertise to perform a comprehensive review, and 3) identify information in the radiological assessment that requires discussion during the site visit. The findings of this preliminary review may be used to determine whether additional technical expertise and/or information is needed.

This preliminary review may also include a review of past studies, assessments, reports, sampling and monitoring data, and other pertinent documents by the Review Team to gain an understanding of site operations and any existing or potential problem areas. Review Team members need to identify and review any Federal, state, and local statutes or regulations that are relevant to their review of the radiological assessment. They should also review any site-specific requirements or guidance documents relevant to the information in the radiological assessment. The Team Leader should work with site or facility personnel to identify material that could be relevant to the review of the radiological assessment.

### **2.5.2 Site Visit Preparation**

In order to maximize the benefit of the site visits for all participants, the Team Leader and members are to be thoroughly prepared for the site visit. Accomplishing the following actions should be considered for proper preparation. A checklist format may be helpful in tracking the completion of actions leading up to and including the site visit.

#### ***2.5.2.1 Coordination of Site Activities and Information Needs***

The Team Leader contacts the appropriate Field Office and site representatives to determine specific dates and logistics for a site visit.

After the dates and logistics for a site visit have been finalized, the Team Leader should send a letter of introduction to the Field Office Manager. It should give the dates for the site visit, list the Team Leader, Review Team members and consultants, the Review Team coordinator if one is appointed, and set forth the Review Team's intended on-site activities.

The letter should outline expectations for the site visit (e.g., site tour, meetings with performance assessment preparers) and should list documents, if any, identified by the Review Team based on its preliminary review that need to be available. The letter should also include a request that the Field Office identify its representatives and the information needed to communicate with them (phone and fax numbers, e-mail addresses).

#### ***2.5.2.2 Security and Health and Safety Planning***

As part of preparation for the review site visit and tour, the Team Leader coordinates the information flow to ensure that security badges are ready for attendees and that any other security or clearance matters are handled prior to arrival at the site. The site personnel coordinating the visit should provide the necessary papers, documents, and site logistics needed to accomplish these important steps when arranging a visit.

Also, as part of preparation for the review site visit, the Team Leader needs to ensure that necessary health and safety planning is performed. If the Review Team members are going to be walking in or around areas under which OSHA health and safety and/or other regulations apply, the Team Leader is to ensure that the necessary training or training waivers and other paperwork have been arranged with site personnel.

#### ***2.5.2.3 Agenda***

The Team Leader develops a detailed agenda for the site visit. A list of topics to be covered and issues to be considered during the review is developed based on the preliminary review of the radiological assessment. The details of the agenda, with logistics and appropriate attendees, should be worked with the site and facility contacts, and finalized shortly before the visit occurs. The Team Leader should ensure that all parties attending the meetings receive the agenda in advance of the visit.

### **2.5.3 Site Visit Activities**

In order to maximize the benefit of the site visit for all participants, the Review Team should consider accomplishing the following actions.

#### ***2.5.3.1 Meetings***

The site visit provides an opportunity for meetings of the Review Team in which they can share technical information gathered during the visit and to discuss remaining site visit activities. Meetings with preparers of the radiological assessment and other cognizant site and facility personnel also provide opportunities for exchange of information relevant to the performance assessment and composite analysis review. To the extent possible, the need for these meetings is identified prior to the site visit, coordinated appropriately, and scheduled on the agenda.

### ***2.5.3.2 Closeout Briefing***

The Team Leader provides a closeout briefing for the site personnel before the Review Team leaves the site. This provides an opportunity for final questions and answers, and exchange of information. Also at this point, any need for further documentation, site tours, technical meetings, and information exchanges with technical personnel can be identified and discussed.

### ***2.5.3.3 Documentation of Site Visit***

After the visit, the Team Leader prepares a trip report documenting the activities and results of the site visit. The trip report is placed in the administrative record. This report should include the final agenda and other documentation of the trip, a list of documents, if any, reviewed during the visit, summaries of meetings, and any other information deemed important to preserve as part of the administrative record.

## **2.6 Performance Assessment / Composite Analysis Technical Reviews**

The principal purpose of a Review Team's activities is to perform detailed technical reviews of performance assessments and/or composite analyses. Based on the reviews, the LFRG will formulate conclusions on whether there is reasonable assurance that the public and the environment are being sufficiently protected from the activities performed at LLW disposal facilities, as demonstrated in the evaluations, and make decisions about operations at the facilities. These evaluations need to be thoroughly reviewed so that the decisions made based on them are justifiable.

The detailed technical review of a performance assessment and composite analysis is to (1) identify whether required information is present, (2) determine that the information presented is correct and applicable, and (3) determine that the analysis supports the conclusions. To that end, the performance assessment and composite analysis are to be reviewed against criteria to determine they are adequate and acceptable.

Chapter 3 provides the basic framework and technical criteria for these reviews. Review Findings are established that represent broad conclusions to be reached on the performance assessment or composite analysis. Detailed acceptance criteria are included to apply to specific topics and discussions in the performance assessment and composite analysis in order to support the Review Findings. Guidance on the minimum information expected in either the performance assessment or composite analysis to support the analysis is provided.

After the analysis review is complete, and Review Team members are comfortable making a determination as to whether the conclusions reached in the performance assessment and/or composite analysis are acceptable and supported by the information they have seen, the Team documents its findings in a report. This is discussed in detail in Section 2.8.

## **2.7 Additional Technical Information**

## **2.7 Additional Technical Information**

As the Review Team is developing conclusions on the performance assessment and/or composite analysis, additional questions may arise. The Review Team should solicit any additional technical information needed to assist in reviewing the information in accordance with the acceptance criteria presented in Chapter 3, in making the review findings, and in developing the Review Report. Additional information requested by the Review Team should be in the form of existing data or information which can be easily compiled or require minimal analysis. The Review Team leader should solicit the assistance of the DOE Field Office liaison in obtaining additional information and analysis.

The Review Team should not solicit additional performance assessment or composite analysis evaluations (e.g., a complete performance assessment calculation to determine the results of an alternative scenario). If this type of additional evaluation is required, this should only be requested by the LFRG as a condition of acceptance of the performance assessment or composite analysis based on the conclusions of the Review Team on the existing performance assessment and/or composite analysis evaluations.

All additional information needs to be documented and become part of the administrative record. A meeting of the Review Team with site and facility representatives for further information exchange could be arranged at this point in the review. If so, documentation of the meeting should be added to the administrative record.

## **2.8 Review Report(s)**

Following the technical review of the radiological assessment, the Review Team prepares a report that provides the results of the team's review. The report summarizes the findings, technical adequacy and completeness of the radiological assessment, the issues identified in the review and their resolution, and any issues that were not resolved. The Review Team should consider including supplemental information and/or documentation deemed necessary to understanding the review as appendices. The Review Report should include all of the information from the review needed to provide the basis for the LFRG's Compliance Evaluation (see Section 2.9) of the radiological assessment.

This guidance is provided in two parts. First, guidance is provided on the performance assessment Review Report. Separate guidance is provided on the composite analysis Review Report. If a Review Team has the opportunity to simultaneously review the performance assessment and composite analysis for a low-level waste disposal facility, then the two parts of the guidance could be combined to create one Review Report.

## **2.8.1 Performance Assessment Review Report Outline**

A suggested performance assessment Review Report outline is as follows:

- I Executive Summary*
- 1.0 Introduction*
- 2.0 Summary of Site and Facility Description*
- 3.0 Summary of Performance Assessment Review*
- 4.0 Technical Adequacy of Performance Assessment*
- 5.0 Consistency of Performance Assessment*
- 6.0 Unresolved Issues*
- 7.0 Recommendation of Review Team*
- 8.0 Appendices*
  - A. Review Team Members and Consultants and Their Qualifications*
  - B. Review Plan*
  - C. Chronology of Review*
  - D. Comments from Review Team Members*
  - E. List of Important Communications Between Site and Review Team*
  - F. List of Supporting Documentation Utilized During the Review*

The following sections address these suggested elements of a performance assessment Review Report.

## **2.8.2 Performance Assessment Review Report Development**

The conclusions of the performance assessment review with respect to the criteria presented in Chapter 3 are to be addressed in a Review Report. This guidance is not intended to provide a comprehensive discussion applicable to all performance assessments. Instead, the Review Team should customize their report under the headings suggested in the outline to provide a concise reflection of the performance assessment review conducted. The Review Report should include references to the performance assessment and any related documentation included in the review. The conclusion of the Review Report should include a recommendation that the performance assessment be *accepted*, *accepted with conditions*, or *not accepted*. The Review Report should be considered a final stand-alone document. Once submitted to the LFRG as a final, no changes should be made to the Review Report.

### *1.0 Introduction*

This section should be a brief introduction of the purpose for the Report, and include the citation of the performance assessment being reviewed and the guidance used to conduct the review. There should also be a concise statement of the review process and Review Team findings, as well as an overview of the Report format.



## 2.0 *Summary of Site and Facility Description*

This section should provide a concise description of the LLW disposal facility that is the topic of the performance assessment and the site surrounding it. The material in this section could be extracted from the performance assessment and presented as background to any readers of the Review Report who are unfamiliar with the site and the disposal facility.

## 3.0 *Summary of Performance Assessment Review*

This section should provide an overview of the performance assessment review. Any documentation from the site that was prepared in response to requests from the Review Team should be briefly discussed. Issues identified during the course of the review and the resolution of those issues should be discussed in this section. The conclusions of the review should be presented in this section. References to any appendices for extended discussions contained in the minutes of the meetings of the Review Team are appropriate. References to appendices that identify the members and consultants on the Review Team, and the chronology of the review are also appropriate.

## 4.0 *Technical Adequacy of Performance Assessment*

This section should provide the basis for concluding that the performance assessment is technically adequate and there is a reasonable expectation that the performance objectives of DOE Order 5820.2A will be met. The performance measures used in the performance assessment should be identified and the basis for the performance measures as appropriate interpretations of the performance objectives should be presented. A summary of the method of analysis used in the performance assessment and the calculated results should be described. The review findings that the performance assessment is complete, thorough and technically supported, and that its conclusions are valid and acceptable should be discussed. Major issues relating to the technical adequacy of the performance assessment should be restated and the discussions of these issues summarized. The technical basis for the conclusions of the review of the performance assessment should be stated.

## 5.0 *Consistency of Performance Assessment*

This section should document the consistency of the performance assessment and any additional material developed in the review with the *Interim Format and Content Guide and Standard Review Plan for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments*. There should be a discussion of how the guidance was interpreted for the performance assessment, and a judgment on the consistency of approach taken with respect to: the performance assessment guidance; existing laws; regulations; DOE Orders; DOE policy; and any applicable agreements with regulatory agencies or affected states. Any conflicts with the performance assessment guidance and other competing regulatory matters should be identified and the approach taken in the performance assessment in addressing these conflicts identified.

The significance of any inconsistencies with respect to the acceptance of the performance assessment should be discussed.

### 6.0 *Unresolved Issues*

This section should identify all issues which were not satisfactorily or completely resolved in the performance assessment review. The review of the performance assessment is certain to identify issues to be addressed. Most of these issues can be expected to be resolved in the course of the review by requests for additional information or discussions between the Review Team and the DOE site. Some issues may remain unresolved because of a lack of sufficient data or knowledge, or because of competing policies or regulatory directives. Some Review Team members may wish to enter dissenting opinions on parts of the review, and these should be discussed in this section. The significance of these unresolved issues on the recommendation to the LFRG should be identified and discussed.

Because many unresolved issues will pertain to the uncertainties involved in the decisionmaking, the assumptions made, and the difficulty in agreeing or disagreeing with findings based on calculations far into the future, the performance assessment maintenance program required by DOE Order 5820.2A can be used as an effective method for resolving these issues. The identification of studies to reduce uncertainty, analysis to justify assumptions, and the collection of data over time are all examples of conditions that should be considered for inclusion in the recommendation specifically as part of the facility's performance assessment maintenance program. Including recommendations for conditions on the performance assessment maintenance program may allow the facility to continue to operate while the uncertainties are being studied.

### 7.0 *Recommendation of Review Team*

The Review Team should recommend that the performance assessment be *accepted*, *accepted with conditions*, or *not accepted*. The basis for the recommendation should be provided, including references to the relevant material in the Review Report.

If the Review Team recommends the performance assessment be *accepted*, this signifies that all issues concerning the results of the performance assessment and any relationship to waste acceptance criteria, disposal facility operations, the performance assessment maintenance program, and any other elements of the management of low-level waste are resolved. This also means that documentation in the administrative record is complete and the Review Team can identify no additional conditions that should be placed in the Disposal Authorization Statement beyond those that have already been addressed in the performance assessment maintenance section of the performance assessment and resolved. This would probably be a rare finding until performance assessments have been reviewed through a few maintenance cycles.

If the Review Team recommends the performance assessment be *accepted with conditions*, then the Review Team has identified some issues that could not be resolved to its full satisfaction, but has identified further analysis, performance assessment maintenance activities, monitoring, or reporting that should lead to issue resolution or closure which can be specified in a Disposal Authorization Statement. Any conditions on the acceptance of the performance assessment should be explicitly stated, with reference to the justifications for the conditions clearly identified in the materials reviewed and placed in the administrative record.

If the Review Team recommends the performance assessment be *not accepted*, then the Review Team has identified major issues which could not be resolved through the development and implementation of any conditions on the facility operations, waste acceptance, monitoring, or reporting. It should be expected that a non-acceptance would require additional rounds of review, therefore, the Review Report should clearly lay out the issues that cannot be resolved, the reasons they cannot be resolved, and any comments that would provide assistance to the performance assessment developers and the site/facility in providing the analysis or data that could allow for a finding of acceptance.

### *Appendices*

Appendices should be used to reduce the Review Report's length and provide references to important information used in the performance assessment review. Appendix A should include a list of the Review Team members and any consultants and their qualifications. Appendix B should be the Review Plan used for the performance assessment review. Appendix C should include a chronology of the performance assessment review that lists of all communications, meetings, and other events which occurred as part of the review. Appendix D should be any Review Team member comments or dissenting opinions that need to be reflected in the Review Report. Appendix E should list all written communications between the DOE site and the Review Team that are considered germane to the conclusions of the review. Appendix F should list any supporting documentation provided by the site for the performance assessment review or used by the Review Team in making the conclusions of the review. This documentation should include any material developed in response to questions posed by the Review Team. Additional appendices may be added to the Review Report as appropriate.

### **2.8.3 Composite Analysis Review Report Outline**

A suggested composite analysis Review Report outline follows:

- I Executive Summary*
- 1.0 Introduction*
- 2.0 Summary of Facility Description and Interacting Sources*
- 3.0 Summary of Composite Analysis Review*
- 4.0 Technical Adequacy of Composite Analysis*
- 5.0 Consistency of Composite Analysis*

- 6.0 *Unresolved Issues*
- 7.0 *Recommendation of Review Team*
- 8.0 *Appendices*
  - A. *Review Team Members and Qualifications*
  - B. *Review Plan*
  - B. *Chronology of Review*
  - C. *List of Important Communications Between Site and Review Team*
  - D. *List of Supporting Documentation Utilized During the Review*

These suggested elements of a composite analysis Review Report are described below.

#### **2.8.4 Composite Analysis Review Report Development**

The results of the composite analysis review using the guidance presented in Chapter 3 are to be addressed in a Review Report. This guidance is not intended to provide a comprehensive discussion for a Review Report applicable to all composite analyses. Instead, the Review Report should be a concise reflection of the composite analysis review conducted with the guidance provided in Chapter 3. The Review Report should include references to the composite analysis, performance assessment, and any related documentation used for the review. The conclusion of the Review Report should include the recommendation that the composite analysis be *accepted*, *accepted with conditions*, or *not accepted*. The Review Report should be a final stand-alone document. Once submitted to the LFRG, no changes should be made to the final Review Report.

##### *1.0 Introduction*

This section provides a brief introduction of the purpose for the Report, and include the citation of the composite analysis being reviewed and the guidance used to conduct the review. If the associated performance assessment is a separate document, the performance assessment citation should be included. There should also be a concise statement of the review process and Review Team findings, as well as an overview of the Report contents.

##### *2.0 Summary of Facility Description and Interacting Source Terms*

The purpose of this section is to provide sufficient background to any readers of the Review Report who are unfamiliar with the disposal facility and other potential contributing sources. This section provides a concise description of the overall geographic area addressed in the composite analysis, of the LLW disposal facility and of all potential sources that could interact with the disposal facility. This section should also identify those potential sources which were not considered in the composite analysis with a concise explanation why they were excluded. The material in this section could be extracted from the composite analysis, and may include material abstracted from the performance assessment.

### 3.0 *Summary of Composite Analysis Review*

This section provides an overview of the composite analysis review. References to appendices that identify the members of the Review Team and consultants to the Review Team and the chronology of the review are appropriate. Any documentation from the site that was prepared in response to requests for additional information by the Review Team should be briefly discussed, with reference to the documentation itself. Issues identified during the course of the review and the resolution of those issues should be documented in this section. Any appendices containing minutes or summaries of extended discussions of the Review Team can be referenced. The conclusions of the review should also be presented in this section.

### 4.0 *Technical Adequacy of the Composite Analysis*

This section should provide the basis for concluding that the composite analysis is technically adequate and provides a reasonable basis for comparison to the performance measures for environmental and public radiation protection in DOE Order 5400.5. To be technically adequate, the composite analysis should present justified analyses which lead to the determination of the projected dose against the limiting performance measure of 100 mrem/year and the constraining performance measure of 30 mrem/year, and include the necessary options and ALARA analyses depending on the results. This section should also include a summary of the method of analysis used in the composite analysis, and the calculated results. The findings that the composite analysis is complete, thorough and technically supported, and that its conclusions are valid and acceptable should be discussed. Major technical issues relating to the technical adequacy of the composite analysis should be restated and the discussions of these summarized. The technical basis for the conclusions of the review of the composite analysis should be stated.

### 5.0 *Consistency of Composite Analysis*

This section documents the consistency of the composite analysis and any additional material developed in the review with the *Guidance for a Composite Analysis of the Impact of Interacting Source Terms on the Radiological Protection of the Public from Department of Energy (DOE) Low-Level Waste Disposal Facilities*. There should be a discussion of how the guidance was interpreted for the composite analysis, and a judgment on the consistency of approach taken with respect to the guidance. Consideration of the interpretations made for existing laws, regulations, other DOE Orders, DOE policy, and applicable agreements with regulatory agencies or affected states should be included in the judgment of consistency. Any conflicts with the composite analysis guidance and other competing regulatory matters and the approach taken in the composite analysis in addressing these conflicts should be identified. The significance of any inconsistencies with respect to the acceptance of the composite analysis should also be discussed.

## 6.0 *Unresolved Issues*

This section identifies all issues which are not satisfactorily or completely resolved in the composite analysis review. The review of the composite analysis is likely to identify issues to be addressed. Most of these issues are expected to be resolved in the course of the review by requests for additional information or discussions between the Review Team and the DOE site. Some issues may remain unresolved however because of a lack of sufficient data or knowledge, or because of competing policies or regulatory directives. Some Review Team members may wish to enter dissenting opinions on parts of the review. If so, these should be discussed in this section. Moreover, the significance of these unresolved issues on the Review Teams recommendation to the LFRG should be identified and discussed.

## 7.0 *Recommendation of the Review Team*

The Review Team recommends that the composite analysis be *accepted*, *accepted with conditions*, or *not accepted*. The basis for the recommendation should be provided, including references to the relevant material in the Review Report.

If the Review Team recommends the composite analysis be *accepted*, this means that all issues concerning the results of the composite analysis are resolved. The documentation in the administrative record is complete and the Review Team can identify no additional conditions that should be in the Disposal Authorization Statement beyond those already addressed.

If the Review Team recommends the composite analysis be *accepted with conditions*, then the Review Team has identified some issues that could not be resolved to their full satisfaction, but has identified further analysis, monitoring, or reporting that should be implemented in the corrective actions identified in the options analysis included in the composite analysis and as conditions in the Disposal Authorization Statement. Any conditions on the acceptance of the composite analysis should be explicitly stated, with reference to the justifications for the conditions clearly identified in the materials reviewed and placed in the administrative record.

If the Review Team recommends the composite analysis be *not accepted*, then the Review Team has identified major issues which could not be resolved through the development and implementation of any conditions on the operations, waste acceptance, monitoring, or reporting by the facility. It should be expected that a “non-acceptance” would require additional rounds of review, therefore, the Review Report needs to clearly lay out the issues that cannot be resolved, the reasons they cannot be resolved, and any comments that would provide assistance to the composite analysis developers and the site/facility in providing the analysis or data that would allow for a finding of acceptance.

## *Appendices*

Appendices should be used to reduce the Review Report's length and provide references to important information used in the composite analysis review. Appendix A lists the Review Team members and any consultants and their qualifications. Appendix B contains the Review Plan used for the composite analysis review. Appendix C includes a chronology of the composite analysis review that includes a list of all communications, meetings, and other events which occurred as part of the composite analysis review. Appendix D should provide any Review Team member comments or dissenting opinions that need to be reflected in the Review Report. Appendix E lists all written communications between the DOE site and the Review Team considered germane to the conclusions made in the Review Report. Appendix F should list any supporting documentation provided by the site for the composite analysis review or used by the Review Team in making the conclusions of the review. This documentation should include any material developed in response to questions posed by the Review Team. Additional appendices may be added to the Review Report as appropriate.

### **2.8.5 Review Report Approval**

The Review Team should review the initial report for adequacy and accuracy and prepare a draft report. The draft Review Report should be provided to the affected DOE Field Office management for a factual accuracy review, and all site comments should be reviewed by the Review Team and incorporated in the final Review Report as appropriate. The final Review Report, together with a summary of the site review comments and the Review Team's response to those comments is submitted to the LFRG for its review and approval. The LFRG should review and approve the Review Report<sup>1</sup>.

### **2.9 Disposal Facility Compliance Evaluation**

The LFRG considers: the Review Report and the recommendation of the Review Team concerning the performance assessment and/or composite analysis; any unresolved issues identified in the Review Report; any other issues which may have been identified after the report was submitted; and any additional information that may have been provided to the LFRG for consideration, and prepare a Compliance Evaluation for the performance assessment and/or composite analysis.

If the performance assessment and composite analysis are submitted simultaneously, the LFRG's review and its findings and recommendations may progress to the development of a draft

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<sup>1</sup> The LFRG member from the affected DOE Field Office has a conflict of interest for a performance assessment and/or composite analysis Review Report for a site under the authority of his/her Field Office. The LFRG Co-chairmen must address this conflict of interest in deciding on approval of the Review Report.

Disposal Authorization Statement, to be sent to the Deputy Assistant Secretary along with the Compliance Evaluation and other pertinent documents.

If, however, the performance assessment and composite analysis are not submitted at the same time, and the performance assessment review is completed without the composite analysis, then the following steps in development of a Compliance Evaluation and Disposal Authorization Statement should be modified appropriately. A suggested approach for the LFRG to consider if the performance assessment and composite analysis are submitted separately is in Section 2.9.8.

### **2.9.1 Issues Resolution**

During the development of the Review Report, issues which were identified and not resolved to the satisfaction of the Review Team may become unresolved issues and/or conditions for facility operation. The LFRG may decide that some or all of the issues should be resolved, or the recommendations of the Review Team modified, prior to the development of a Compliance Evaluation and/or Disposal Authorization Statement. If this is the action taken by the LFRG, the LFRG should not made any changes to the Review Report. Instead, the resolution or modification of conclusions concerning these issues should be thoroughly documented with issues papers, analyses, and briefing and meeting minutes and added to the administrative record for the performance assessment/composite analysis review. Resolution or modifications to these issues should be discussed in the Compliance Evaluation transmitted to the Deputy Assistant Secretary.

The LFRG should consider having a meeting with the Review Team members and site/facility personnel involved in the development of the performance assessment and/or composite analysis to assist in the resolution of unresolved issues that have been brought forth in the Review Report.

### **2.9.2 LFRG Review of a Performance Assessment Review Report**

The LFRG thoroughly reviews the performance assessment Review Report; assimilates the necessary information from the appendices and the administrative record; evaluates the performance assessment, any additional information or issues discussed after the submittal of the Review Report, and addresses the following subjects.

#### ***2.9.2.1 DOE Order 5820.2A Compliance***

The LFRG should determine if the performance assessment, as reviewed by the Review Team and discussed in the Review Report, provides a reasonable expectation that the performance objectives of DOE Order 5820.2A are met for the LLW disposal facility evaluated in the performance assessment. The criterion for reasonable expectation is a “weight of evidence” determination that is based on the material included in the performance assessment, supplemental documentation, and Review Report that the performance assessment is complete and logical, provides a comprehensive evaluation of the long-term performance of the disposal facility that is



technically supported, and provides valid and acceptable conclusions including reasonable actions that can be taken at the disposal facility.

### ***2.9.2.2 Conditions of Acceptance***

The recommendation of the Review Team that the performance assessment be *accepted*, *accepted with conditions*, or *not accepted* should be reviewed and discussed in consideration of any unresolved issues in the Review Report, and any other issues or information identified following the performance assessment review. The LFRG evaluates any conditions identified by the Review Team. Each condition of acceptance identified by the Review Team should be justified in the Review Report. If the LFRG is able to settle any unresolved issues identified in the Review Report, it should do so and document the resolutions. Should these resolutions lead to modifications of the conditions for acceptance identified by the Review Team, changes to the conditions for acceptance should be made and documented. The use of the performance assessment maintenance program to reduce uncertainties should be examined carefully to ensure that the goals of those conditions as proposed by the Review Team are both useful and reasonable.

New issues not raised in the Review Report that were identified following the performance assessment review should be discussed, any conditions for acceptance of the performance assessment should be developed, and the basis for the new conditions should be documented. The final conditions for acceptance of the performance assessment should be agreed upon by the LFRG. These final conditions and the justification of these conditions by the Review Report or other information should be documented as part of the decision of the LFRG.

### ***2.9.2.3 Acceptance of the Performance Assessment***

The performance assessment, Review Report, administrative record, evaluations by the LFRG, and any conditions for acceptance of the performance assessment should form the basis for accepting the performance assessment. The LFRG should review this material and conclude whether the performance assessment should be accepted and recommended for approval. Acceptance of the performance assessment and associated documentation means the LLW disposal facility can be expected to operate under specified conditions with a reasonable expectation that the performance objectives of DOE Order 5820.2A will be met. [Approval of the performance assessment and associated documentation also means the LLW disposal facility should have a Disposal Authorization Statement issued provided that a recommendation for approval is also made following the review of the composite analysis (See Section 2.9.6)].

## **2.9.3 Performance Assessment Compliance Evaluation Development**

The findings of the LFRG should be documented in a Compliance Evaluation to be submitted to EM-30. If the LFRG does not accept the performance assessment and not recommend approval of the performance assessment by DOE, the necessary steps to be taken by the DOE site to gain

acceptance and approval should be documented and submitted to the Deputy Assistant Secretary for transmittal to the Field Office Manager.

If the LFRG accepts the performance assessment and recommends its approval, a Compliance Evaluation documenting approval of the performance assessment should be prepared by the LFRG and submitted to the Deputy Assistant Secretary. The Compliance Evaluation should include: a summary of the findings on the guidance described in Section 2.9.2; any conditions on the performance assessment maintenance program, disposal operations, waste acceptance and receipt, monitoring, and recordkeeping at the subject facility for acceptance of the performance assessment; and any other pertinent information needed to maintain reasonable assurance the performance objectives of DOE Order 5820.2A will be met.

The Compliance Evaluation should include a draft Disposal Authorization Statement with the conditions for the facility to meet that the Deputy Assistant Secretary may sign as final.

#### **2.9.4 LFRG Review of a Composite Analysis Review Report**

The LFRG thoroughly reviews the composite analysis Review Report; assimilates the necessary information from the appendices and the administrative record; evaluates the composite analysis, any additional information, and issues discussed after the submittal of the Review Report, and addresses the following subjects.

##### ***2.9.4.1 Conclusions Concerning Performance Measures***

The LFRG should determine if the composite analysis, as reviewed by the Review Team and discussed in the Review Report, (1) provides a reasonable expectation that the authorization of the disposal facility is not likely to result in long-term compliance problems, and (2) should potential problems be identified, provides for management alternatives and corrective actions that could be taken that will provide a reasonable expectation that current LLW disposal activities will not result in the need for future corrective or remedial actions to protect the public and environment. For LLW disposal facilities and other contributing sources which exceed the constraining performance measure, corrective actions are identified that, when implemented, provide for a reasonable expectation that the constraining performance measure will not be exceeded in the future. Corrective actions presented should be a reasonable first line of defense actions designed to aid in the understanding of where potential problems should be addressed. Such actions as refining the analysis to reduce conservatism, limiting receipt of certain wastes until further information is collected, evaluating remedial measures on interacting source terms, or evaluating alternative land use plans are example kinds of corrective actions that should be proposed. Additional discussion of composite analysis corrective actions can be found in the *Guidance for a Composite Analysis of the Impact of Interacting Source Terms on the Radiological Protection of the Public from Department of Energy (DOE) Low-Level Waste Disposal Facilities*.

The basis for the determination made on the composite analysis should be the material presented in the composite analysis, Review Report, and supplemental information developed in the course of the review. The recommendation concerning the acceptance of the composite analysis should be supported by the information contained in the Review Report to justify the conclusion and any conditions which might be placed on a recommendation to accept the composite analysis.

#### ***2.9.4.2 Conditions of Acceptance***

The recommendation of the Review Team that the composite analysis, *be accepted, accepted with conditions, or not accepted* should be reviewed and discussed in consideration of any unresolved issues in the Review Report and any other issues or information identified following the composite analysis review. The LFRG should either concur with any conditions recommended by the Review Team or modify the recommendations based on other issues or information. If the LFRG elects to modify the recommendations of the Review Team, the justification for any modifications should be documented. If the LFRG is able to settle any unresolved issues identified in the Review Report, it should do so and document the resolutions. If these resolutions lead to modifications of the conditions for acceptance identified by the Review Team, changes to the conditions for acceptance should be made and documented. New issues not identified by the Review Report that were identified following the composite analysis review should be discussed, and any conditions for acceptance of the composite analysis developed and the basis for the new conditions documented.

The final conditions for acceptance of the composite analysis should be agreed upon by the LFRG. These final conditions and the justification of these conditions by the Review Report or other information should be documented as part of the decision of the LFRG.

#### ***2.9.4.3 Acceptance of the Composite Analysis***

The composite analysis, Review Report, administrative record, evaluations by the LFRG, and any conditions for acceptance of the composite analysis form the basis for accepting the composite analysis. The LFRG should review this material and conclude whether the composite analysis should be accepted and recommended for approval. Acceptance of the composite analysis and associated documentation means the LLW disposal facility can be expected to operate under the specified conditions without the low-level waste disposal facility being the cause of exceeding the constraining dose limit. Approval of the composite analysis means the LLW disposal facility should have a Disposal Authorization Statement issued provided that a recommendation for approval to EM-30 is also made based on the performance assessment review (See Section 2.9.6).

### **2.9.5 Composite Analysis Compliance Evaluation Development**

The findings of the LFRG should be documented in a Compliance Evaluation to be submitted to EM-30. Should the LFRG not accept the composite analysis and not recommend approval of the

composite analysis by DOE, the necessary steps to be taken by the DOE site to gain acceptance and approval should be documented and submitted to the Deputy Assistant Secretary for transmittal to the Field Office Manager.

If the LFRG accepts the composite analysis and recommend its approval by DOE, a Compliance Evaluation documenting approval of the composite analysis should be prepared by the LFRG and submitted to the Deputy Assistant Secretary. The Compliance Evaluation should include: a summary of the findings on the guidance described in Section 2.9.4, any conditions for acceptance of the composite analysis; and any other pertinent information needed to maintain reasonable assurance that planning for continued protection of the public from radioactive material disposed in the low-level waste disposal facility is being done appropriately.

The Compliance Evaluation should include a draft Disposal Authorization Statement with the conditions for the facility to meet that the Deputy Assistant Secretary may sign as final.

### **2.9.6 Development of Disposal Authorization Statement**

The LFRG develops a draft Disposal Authorization Statement that authorizes the operation (or continued operation) of the LLW disposal facility evaluated in the performance assessment and composite analysis. The Statement should be based on the results of the performance assessment and composite analysis reviews as documented in the Compliance Evaluations, and specify the conditions under which the LFRG would permit the operation to continue, as derived from the Compliance Evaluation. The assistance of the Review Team leader should be solicited if necessary for developing the Disposal Authorization Statement.

Conditions in Disposal Authorization Statements include waste acceptance and receipt, waste form, facility operations, closure, performance assessment maintenance, monitoring, record keeping, and planning conditions, as well as reports and data that must be collected and submitted for further analysis, including time frames within which the work should be completed. References to the performance assessment, composite analysis, and other procedures and facility-specific documents should be included to ensure operational controls that are expected to be followed are clearly identified. Deadlines for submittal of information or data, and specific measures of performance should be identified for clarity. The expiration date for the Disposal Authorization Statement should be clearly indicated, as well as expiration dates for any interim conditions.

### **2.9.7 Compliance Evaluation / Disposal Authorization Statement Approval**

The Compliance Evaluations and Disposal Authorization Statement undergoes a thorough internal (LFRG) review for adequacy and accuracy, both during preparation and prior to final transmittal. The LFRG approves the final Compliance Evaluations and draft Disposal Authorization Statement, and transmits them to the Deputy Assistant Secretary. The LFRG also transmits any documentation such as the Review Report and documentation of resolution of

issues along with the Compliance Evaluations and Disposal Authorization Statement that will assist the Deputy Assistance Secretary's understanding of the Compliance Evaluations and Disposal Authorization Statement. The Deputy Assistant Secretary should then take the appropriate action on the approval package in accordance with his management responsibilities.

### **2.9.8 Compliance Evaluations for Separate Performance Assessments and Composite Analyses**

The final Disposal Authorization Statement is not to be issued by the Deputy Assistant Secretary until approval of both the performance assessment and the composite analysis has occurred and all conditions necessary for the disposal facility to follow as a result of both analyses has been determined. However, the timing of submittals of performance assessments and composite analyses from some DOE sites to Headquarters for review is complicated by the fact that some performance assessments have been completed and reviewed already, while composite analysis reviews are just beginning. This could result in the completion of LFRG activities on some performance assessments in advance of those concerning the composite analysis for the same facility.

If this occurs, the LFRG should implement a modification of the development of the Compliance Evaluations and Disposal Authorization Statement to accommodate this event. A suggested approach is to develop the performance assessment Compliance Evaluation for the disposal facility, conditionally approving the performance assessment and allowing operations to continue. One condition of allowing operations to continue should specify the time of submittal of the final composite analysis by the site. Some conditions on the operation of the facility until the composite analysis is completed could also be considered, such as limitations of acceptance of radionuclides that may be potentially critical contributors to dose to the public in the composite analysis.

The draft Disposal Authorization Statement should be prepared following the completion of the review and approval of both the performance assessment and the composite analysis. In this case, documentation on the facility accompanying the Disposal Authorization Statement prepared by the LFRG could include two Compliance Evaluations, one for the performance assessment and one for the composite analysis. The conditions in the draft Disposal Authorization Statement would be an appropriate consolidation of discussions from the two Compliance Evaluations.

Also, a performance assessment may be approved, while a composite analysis is not. In this case, an interim or limited Disposal Authorization Statement that provides for appropriate conditional operation of the disposal facility could be prepared .

## **2.10 Review Closeout**

### **2.10.1 Review Feedback**

The LFRG performance assessment and composite analysis review for a site includes an opportunity for evaluation and feedback by Review Team members, the staff responsible for the site/facility being reviewed, the LFRG, and any other DOE organizations (e.g., EM, EH, Field Offices) involved with or affected by the review. If requested by the site/facility being reviewed, a meeting between the LFRG, Review Team members, and site personnel should be convened to provide for an understanding of the results of the review and the conditions recommended in the Disposal Authorization Statement.

The Review Team Leader should report any feedback on or suggestions for improving this manual or the performance assessment/composite analysis review process to the LFRG. Review Team members and personnel at the site that was reviewed should be encouraged by the LFRG and the Team Leader to provide this feedback. The LFRG should consider these critiques and develop updates to this *LLW Facility Federal Review Group Guidance Manual* as appropriate.

### **2.10.2 Final Administrative Record**

During the performance assessment and/or composite analysis review process, the Review Team Leader should be assembling the documentation to go into the administrative record for the review. Following approval of the Disposal Authorization Statement by the Deputy Assistant Secretary, the Statement should be placed in the administrative record, and the review considered closed.

A central location should be chosen to maintain and store the administrative records for all performance assessment and composite analysis reviews.

If the LFRG decides to take additional actions with respect to the disposal facility, then documentation of these actions should be placed into the same administrative record. When another substantive review of a performance assessment and/or composite analysis for the same disposal facility is conducted, for example, at a performance assessment maintenance cycle, then the LFRG should use the same administrative record again, and have the Review Team Leader for the subsequent review maintain the documentation in that same administrative record. The administrative record then becomes a comprehensive record of all disposal authorization decisions through all or remaining operations at the facility, similar to a docket file for a facility licensed by the NRC.

### **2.10.3 Conditions Tracking**

The LFRG is responsible for ensuring that completion of actions or adherence with conditions specified in the Disposal Authorization Statement are tracked and a status provided to the Deputy

Assistant Secretary, if requested. Completion of other commitments or actions of the site and/or LFRG related to the performance assessment/composite analysis review, but not specified in the Disposal Authorization Statement (e.g., commitment to change LFRG guidance), should also be tracked by the LFRG.

### **3. TECHNICAL REVIEW CRITERIA**

This chapter provides the framework and technical review criteria for Review Teams to evaluate low-level radioactive waste disposal facility performance assessments and composite analyses. The performance assessment and composite analysis under review are technical studies that are prepared with considerable engineering and professional judgment and, as a result, contain arguments and discussions that often do not lead to results or conclusion that are absolutes. The Review Team must recognize this in reaching conclusions on the review of the performance assessment and composite analysis. The technical review of a performance assessment or composite analysis aims to identify that all of the relevant and important technical discussions, analyses and methodologies, and supporting data and information of a proper presentation of a technical, engineering judgment are included and that they are appropriately supported.

The following sections include acceptance criteria for performance assessment and composite analysis reviews. In many cases, the acceptance criteria are followed by sub-criteria that provide minimum information expected or other guidance on how each of the acceptance criteria can be measured. These acceptance criteria are to be used as guidance in the review of the performance assessment and composite analysis by the Review Team, and for preparing the Review Report discussed in Section 2.8.

The technical criteria presented in this chapter have been formulated through prior performance assessment reviews and consideration of a “generic” situation. They provide benchmarks to be addressed in the review of the performance assessment and composite analysis and direction to ensure the review satisfies its objectives. In the conduct of a specific review, changes to these criteria or additional criteria may be necessary for determining the acceptability of site-specific information. Review Teams should document the changes and additions to these criteria in the Review Report for the specific performance assessment/composite analysis review.

#### **3.1 Performance Assessment Review Criteria**

The Review Team should make the following fundamental conclusions, called review findings, regarding the performance assessment:

- The Performance Assessment is Complete
- The Performance Assessment is Thorough and Technically Supported
- The Performance Assessment Conclusions are Valid and Acceptable

Each of these review findings can be made using the acceptance criteria presented in the following sections. These acceptance criteria are intended to provide guidance but are not to be considered requirements to be satisfied in detail for every performance assessment. Instead, the acceptance criteria should be addressed in the review commensurate with the importance of each criterion to the performance of the site and disposal facility, and to the results and conclusions of the



performance assessment for evaluating LLW disposed after September 26, 1988. The criteria provide a thorough listing of topics to be addressed in the course of the review and present the basis for any requests for additional information concerning the disposal facility or the performance assessment.

### **3.1.1 Review Finding I - The Performance Assessment is Complete**

In order to make the review finding that the performance assessment is complete, the Review Team should make the following conclusions:

All material considered to be important in understanding the performance assessment and associated analysis is present so that a detailed review can be performed. The performance assessment addresses each of the topics identified in the *Interim Format and Content Guide and Standard Review Plan for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments*, and the discussion contains sufficient information for the review of the performance assessment. The material presented in the performance assessment is representative of current and available knowledge, does not overlook known information, and includes supporting information.

The arguments and discussions included in the performance assessment have technical merit, and the conclusions represent reasonable interpretations of the results for the long-term performance of the LLW disposal facility and as presented with the supporting data. The steps of the analysis follow logically one after another, and there are no extraneous discussions or unjustified assumptions. The methodology of analysis evaluates the important features of the site and the disposal facility and demonstrates an understanding of the site and facility. The methodology of analysis is clearly explained, the assumptions and performance measures are clearly presented, including justifications, and the results of the application of the methodology of analysis are clearly presented and interpreted to formulate the conclusions.

The following acceptance criteria address this review finding and provide the basis for identifying questions to be addressed and requests for additional data or information concerning the disposal facility or the performance assessment that may be necessary to conduct a comprehensive review of the performance assessment and ensure the arguments presented in the performance assessment are rational and logical.

**Criterion 3.1.1.a.** The performance assessment identifies the performance measures used in the performance assessment and a justification of those performance measures as site-specific applications of the performance objectives.

**Criterion 3.1.1.b.** The performance assessment presents information on the site geography, demography, land use plans, meteorology, ecology, geology, seismology, volcanology, surface

water and groundwater hydrology, geochemistry, geologic resources, water resources, and natural background radiation sufficient to support the analysis presented in the performance assessment.

**Criterion 3.1.1.c.** The performance assessment presents information on the facility design features including elements of the design that address water infiltration, disposal unit cover integrity, structural stability, and the inadvertent intruder barrier sufficient to support the analysis presented in the performance assessment.

**Criterion 3.1.1.d.** The performance assessment identifies Federal, state, and local statutes or regulations or agreements that impact site engineering, facility design, facility operations, and the relationship and/or impact of the results of the performance assessment on site engineering, facility design, or facility operations because of these factors.

**Criterion 3.1.1.e.** The performance assessment identifies procedures and facility related documentation (e.g., SARs, ORR, WAC) that may impact site engineering, facility design, or facility operations and the relationship and/or impact of the results of the performance assessment on the documents and site engineering, facility design, or facility operations.

**Criterion 3.1.1.f.** The performance assessment identifies and justifies the key assumptions included in the analysis presented in the performance assessment.

**Criterion 3.1.1.g.** The performance assessment identifies the point of assessment for each performance measure, and justifies the selection of each point of assessment.

*1.g.1.* The point of assessment for all-pathways, the air pathway excluding radon, and groundwater resource protection is justified based on future land use. If the future site boundary is uncertain, a reasonable point of assessment (e.g., point of maximum impact greater than 100-m from the edge of the disposal unit) is justified.

*1.g.2.* The default point of assessment for the performance measure for radon exposure that is based on a limit on the average flux of radon of 20 pCi/m<sup>2</sup>/s at the ground surface is the ground surface over the disposal unit.

*1.g.3.* The default point of assessment for the alternative performance measure for radon exposure that is based on a limit on air concentration of radioactive material of 0.5 pCi/L is 100-m from the edge of the disposal unit.

**Criterion 3.1.1.h.** The performance assessment identifies and quantifies all radionuclides present in the low-level waste to be disposed of at the facility that could significantly contribute to dose for the all pathways analysis, the air pathway analysis, the groundwater analysis, and the intruder analysis. Technical justification is provided for those radionuclides considered in detail in the analyses, and conversely, those not considered in the analyses.

**Criterion 3.1.1.i.** The performance assessment accounts for all relevant mechanisms for the release of radionuclides from the waste materials for environmental transport. The mechanisms analyzed are justified by references to relevant studies, available data, or supporting analyses in the performance assessment.

**Criterion 3.1.1.j.** The performance assessment provides a complete and clear description of the conceptual model of the environmental transport of radionuclides from the waste materials to the points of compliance by air and water. The conceptual model is justified by referenced investigations, data, and supporting analyses that are representative of the site-specific conditions described.

*1.j.1.* The conceptual model incorporates interpretations of available geochemical, geologic, meteorologic and hydrologic data, and the relevant mechanisms that have a significant effect on the transport of radionuclides at the disposal site.

*1.j.2.* Assumptions incorporated into the conceptual model to account for transport mechanisms lacking sufficient data or supporting analyses are identified and justified as reasonable representations of site behavior over the time period considered in the analysis.

*1.j.3.* The conceptual model includes closure of the facility as justified based on referenced closure plans or reasonable assumptions of facility closure.

*1.j.4.* The conceptual model includes any credits to be taken in the analysis for the performance of engineered features. Credits for engineered features include a reasonable representation of the degradation of the engineered features that is justified by supporting investigations and data.

*1.j.5.* The conceptual model includes natural processes that affect the transport of radionuclides (e.g., flooding, mass wasting, erosion, weathering) over the time period considered in the analysis, as justified based on referenced investigations and supporting analysis.

**Criterion 3.1.1.k.** The performance assessment provides a clear description of the mathematical models used in the analysis, the basis for their selection, and their linkage. The mathematical models selected are justified and provide a reasonable representation of all of the elements of the conceptual model.

*1.k.1.* The complexity of the mathematical models selected is commensurate with the available site data.

*1.k.2.* Assumptions incorporated into the mathematical models are identified, justified, and consistent with the conceptual model.

*1.k.3.* Mathematical models selected are documented and verified either in referenced publications or in the appendices of the performance assessment.

***Criterion 3.1.1.1.*** The performance assessment provides a complete description of the important exposure pathways and scenarios for the specific disposal facility that are used in the evaluation of the potential doses to a hypothetical, individual member of the public and inadvertent intruder consistent with site-specific environmental conditions and local and regional practices. The exposure pathways and scenarios selected for detailed analysis are justified as conservative representations of the long-term performance of the LLW disposal facility. These include:

*1.1.1.* Exposure pathways from the transport of contamination in groundwater that may be considered include potential exposures from the ingestion of contaminated groundwater, the use of contaminated groundwater for irrigation and livestock watering, and the biotic uptake and transport of contamination from groundwater and surface water. Potential exposure pathways from the transport of contamination in surface water include the ingestion of contaminated surface water and contaminated fish.

*1.1.2.* If radiation dose is used as a measure groundwater resource protection, the exposure scenarios consider the ingestion of water (at 2 liters per day or an alternative rate, if a justification is included) at the point of assessment, which represents the location of maximum exposure from a well constructed and developed using current practices typical for the local area.

*1.1.3.* Exposure scenarios from the transport of contamination in water for the all pathways analysis considers the use of groundwater and surface water consistent with local and regional practices. Exposure scenarios that may be considered include drinking water, crop irrigation and livestock watering, the ingestion of dairy products, livestock, fish, crops, and soil, the inhalation of resuspended particles, and external exposure.

*1.1.4.* Exposure pathways from the transport of contamination in the atmosphere that may be considered include potential exposure from immersion in air contaminated with volatile and nonvolatile radionuclides, deposition of volatile and nonvolatile radionuclides, and subsequent exposure from direct radiation, ingestion, and resuspension.

*1.1.5.* Exposure scenarios from the transport of contamination in air that may be considered include residential and gardening activities which include the direct inhalation of volatile and nonvolatile radionuclides, external exposure, ingestion of crops, soil, livestock, dairy products, and inhalation of resuspended particles.

*1.1.6.* Exposure pathways from inadvertent intrusion into the waste disposal units identify the chronic and acute exposure pathways for each of the exposure scenarios considered. The exposure pathways include all relevant ingestion, external exposure, and inhalation pathways for each exposure scenario. [Direct ingestion of contaminated

groundwater and exposures to radon should not be considered for inadvertent intrusion, because they are considered separately.]

*1.1.7.* Acute exposure scenarios for inadvertent intrusion considers direct intrusion into the disposal site and exhumation of accessible waste material. Relevant scenarios that may be considered include discovery, residential construction, and well drilling that incorporate external exposure, inhalation of resuspended particles, and ingestion of particles.

*1.1.8.* Chronic exposure scenarios for inadvertent intrusion consider direct intrusion into the disposal site and exhumation of accessible waste material. Relevant scenarios that may be considered include residential use and post-construction, and post drilling agricultural use, that incorporate the ingestion of foodstuffs, ingestion of soil, external exposure, and inhalation of resuspended particles.

***Criterion 3.1.1.m.*** The performance assessment provides a coherent presentation of the relevant descriptive information concerning the site, the disposal facility, the waste characteristics that are reflected in the conceptual model, and the selection of the mathematical models used in the analysis. The descriptive information and the approach to modeling provide the necessary results to evaluate the exposure pathways and scenarios that are important to assess the performance of the disposal facility.

***Criterion 3.1.1.n.*** The calculated results presented in the performance assessment are demonstrated to be consistent with the site characteristics, the waste characteristics, and the conceptual model of the facility. The demonstration of consistency is supported by available site monitoring data and supporting field investigations.

***Criterion 3.1.1.o.*** The models used for calculating the results presented in the performance assessment are analyzed to identify the sensitive parameters in the analysis. The results of the sensitivity analysis are used to evaluate the uncertainty in the calculated results.

***Criterion 3.1.1.p.*** The results of the uncertainty analysis are interpreted as they relate to establishing reasonable assurance that the conclusions of the performance assessment are correct.

***Criterion 3.1.1.q.*** The performance assessment integrates the results of the analysis, the uncertainty analysis, the performance measures, waste acceptance criteria, operating procedures, and applicable laws, regulations, policies and agreements to formulate conclusions.

***Criterion 3.1.1.r.*** The performance assessment includes an interpretation of the results that allows for a comparison to the performance measures used in the performance assessment, and include any necessary limitations on facility design or operations that are required to meet the performance objectives.

**Criterion 3.1.1.s.** The performance assessment discusses the quality assurance measures applied to the preparation of the analysis and its documentation.

**Criterion 3.1.1.t.** The performance assessment includes an ALARA analysis, and if appropriate, the analytical methods for the ALARA assessment are described.

**Criterion 3.1.1.u.** The performance assessment includes appendices or references to published documents and/or data that provide a basis for the discussions and analysis in the performance assessment.

**3.1.2 Review Finding II - The Performance Assessment is Thorough and Technically Supported.**

In order to make the review finding that the performance assessment is thorough and technically supported, the Review Team should make the following conclusions:

The performance assessment is a comprehensive examination of the long-term performance of the disposal facility that includes sufficient analyses to support the conclusions. The analysis is representative of the available knowledge of site behavior and is a comprehensive representation of that knowledge. Sufficient depth of analysis is presented in the evaluations of radionuclide inventory, physical and chemical characteristics of waste, the conceptual models, the key assumptions incorporated into the models, and the sensitivity and uncertainty analysis to support the conclusions.

The performance assessment analysis includes technically correct methodologies and calculations. The methodology of analysis is justified and based on site data. Pathways and scenarios addressed in the analysis are justified, and are reasonable representations of the site and disposal facility. The models used in the analysis are justified and based on site data. The parameters and input data in the analysis are justified and representative of the site and disposal facility. The results determined from the models used are verified and consistent with available site information, the conceptual model, and monitoring data, and no inconsistencies or errors are present.

The sensitivity and uncertainty of the calculated results are analyzed for all aspects of the assessment that have a significant effect on the conclusions of the performance assessment. The results are interpreted to provide a comprehensive understanding of the long-term performance of the disposal facility, and the conclusions are based on the interpretations of the results. The conclusions are incorporated into the disposal facility design and operations.

The following acceptance criteria address this review finding. These criteria can be used to examine the thoroughness of the analysis presented in the performance assessment, and as the basis for requesting additional information to provide a reasonable expectation that the

conclusions of the performance assessment are consistent with site and facility information and are justified and defensible.

**Criterion 3.1.2.a.** The performance assessment presents an estimate of the radionuclide inventory of the radioactive waste disposed of and to be disposed of at the facility which is quantified and technically supported by records, data, studies, and evaluations.

*2.a.1.* All of the radionuclides disposed and anticipated to be present in wastes to be disposed of are evaluated in the performance assessment. Any radionuclides screened from detailed analysis or having no inventory limit are identified, and the bases for these conclusions are supported and defensible.

*2.a.2.* Any estimates of the radionuclide inventory for past waste disposals are described and to the extent practical are based on past waste disposal records, a reasonable expectation of actual waste content based on a knowledge of the processes that generated the waste, calculations, sampling data, technical studies, and reasonable projections of waste to be disposed.

**Criterion 3.1.2.b.** The physical and chemical characteristics of the waste disposed of in the past that affect the release and transport of radionuclides are identified. The physical and chemical characteristics of the waste form are quantified and supported by laboratory or field studies, or are based on referenced documentation.

**Criterion 3.1.2.c.** Any inventory limits are developed from reasonable projections of waste to be disposed and analyses that consider the physical and chemical characteristics of the wastes if those characteristics affect the release and transport of radionuclides.

**Criterion 3.1.2.d.** The conceptual model is a reasonable interpretation of the existing geochemical, geologic, meteorologic, hydrologic, and monitoring data for the site and disposal facility. The components of the conceptual model for the transport of radionuclides that are important to the conclusions relating to the long-term performance of the disposal facility are thoroughly analyzed. The assumptions incorporated into the conceptual model are consistent with the available data, related investigations, and theory related to the conceptual model. Any parameters included in the conceptual model are supported by data or related investigations relevant to the site and disposal facility.

**Criterion 3.1.2.e.** The assumptions of the performance assessment related to the waste, site, and facility design and operations which are critical to the conclusions of the performance assessment are supported and the uncertainties associated with these assumptions are analyzed as part of the performance assessment. Credits for the performance of engineered features and site closure included in the conceptual model are based on data derived from field investigations, related investigations, or documented sources of information relevant to the site and disposal facility.

**Criterion 3.1.2.f.** The conceptual model for the source term, groundwater flow, and radionuclide transport includes parameters for unsaturated and saturated flow, total and effective porosity, hydraulic conductivity, water retention, relative permeability relationships, volumetric water content, retardation, and diffusion that are based on data, related investigations, or documented references relevant to the site and disposal facility.

**Criterion 3.1.2.g.** The mathematical models used in the performance assessment for analyzing air and water transport of radionuclides are appropriate for the disposal facility and disposal site. The selected models provide a justified representation of the technically important mechanisms identified in the conceptual model, and provide calculated results that are a defensible basis for formulating conclusions.

2.g.1. The input data for the mathematical models are derived from field data from the site, laboratory data interpreted for field applications, or referenced literature sources which are applicable to the site. Assumptions which are used to formulate input data are justified and have a defensible technical basis.

2.g.2. Intermediate calculations are performed and results are presented that demonstrate, by comparison to site data or related investigations, the calculations of the mathematical models used in the performance assessment are representative of disposal site and facility behavior for important mechanisms represented in the mathematical models.

2.g.3. Representations of groundwater well performance (e.g., construction, diameter, yield, depth of penetration, screen length) are reasonable reflections of regional practices and are justified.

2.g.4. The mathematical models are tested, by comparison to analytical calculations or other models, to demonstrate that the results are consistent with the conceptual model, physical and chemical processes represented in the models, and available site data. The models are evaluated for defensibility and are reasonable representations of the disposal site and facility performance by comparison to available site data, related technical investigations, or referenced documentation or literature.

2.g.5. The initial conditions, the boundary conditions, and the changes of properties with time for the mathematical model are analytically correct (i.e., well posed), and derived from existing site data and information.

**Criterion 3.1.2.h.** The dose analysis considers the exposure pathways and transfer factors and calculates the maximum dose using acceptable methodologies and parameters.



*2.h.1.* The dose analysis for exposures to radionuclides identifies the transfer coefficients between media and justifies the parameters used in the analysis with supporting data or references to the literature.

*2.h.2.* The dose analysis specifies the consumption of radioactively contaminated materials for the exposure pathways evaluated, the inhalation rates of contaminated materials, and the external exposure rates and conditions to radioactive materials. These parameters are justified using references to the literature or site-specific investigations.

*2.h.3.* The dose analysis is conducted using effective dose equivalents in accordance with ICRP-30 (1979) and uses dose conversion factors from recognized published sources.

*2.h.4.* The maximum dose projected for 1000 years after facility closure at the point of compliance is used in the analysis for evaluating disposal of LLW or establishing waste acceptance criteria for future disposals.

***Criterion 3.1.2.i.*** The sensitivity and uncertainty analysis considers those parameters and mechanisms that are important to the conclusions relating to the long-term performance of the disposal facility, including radionuclide inventory, radionuclide characteristics, release rates, site and facility characteristics, groundwater flow parameters, site meteorology, and radionuclide transport parameters. Parametric and mechanistic variations analyzed in the uncertainty analysis that are important to the conclusions are justified as reasonable for the site and facility using data or related field investigations.

*2.i.1.* The parameters important to the components of the analysis are analyzed to identify the sensitive parameters, and the selection of sensitive parameters is quantitatively justified.

*2.i.2.* The sensitive parameters are analyzed for uncertainty in the results of the analysis to provide quantitative bounds for interpreting the results of the analysis.

*2.i.3.* The results of the sensitivity analysis are determined using a prescribed methodology that is technically justified. The results of the analysis provide the necessary information to justify the assumptions and conclusions of the performance assessment.

*2.i.4.* The maximum projected dose and time of occurrence is presented in the performance assessment to provide for understanding of the natural system being modeled and the behavior of the model.

***Criterion 3.1.2.j.*** The ALARA analysis provides a cost-benefit analysis that is an optimization of the collective or population dose based on the cost of dose reduction in the exposed population of \$1,000 to \$10,000 per person-rem averted. [ALARA analysis is not required if the projected individual or collective doses in the exposed population are trivial.]

**Criterion 3.1.2.k.** The inadvertent intruder analysis considers the natural and man-made processes that impact the possible exposure to an intruder and calculates the dose using acceptable methodologies and parameters

*2.k.1.* The inadvertent intruder analysis specifies the reductions in concentrations of radioactive material from mixing with uncontaminated material or the transport of radionuclides from the disposed waste mass, and justifies the parameters used in the analysis with site data, supporting analysis, or referenced information.

*2.k.2.* The inadvertent intruder analysis accounts for naturally occurring processes (e.g., erosion, precipitation, flooding) and the degradation of engineered barriers in the calculation of results.

*2.k.3.* The inadvertent intruder analysis calculates the maximum dose from disposed materials during the period of 100 - 1000 years after site closure for waste acceptance criteria for wastes to be disposed of in the disposal facility using the recommendations of ICRP-30 (1979) and dose conversion factors from recognized published sources.

**Criterion 3.1.2.l.** The results of the analyses for transport of radionuclides and the inadvertent intrusion into the disposal facility, and the sensitivity and uncertainty of the calculated results are comprehensive representations of the existing knowledge of the site and the disposal facility design and operations.

### **3.1.3 Review Finding III - The Performance Assessment Conclusions are Valid and Acceptable**

In order to make the review finding that the performance assessment conclusions are valid and acceptable, the Review Team should make the following conclusions:

The performance assessment provides a reasonable expectation that the conclusions of the evaluation are valid, complete, and defensible, and the performance objectives of DOE Order 5820.2A are demonstrated to be met. The conclusions incorporate the results, the uncertainties in the analysis, and the relevant site-specific issues to provide a valid projection of the operation and performance of the LLW facility. The results of the analysis accommodate the various uncertainties logically, allowing a valid basis for making a compliance decision. The analysis, results, and conclusions presented in the performance assessment are sufficient for making a valid compliance decision. The performance objectives of DOE Order 5820.2A are compared to the calculated results of the performance assessment, the sensitivity and uncertainty analysis, the inadvertent intruder analysis, and the interpretations of these results and are presented in the conclusions.

The following acceptance criteria address this review finding that the conclusions of the performance assessment are valid and acceptable.

**Criterion 3.1.3.a.** The performance assessment presents valid conclusions that demonstrate that the all-pathways analysis, air pathway analysis, groundwater resource protection analysis, and inadvertent intruder analysis meet the performance objectives of DOE Order 5820.2A.

*3.a.1.* The all pathways performance objective of 25 mrem/year effective dose equivalent is met over the performance period of 1000 years for all radionuclides disposed of in the disposal facility.

*3.a.2.* The air pathways performance objective of 10 mrem/year effective dose equivalent is met over the performance period of 1000 years for all radionuclides disposed of in the disposal facility.

*3.a.3.* The radon performance objective of an average flux of 20 pCi/m<sup>2</sup>/s at the disposal surface or 0.5 pCi/L in air at the point of compliance is met over the performance period of 1000 years for all radionuclides disposed of in the disposal facility.

*3.a.4.* The groundwater resource performance measures for all radionuclides to be disposed of in the disposal facility are met over the performance period of 1000 years at the prescribed point of compliance.

*3.a.5.* The inadvertent intruder performance objectives of 100 mrem/year effective dose equivalent for chronic exposure and 500 mrem effective dose equivalent for acute exposure are met within the disposal facility over the performance period of 1000 years.

*3.a.6.* The condition that doses from the disposal of waste are ALARA has been demonstrated and incorporated into the design and operations of the disposal facility.

**Criterion 3.1.3.b.** The performance assessment conclusions incorporate the findings of the calculated results for the all pathways analysis, air pathway analysis, groundwater resource protection analysis, inadvertent intruder analysis, and sensitivity and uncertainty analysis. The results are interpreted and integrated to formulate conclusions which are supported by the results and the uncertainties in the results.

**Criterion 3.1.3.c.** The conclusions of the performance assessment are applied to the facility design and operations. The resulting design constraints and limitations on operations can be reasonably accomplished at the disposal facility.

**Criterion 3.1.3.d.** The conclusions of the performance assessment address and incorporate any constraints included in any Federal, state, and local statutes or regulations or agreements that impact the site design, facility design, or facility operations. The conclusions also address and

incorporate any procedural or site documentation changes or constraints due to the results of the facility performance assessment. Reasonable assurance exists that these constraints and impacts are appropriately addressed in the performance assessment.

**Criterion 3.1.3.e.** The analysis, results, and conclusions of the performance assessment provide both a reasonable representation of the disposal facility's long-term performance and a reasonable expectation that the disposal facility will remain in compliance with DOE Order 5820.2A.

### **3.2 Composite Analysis Review Criteria**

The Review Team should make the following fundamental conclusions, called review findings, regarding the composite analysis:

- The Composite Analysis is Complete
- The Composite Analysis is Thorough and Technically Supported
- The Composite Analysis Conclusions are Valid and Acceptable

Each of these review findings can be made using the acceptance criteria presented in the following sections. These acceptance criteria are intended to provide guidance but are not to be considered requirements to be satisfied in detail for every composite analysis. Instead, the criteria should be addressed in the review commensurate with the importance of each criterion to the facilities being considered by the composite analysis. Every composite analysis will be limited by the amount of available data on the historical disposal facilities and other sources that could contribute to the potential offsite dose. Consequently, throughout the review of a composite analysis, the emphasis of the review should be placed on understanding the estimates established in the analysis, and determining the likelihood that the estimates capture the consequences of LLW disposal considering all of the contributing sources included in the composite analysis.

#### **3.2.1 *Review Finding I - The Composite Analysis is Complete***

In order to make the review finding that the composite analysis is complete, the Review Team should make the following conclusions:

All material considered to be important in understanding the composite analysis is presented so that a detailed composite analysis review can be performed. The composite analysis addresses each of the topics identified in the *Guidance for a Composite Analysis of the Impact of Interacting Source Terms on the Radiological Protection of the Public from Department of Energy (DOE) Low-Level Waste Disposal Facilities* and the discussion contains sufficient information for the review of the composite analysis. The material presented in the composite analysis is representative of current and available knowledge, does not overlook known information, and includes supporting information.

The arguments and discussions included in the composite analysis have technical merit and the conclusions represent reasonable interpretations of the results of the composite analysis and are justified by the supporting data. The steps of the analysis follow logically one after another, and there are no extraneous discussions or unjustified assumptions. The methodology of analysis evaluates the important features of the other sources of radioactive material included in the composite analysis, demonstrates an understanding of their relationship with the disposal facility, and is consistent with the analysis presented in the performance assessment. The methodology of analysis is clearly explained and presented, and the results of the application of the methodology of analysis are clearly presented and interpreted to formulate the conclusions.

The following acceptance criteria address this review finding and provide the basis for identifying questions to be addressed, or requests for additional data or information concerning the disposal facility or the composite analysis that are necessary to conduct a comprehensive review of the composite analysis and to ensure the arguments presented in the composite analysis are rational and logical.

**Criterion 3.2.1.a.** The composite analysis includes a discussion of how the Data Quality Objectives (DQO) process was used as a flexible planning tool and applied to the composite analysis preparation.

**Criterion 3.2.1.b.** The composite analysis identifies results, objectives, or milestones of other DOE programs, Federal, state, or local statutes, or agreements (e.g., D&D programs, FUSRAP, CERCLA RODs) that may impact the analysis or conclusions of the composite analysis.

**Criterion 3.2.1.c.** The composite analysis specifies and justifies the point of assessment for the disposal facility and all other contributing sources.

*1.c.1.* The point of assessment is the publicly accessible point of maximum impact reasonably expected for future members of the public for the time period of assessment.

*1.c.2.* The point of assessment selected is supported by land use plans or reasonably conservative assumptions that are justified.

*1.c.3.* Changes in the point of assessment as a function of time are justified.

**Criterion 3.2.1.d.** The composite analysis identifies all sources of radioactive material in the ground that could contribute to the potential future doses from the LLW disposal facility. Sources selected for the composite analysis and the reasons for excluding any source are justified. Other potential sources of radioactive material to be considered include wastes disposed of prior to 1988, other LLW disposal facilities, transuranic waste or alpha LLW disposals, buildings, tanks, cribs, spills, ditches, seepage basins, and leaks. Sources selected should include all sources that

could make a significant contribution to potential future doses associated with the LLW disposal facility.

**Criterion 3.2.1.e.** The composite analysis identifies and quantifies all radionuclides present in the LLW disposal facility and all other contributing sources of radioactive material that could contribute significantly to the total potential dose. Inventory estimates included in the analysis are justified.

*1.e.1.* The estimates of radionuclide species and inventories in the sources selected for consideration are derived from referenced documentation or data summaries presented in the composite analysis and are based on existing records, process knowledge, or site investigations (e.g., Remedial Investigations, Feasibility Studies).

*1.e.2.* Extrapolations are made and justified from known data to estimate radionuclides and inventories where clear information does not exist.

**Criterion 3.2.1.f.** The composite analysis provides a reasonable methodology for estimating the release of radionuclides from the contributing sources selected for the composite analysis based on available data.

*1.f.1.* The estimates of the release of radionuclides include the effects of CERCLA actions prescribed in RODs or similar binding agreements such as those associated with D&D.

*1.f.2.* The release mechanisms consider the physical and chemical characteristics of the source materials and the site characteristics.

*1.f.3.* Assumptions incorporated into the analysis are identified, justified, and consistent with the conceptual model of site behavior presented in the performance assessment conducted on the LLW disposal facility.

**Criterion 3.2.1.g.** The composite analysis presents a reasonable methodology for estimating the transport of radionuclides to the point of assessment from all sources based on the available data for characterizing environmental behavior.

*1.g.1.* Mathematical modeling of the transport of radionuclides is commensurate with the available site data.

*1.g.2.* Assumptions incorporated into the mathematical models are identified, justified, and consistent with the conceptual model of site behavior presented in the performance assessment conducted on the LLW disposal facility.

*1.g.3.* Mathematical models selected are documented and verified either in referenced publications or in the appendices of the composite analysis.

***Criterion 3.2.1.h.*** The composite analysis provides a complete discussion of all important exposure pathways for the evaluation of potential doses to a hypothetical, individual member of the public at the point of exposure for any time during the period of assessment. The exposure pathways identified in the composite analysis should be consistent with the exposure pathways in the performance assessment. The exposure pathways considered in the composite analysis include only those pathways that are related to the exposure of individual members of the public at the point of assessment and are justified.

***Criterion 3.2.1.i.*** The composite analysis provides a coherent presentation of the relevant descriptive information concerning the disposal site, its location on the DOE site, and its proximity to other sources of radioactive material. The sources of radioactive material are described along with the methodology for assessing the migration of radionuclides to the point of assessment, and the exposure scenarios following transport.

***Criterion 3.2.1.j.*** The composite analysis presents an assessment using the time of 1000 years for exposures to hypothetical members of the public with all disposal facilities closed, decontamination and decommissioning completed, and operations at the DOE site terminated. The assessment establishes a “base case,” that is a reasonable conservative, but realistic case for comparison with the dose limit and dose constraint.

***Criterion 3.2.1.k.*** The calculated results presented in the composite analysis are consistent with the site characteristics, waste characteristics, and the conceptual model of the DOE site. The calculated results are consistent with available site monitoring data and any other data from supporting field investigations.

***Criterion 3.2.1.l.*** The sensitivity or uncertainty of the results are analyzed, including the consideration of alternative land uses and remedial actions. Uncertainties in radionuclide inventories for the disposal facility and other contributing sources are analyzed.

***Criterion 3.2.1.m.*** The calculated results and the sensitivity or uncertainty analysis results are interpreted to evaluate meeting the dose constraint of 30 mrem/year and the dose limit of 100 mrem/year at the point of assessment over the period of assessment.

***Criterion 3.2.1.n.*** An options analysis is performed that identifies alternative actions which could be performed to reduce potential doses to a member of the public for results which exceed the dose constraint. The options analysis also identifies alternative actions which could be performed to reduce potential doses to a member of the public for results that exceed the dose limit.

**Criterion 3.2.1.o.** The need for an ALARA assessment is presented based on the results of the composite analysis and, if warranted, an assessment is performed to identify a need for actions to further reduce the doses calculated in the analysis.

**Criterion 3.2.1.p.** The composite analysis includes appendices or references to published documents that provide a basis for the discussions in the composite analysis.

### ***3.2.2 Review Finding II - The Composite Analysis is Thorough and Technically Supported***

In order to make the review finding that the composite analysis is thorough and technically supported, the Review Team should make the following conclusions:

The composite analysis thoroughly examines the potential contribution of interacting source terms on the long-term performance of the disposal facility. The analysis addresses the important issues related to the disposal facility and other contributing sources to an extent commensurate with the data available and the significance of the source's contribution to the offsite dose. The analysis is representative of the available knowledge of site behavior and of available data on the interacting sources, and is a thorough representation of that knowledge. Sufficient depth of analysis, commensurate with the data available is presented in the estimates of radionuclide inventory, the conceptual models, the key assumptions incorporated into the models, the sensitivity or uncertainty analysis, and the options analysis to support the conclusions.

The composite analysis includes technically correct methodologies and calculations. The methodology of analysis is justified and based on information and data about the potential contributing sources. Pathways and scenarios addressed in the analysis are justified, and are reasonable representations of the disposal facility and interacting source terms. The results determined are consistent with what would be expected based on the results of the performance assessment of the LLW disposal facility and are representative of the disposal facility and the interacting source terms. The sensitivity or uncertainty of the calculated results are analyzed for the aspects of the assessment that may have a significant effect on the conclusions of the composite analysis and the conclusions are supported, defensible, and justified.

The following acceptance criteria address this review finding. The criteria can be used to examine the thoroughness of the analysis and as the basis for requesting additional information to ensure the analysis is consistent with existing site information and that the conclusions are fully justified and defensible.

**Criterion 3.2.2.a.** The composite analysis presents an estimate of the radionuclide inventory of the radioactive material considered in the analysis and justifies the estimate. This estimate is based on an examination of the waste disposal records, process knowledge, historical information related to the disposal facility and the contributing sources, and documents describing potential



contributing sources of radioactive material such as Remedial Investigations and Feasibility Studies for cleanup actions, and other appropriate studies.

*2.a.1.* All of the radionuclides anticipated to be present in wastes and in the contributing sources are considered in the composite analysis. Any radionuclides that are screened from the analysis are identified and their exclusion justified as being insignificant contributors to the total dose estimated in the analysis.

*2.a.2.* The known physical and chemical characteristics of the radioactive materials considered in the composite analysis are included in the generation of the source terms and the transport of the radionuclides.

***Criterion 3.2.2.b.*** The conceptual model used for the composite analysis is consistent with the representation of the conceptual model used in the performance assessment, and includes the major mechanisms affecting the transport of radionuclides at the DOE site. The components of the conceptual model for the composite analysis are reasonably represented in the analysis of the LLW disposal facility and other contributing sources.

***Criterion 3.2.2.c.*** Credits for CERCLA actions or other remedial actions are represented in the conceptual models used in the composite analysis, and are justified by supporting or referenced documentation.

***Criterion 3.2.2.d.*** Source terms and flow and transport models in the composite analysis are commensurate with the available data, incorporate the important characteristics identified in the performance assessment, and provide results consistent with the performance assessment.

***Criterion 3.2.2.e.*** The assumptions in the composite analysis related to the radionuclides to be considered, to the inventories of radionuclides, the source term evaluation, and the transport of radionuclides are justified.

***Criterion 3.2.2.f.*** Any mathematical models used in the composite analysis for analyzing the transport of radionuclides to the point of assessment are appropriate for the LLW disposal facility and all other contributing sources. The mathematical models used in the composite analysis provide calculated results that are representative of the results calculated in the performance assessment for similar wastes in similar disposal facilities.

*2.f.1.* The input data are based on field data from the site, laboratory data interpreted for field applications, referenced literature sources which are applicable to the site, or related analyses performed for the performance assessment. Any assumptions used to formulate input data are justified and have a defensible technical basis.

2.f.2. Intermediate calculations are performed, and the results are presented to demonstrate the composite analysis calculations are representative of the site and are consistent with results presented in the performance assessment for similar situations.

**Criterion 3.2.2.g.** The dose analysis performed for the composite analysis is consistent with that performed for the performance assessment for similar exposure pathways and similar exposure scenarios.

**Criterion 3.2.2.h.** The sensitivity or uncertainty analysis considers factors such as alternative land use plans, remedial actions, radionuclide inventories, site and facility characteristics, and transport parameters to provide reasonable estimates of potential doses at the point of assessment for the period of the assessment. The maximum projected dose over the period of the assessment (at least 1000 years) is presented at the point of assessment.

**Criterion 3.2.2.i.** The need for an ALARA assessment as well as the ALARA assessment itself, is demonstrated using a cost-benefit analysis based on the cost of dose-reduction in the exposed population of \$1,000 to \$10,000 per person-rem averted. [ALARA assessments are not required if the projected individual or collective doses in the exposed population are trivial.]

**Criterion 3.2.2.j.** The options analysis considers alternatives which are technically feasible and demonstrated to be effective in reducing doses to the public at the point of assessment over the period of the assessment.

**Criterion 3.2.2.k.** The results of the analysis for the source terms and transport of radionuclides, dose analysis, sensitivity or uncertainty analysis, and options analysis are reasonable representations of the existing knowledge of the site, disposal facility, and contributing sources.

### **3.2.3 Review Finding III - The Composite Analysis Conclusions are Valid and Acceptable**

In order to make the review finding that the composite analysis conclusions are valid and acceptable, the Review Team should make the following conclusions:

The conclusions of the composite analysis are complete and defensible with respect to the comparison of total projected dose from the LLW disposal facility and the contributing sources with the dose constraint and the dose limit. For the conclusions to be defensible, the calculated results from the analysis are thorough, technically supported, and correctly interpreted with respect to the dose constraint and dose limit. For facilities where the dose constraint or dose limit is exceeded, the options analysis and any associated ALARA analysis identifies alternatives for reducing the dose to below the constraint. For the conclusions to be complete, all uncertainties associated with the analysis are addressed and the potential for exceeding the dose constraint and dose limit evaluated. With the evaluation of the defensibility and completeness of the conclusions of the composite

analysis, the validity of the conclusions of the composite analysis is established by determining that the conclusions of the composite analysis provide a reasonable basis for an acceptable decision by DOE concerning the operation of the LLW disposal facility being evaluated.

The following acceptance criteria address the review finding of acceptability and are related to the validity of the conclusions of the composite analysis as presented in the interpretation of results and the options analysis.

**Criterion 3.2.3.a.** The composite analysis presents conclusions that demonstrate that the long-term performance of the disposal facility and other contributing sources is in accordance with the guidance in the *Guidance for a Composite Analysis of the Impact of Interacting Source Terms on the Radiological Protection of the Public from Department of Energy (DOE) Low-Level Waste Disposal Facilities*.

**3.a.1.** For analyses that are less than the dose constraint of 30 mrem/year for the disposal facility and all other contributing sources, the need for an ALARA assessment is presented, and an ALARA assessment is performed if required.

**3.a.2.** For analyses that exceed the dose constraint but are less than the dose limit of 100 mrem/year, an options analysis is provided which identifies alternatives that could be conducted to reduce the dose to less than the dose constraint. The need for an ALARA assessment is presented, and an ALARA assessment is performed if required.

**3.a.3.** For analyses that exceed the dose limit of 100 mrem/year, an options analysis is provided which identifies alternatives that should be conducted to reduce the dose to less than the limit. The need for an ALARA assessment is presented, and an ALARA assessment is performed if required.

**Criterion 3.2.3.b.** The conclusions of the composite analysis are derived from the interpretation of the calculated results for the LLW disposal facility and all contributing sources, the sensitivity or uncertainty analysis, and lead to the development of an options analysis if required.

**Criterion 3.2.3.c.** The conclusions of the composite analysis presented in the interpretation of results and options analysis can be reasonably accomplished at the disposal facility or reasonably implemented to affect the radionuclide contribution to dose from the other contributing sources.

**Criterion 3.2.3.d.** The conclusions of the composite analysis address and incorporate any constraints resulting from other DOE programs or from any Federal, state, and local statutes or regulations or agreements that would influence the calculated results or the options analysis.

***Criterion 3.2.3.e.*** The analysis, results, and conclusions of the composite analysis provide a reasonable representation of the disposal facility and other contributing sources for determining the appropriate actions to be taken for the protection of public health and environment. The analysis and results of the composite analysis are consistent with comparable results of the performance assessment and provide a defensible and complete basis for an acceptable decision by DOE.

## Appendix A - Memo Establishing LFRG and LFRG Charter