

## INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

### Part I: Background Information

Title: Maintenance Plan for the Hanford Integrated Disposal Facility Performance Assessment	Information Category: <input type="radio"/> Abstract <input type="radio"/> Journal Article <input type="radio"/> Summary <input type="radio"/> Internet <input type="radio"/> Visual Aid <input type="radio"/> Software <input type="radio"/> Full Paper <input checked="" type="radio"/> Report <input type="radio"/> Other
Document Number: DOE/ORP-2000-01, Rev. 1	Date: 6/14/04
Author: F.M. Mann	
Purpose of Document: This plan updates the plan issued in 2000 due to the new mission of IDF	

### Part II: External/Public Presentation Information

Conference Name:	
Sponsoring Organization(s):	
Date of Conference:	Conference Location:
Will Material be Handed Out? <input type="radio"/> Yes <input type="radio"/> No	Will Information be Published? <input type="radio"/> Yes <input type="radio"/> No <small>(If Yes, attach copy of Conference format instructions/guidance)</small>

### Part III: CH2M HILL Document Originator Checklist

Description	Yes	N/A	Signature
Information Product meets Administrative Manual requirements?	<input type="radio"/>	<input type="radio"/>	
Technical Checklist completed? (Attach checklist)	<input type="radio"/>	<input type="radio"/>	
If product contains pictures, Safety review completed?	<input type="radio"/>	<input type="radio"/>	

### Part IV: CH2M HILL Internal Review

Function	Organization	Date	Signature/Date
Subject Matter Expert	F.M. Mann	6/16/04	Fredrick M. Mann 6/16/04
Responsible Manager	J.G. Field	6/21/04	J.G. Field 6/21/04
Other: G. Parsons		7/1/04	G.A. Parsons 7/1/04

### Part V: IRM Clearance Services Review

Description	Yes	No	
Document contains Classified Information?	<input type="radio"/>	<input checked="" type="radio"/>	If answer is "Yes," ADC approval required.  _____ Signature and Date
Document contains Information restricted by DOE Operational Security Guidelines?	<input type="radio"/>	<input checked="" type="radio"/>	Reviewer Signature:  _____ Signature and Date
Document is subject to Release Restrictions? If answer is "Yes," please mark category at right and describe limitation or responsible organization below:	<input type="radio"/>	<input checked="" type="radio"/>	Document contains: <input type="checkbox"/> Applied Technology <input type="checkbox"/> Protected CRADA <input type="checkbox"/> Personal/Private <input type="checkbox"/> Export Controlled <input type="checkbox"/> Proprietary <input type="checkbox"/> Procurement-Sensitive <input type="checkbox"/> Patentable Info. <input type="checkbox"/> Business-Sensitive <input type="checkbox"/> Predecisional Info. <input type="checkbox"/> UCNI <input type="checkbox"/> Restricted by Operational Security Guidelines <input type="checkbox"/> Other (Specify) _____
Additional Comments from Information Clearance Specialist Review?	<input type="radio"/>	<input checked="" type="radio"/>	Information Clearance Specialist Approval  <i>Janis Nordal</i> 8-4-2004 _____ Signature and Date

## INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL (Page 2)

### Part VI: Final Review and Approvals

Organization/Function	Approved for Release		Signature/Date
	Yes	N/A	
CH2M HILL Public Affairs	<input checked="" type="radio"/>	<input type="radio"/>	<i>Whidden July 7, 2004</i>
CH2M HILL Office of Chief Counsel	<input checked="" type="radio"/>	<input type="radio"/>	<i>Stewart 7/7/04</i>
DOE-ORP Public Affairs/Communications	<input type="radio"/>	<input type="radio"/>	
Other: <i>Kepp SP+NA</i>	<input checked="" type="radio"/>	<input type="radio"/>	<i>A. J. Kepp 7/6/04</i>
Other: <i>04-TPP-072, 8/3/04</i>	<input checked="" type="radio"/>	<input type="radio"/>	<i>P. E. Lamont</i>

Comments:



#### Information Release Station Information

Was/Is Information Product approved for release?  Yes  No

If Yes, what is the Level of Release?  Public/Unrestricted  Other (Specify) \_\_\_\_\_

Date Information Product stamped/marked for Release: 8/4/2004

Was Information Product transferred to OSTI?  Yes  No

Date Information Product sent/mailed to OSTI: \_\_\_\_\_

#### Records Management Information

Ascension Number assigned to Information Product: \_\_\_\_\_

What is/are the ascension numbers associated with CH2M HILL internal processing documentation? \_\_\_\_\_

Forward Copies of Completed Form to CH2M HILL Originator and CH2M HILL CIO Office

Description	Yes	N/A	Applicable but not Available (Provide Explanation Below)
CH2M HILL Information Product	<input type="radio"/>	<input type="radio"/>	
Conference Paper Guidelines	<input type="radio"/>	<input type="radio"/>	
Trademark/Copyright "Right to Use" Information or Permission Documentation	<input type="radio"/>	<input type="radio"/>	
CH2M HILL Administrative Checklist	<input type="radio"/>	<input type="radio"/>	
CH2M HILL Technical Checklist	<input type="radio"/>	<input type="radio"/>	
	<input type="radio"/>	<input type="radio"/>	

## DISTRIBUTION SHEET

To Distribution	From F.M. Mann	Page 1 of 1
Project Title/Work Order		Date 6/14/04
Maintenance Plan for the Hanford Integrated Disposal Facility Performance Assessment, DOE/ORP-2000-01, Rev. 1		EDT No. <del>614645</del> <i>July 8/04</i>
		ECN No.

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
DOE - Office of River Protection					
P.E. LaMont	H6-60	x			
R.W. Lober	H6-60	x			
R.M. Yasek	H6-60	x			
DOE - Richland Operations					
R.D. Hildebrand	A5-13	x			
CH2M HILL Hanford Group					
J.G. Field	H6-62	x			
A. Knepp	H6-03	x			
F.M. Mann (5 copies) H	E6-35	x			
G. Parsons	H6-19	x			
F.J. Anderson	E6-35	x			
A. Amonette (files) H	E6-35	x			
Fluor Government Group					
R.J. Puigh	E6-17	x			
Fluor Hanford					
M.I. Wood	H8-44	x			
B. Ford	E6-35	x			
Pacific Northwest National Laboratory					
M.P. Bergeron	K9-36	x			
Washington State Department of Ecology					
3100 Port of Benton Blvd., Richland, WA					
Suzanne Dahl H	H0-57	x			
Central Files	B1-07	x			

# Maintenance Plan for the Hanford Integrated Disposal Facility Performance Assessment

Prepared for the U.S. Department of Energy  
Assistant Secretary for Environmental Management

**Office of River Protection**

P.O. Box 450  
Richland, Washington 99352

# Maintenance Plan for the Hanford Integrated Disposal Facility Performance Assessment

F. M. Mann  
CH2M HILL Hanford Group, Inc.

Date Published  
June 2004

Prepared for the U.S. Department of Energy  
Assistant Secretary for Environmental Management

**Office of River Protection**

P.O. Box 450  
Richland, Washington 99352

  
Release Approval

8-4-2004  
Date

**TRADEMARK DISCLAIMER**

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors

This report has been reproduced from the best available copy.

Printed in the United States of America

## EXECUTIVE SUMMARY

This document describes the plan for maintaining the *Hanford Integrated Disposal Facility Performance Assessment (IDF PA)* in accordance with the Department of Energy (DOE) order on radioactive waste management<sup>(1)</sup> (DOE O 435.1). The IDF PA is the successor to the *Hanford Immobilized Low-Activity Tank Waste Performance Assessment (ILAW PA)*<sup>(2)</sup>, which was approved in 2003<sup>(3)</sup>.

This document describes the current plans for the IDF and how the IDF and the PA supporting it are integrated with other Hanford Site activities. Besides providing current plans for the disposal of low-level radioactive waste (including traditional solid waste, immobilized low-activity waste, and immobilization equipment such as melters), this document describes the expected work on performance assessment reviews and revisions, waste receipts, monitoring, other operational activities, testing and research activities, and interfaces with other Hanford Site activities.

1. "Radioactive Waste Management," DOE Order 435.1, U.S. Department of Energy, Washington, D.C., July 9, 1999.
2. F.M. Mann, R.J. Puigh II, P.D. Rittmann, N.W. Kline, J.A. Voogd, Y. Chen, C.R. Eiholzer, C.T. Kincaid, B.P. McGrail, A.H. Lu, G.F. Williamson, N.R. Brown, and P.E. LaMont, *Hanford Immobilized Low-Activity Tank Waste Performance Assessment*, DOE/RL-97-69, Rev. 0, U.S. Department of Energy, Richland, Washington, March 1998..
3. "Hanford Immobilized Low-Activity Waste Performance Assessment: 2001 Version DOE/ORP-2000-24, Rev. 0," Memorandum from Mark W. Frei (Acting Deputy Assistant Secretary for Project Completion and Deputy Assistant Secretary for Site Closure to Roy J. Schepens, Manager, Office of River Protection, and to Keith A. Klein, Manager, Richland Operations Office, U.S. Department of Energy, Washington, D.C., August 6, 2003.

**This page intentionally left blank.**

## TABLE OF CONTENTS

EXECUTIVE SUMMARY .....		ES-1
ACRONYMS.....		iii
<b>1.0 INTRODUCTION .....</b>		<b>1</b>
<b>1.1 BACKGROUND .....</b>		<b>1</b>
<b>1.2 FACILITY: BRIEF DESCRIPTION AND SCHEDULE .....</b>		<b>1</b>
1.2.1 Brief Description.....		1
1.2.2 Schedule.....		2
<b>1.3 RELATIONSHIP BETWEEN THE PA ACTIVITY AND OTHER     ACTIVITIES.....</b>		<b>2</b>
1.3.1 Overview.....		2
1.3.2 IDF Disposal Operations.....		3
1.3.3 Facility Design.....		3
1.3.4 Tank Inventory.....		3
1.3.5 Tank Waste Treatment Contractor.....		3
1.3.6 Fluor Hanford Company.....		4
<b>1.4 RELATED HANFORD SITE ENVIRONMENTAL ASSESSMNETS.....</b>		<b>4</b>
1.4.1 Overview.....		4
1.4.2 Other Performance Assessments.....		4
1.4.3 Composite Analysis (CA).....		5
1.4.4 Other Major Assessments .....		5
1.4.4.1 Overview.....		5
1.4.4.2 System Assessment Capability.....		5
1.4.4.3 Tank Farm Vadose Zone.....		5
1.4.5 Other Remediation Activities.....		6
1.4.6 Recent Environmental Impact Statements.....		6
1.4.7 Hanford Groundwater Remediation Project.....		6
1.4.7.1 200 Area Remediation Project.....		6
1.4.7.2 Hanford Groundwater Program.....		7
1.4.7.3 Hanford Site-Wide Assessment Project.....		7
1.4.7.4 Characterization of Systems.....		7
1.4.7.5 Remediation and Closure Science Program.....		7
1.4.7.6 IDF PA Activity.....		7
1.4.7.7 Tank Farm Vadose Zone Project.....		7
<b>2.0 PERFORMANCE ASSESSMENT REVIEWS AND REVISION .....</b>		<b>9</b>
<b>2.1 ANNUAL REVIEW .....</b>		<b>9</b>
2.1.1 Requirements .....		9
2.1.2 Status.....		9
2.1.3 Plans.....		9

2.2	PERFORMANCE ASSESSMENT REVISIONS .....	10
2.2.1	Requirements .....	10
2.2.2	Status.....	10
2.2.3	Plans.....	10
2.3	SPECIAL ANALYSES .....	11
2.3.1	Requirements .....	11
2.3.2	Status.....	11
2.3.3	Plans.....	11
3.0	WASTE RECEIPTS .....	13
3.1	REQUIREMENTS.....	13
3.2	STATUS .....	13
3.3	PLANS.....	13
4.0	MONITORING.....	15
4.1	REQUIREMENTS.....	15
4.2	STATUS .....	15
4.3	PLANS.....	15
5.0	OTHER OPERATIONAL ACTIVITIES .....	17
5.1	REQUIREMENTS.....	17
5.2	STATUS .....	17
5.3	PLANS.....	17
6.0	TESTING AND RESEARCH ACTIVITIES .....	19
6.1	REQUIREMENTS.....	19
6.2	STATUS .....	19
6.3	PLANS.....	19
7.0	INTERFACE AND INTEGRATION ACTIVITIES.....	21
7.1	REQUIREMENTS.....	21
7.2	STATUS .....	21
7.3	PLANS.....	21
8.0	REFERENCES .....	23
APPENDIX A: DOE GUIDANCE ON PA MAINTENANCE .....		A-1
APPENDIX B: FORMAT AND CONTENTS OF ANNUAL SUMMARY .....		B-1

## LIST OF TABLES

Table 1-1. Important Dates for IDF .....	2
--	---

## ACRONYMS

CA	Composite Analysis
DOE	U.S. Department of Energy
IDF	Integrated Disposal Facility
ILAW	immobilized low-activity waste
LFRG	Low-Level Waste Disposal Facility Federal Review Group
ORP	Office of River Protection
PA	performance assessment
PUREX	plutonium uranium extraction
RCRA	Resource, Conservation, and Recovery Act
SAC	System Assessment Capability
WAC	waste acceptance criteria

**This page intentionally left blank.**

## 1.0 INTRODUCTION

### 1.1 BACKGROUND

The Department of Energy (DOE) Order 435.1 (DOE 1999a) and its associated manual (DOE 1999b) set the requirements for radioactive waste management for operations undertaken by the DOE. The low-level waste chapter (Chapter 4) of the manual contains the requirements for the creation and maintenance of a performance assessment (PA) that analyzes the long-term effect of disposing of low-level waste. DOE has also issued guidance on the manual (DOE 1999c) and a guide dealing with the maintenance of performance assessments (DOE 1999d).

DOE has recently decided (DOE 2004a), based on the *Final Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement, Richland, Washington* (DOE 2004b) to construct an Integrated Disposal Facility (IDF) in the 200 East Area of the Hanford Site. Waste to be disposed of in the IDF will consist of low-level radioactive solid waste (usually buried in DOE's low-level radioactive burial grounds, including mixed low-level radioactive waste), immobilized low-activity waste (ILAW) from the planned treatment of Hanford tank waste, and surplus or failed immobilization/treatment equipment (such as melters). The solid waste will come from the Hanford Site and potentially from other DOE sites.

The *Hanford Immobilized Low-Activity Tank Waste Performance Assessment* (Mann et al. 1998), referred to as the 1998 ILAW PA, was issued to support the disposal of the ILAW. DOE provided conditional approval of the 1998 ILAW PA in 1999 (DOE 1999e). This PA was then modified in 2001 (Mann et al. 2001) (the draft being approved in 2001 [DOE 2001] and the final in 2003 [DOE 2003a]). When DOE gave approval (DOE 2003b) of the 2003 Annual Summary (Mann 2003a), DOE recognized a change of mission to the IDF from only the disposal of ILAW to its expanded role.

### 1.2 FACILITY: BRIEF DESCRIPTION AND SCHEDULE

#### 1.2.1 Brief Description

The IDF is similar to the proposed ILAW disposal facility. The IDF location is the same as that proposed for the ILAW disposal facility. The design of the IDF is very similar to the conceptual design of the ILAW disposal facility. The IDF consists of a single landfill with two separate, expandable cells. Both cells will be regulated under the *Atomic Energy Act* (AEA). One cell will also be permitted as a *Resource Conservation and Recovery Act* (RCRA) Subtitle C compliant landfill system. Both landfill cells will include a double liner, a leachate collection and removal system, a leak detection system, and a secondary leak detection system. The landfill liner system will comply with RCRA requirements for hazardous waste landfills. The IDF shall be designed to allow for future expansion. Each future liner construction project will connect to the previously constructed liner and the operations systems. The disposal landfill

cover will be designed and located to satisfy the dangerous waste disposal requirements once a decision is made to construct the final cover over the landfill. Operations would continue until the retrieval of tank waste is completed and the last ILAW package created (presently considered to be around 2028), or as long as needed to serve the Hanford Site's needs (presumably about the time of Site closure, around 2035).

### 1.2.2 Schedule

Important dates for the IDF are displayed in Table 1-1.. These dates may change because of the current renegotiations of the Tri-Party Agreement (Ecology et al. 1989) which sets the cleanup schedule for the Hanford Site, as well as contract renegotiations concerning treatment contract extensions.

**Table 1.1 Important Dates for IDF**

Description	Date
Disposal Authorization Statement Issued by DOE <sup>1</sup>	October 1999
DOE/HQ recognition of the change mission <sup>2</sup>	December 2003
NEPA coverage for IDF	June 2004
Start construction	October 2004
Complete construction of initial capacity	October 2005
Begin operations	March 2006
Expand initial volumes	...
Receive last ILAW package	~2028
Receive last waste package	~2034
Close last set of trenches	~2035
Notes: 1 = DOE 1999f. 2 = DOE 2003b. HQ = Headquarters IDF = Integrated Disposal Facility NEPA = National Environmental Policy Act of 1969 ILAW = Immobilized Low Activity Waste	

## 1.3 RELATIONSHIP BETWEEN THE PA ACTIVITY AND OTHER ACTIVITIES

### 1.3.1 Overview

The IDF PA activity is tightly integrated with activities of other organizations dealing with ILAW and solid waste. Some of these are the responsibility of the tank farm contractor (presently CH2M HILL Hanford Group), such as future IDF operations, facility design, and tank

inventory. The design of the tank waste treatment and immobilization facility is the responsibility of the treatment contractor (presently Bechtel National, Inc.). Solid Waste disposal is currently the responsibility of the Hanford Integration Contractor (presently Fluor Hanford, Inc.). The IDF PA activity is also involved with other Hanford Site activities, which are discussed in Section 1.4.

### **1.3.2 IDF Disposal Operations**

As noted in the section above, the construction of the IDF has not yet started. Once disposal starts, the IDF PA activity staff will rely on the operations activity for

- the as-built design,
- the disposed waste inventory,
- monitoring reports, and
- any operational occurrence that might impact long-term performance.

The operations management will ensure that waste acceptance criteria are consistent with the results of the currently approved IDF PA.

### **1.3.3 Facility Design**

Disposal operations are expected to last twenty years or more. During that time, the cells are expected to be expanded to its maximum design size. For the next few years in particular, the IDF PA activity staff will maintain close contact with both the program staff and the architect engineer. This will ensure that environmental impacts due to potential changes in the initial facility design are investigated and updated as needed.

### **1.3.4 Tank Inventory**

The source of much of the material having the largest potential environmental impact that will end up in the IDF is in the underground storage tanks at the Hanford Site, managed by the Office of River Protection. The In-Tank Characterization Program is responsible for determining the inventory within those tanks. The IDF PA activity staff will maintain its interface with this program.

### **1.3.5 Tank Waste Treatment Contractor**

Some of the biggest sources of wastes for the IDF are the ILAW product and secondary waste from the generation of immobilized low-activity and immobilized high-level waste products. The processes will greatly impact the radionuclide and chemical inventory and the waste form performance (because the contractor will determine the separation and immobilization process to be used and will perform the product certification quality control).

Therefore, the IDF PA activity staff is maintaining close contact with the treatment contractor. Such interactions address separation and immobilization technologies. These interactions will

continue as it is expected that even after the initial selection of technologies is made, changes will be made to improve the processes.

### 1.3.6 Fluor Hanford Company

The Fluor Hanford Company (FHC) presently operates the solid waste burial grounds for the Hanford Site. Thus, FHC has prepared performance assessments (Wood et al. 1995 and Wood 1996), annual summaries (the last being Wood 2003), and waste acceptance criteria (the latest version being Girres 2003). The IDF PA staff will build on this experience.

## 1.4 RELATED HANFORD SITE ENVIRONMENTAL ASSESSMENTS

### 1.4.1 Overview

There are many programs at the Hanford Site not in the IDF scope that could provide information useful to the IDF PA. Among the most important of these are the other active performance assessment programs at Hanford as well as the reports from the Hanford Site Composite Analysis. In addition, there are a series of other major assessments and data collection efforts that are on-going on the Hanford Site that should provide useful data to the IDF PA activity.

### 1.4.2 Other Performance Assessments

A number of performance assessments have been written at the Hanford Site (Stewart et al. 1987; Wood et al. 1994, Wood et al. 1995, Wood 1996; Kincaid et al. 1995; Mann et al. 1998, Mann et al. 2001, and Mann et al. 2003c). Some of these deal with inactive programs (grouted waste – Stewart et al. 1987 and Kincaid et al. 1995) or programs that went a different regulatory route (Environmental Restoration Disposal Facility – Wood et al. 1994).

As mentioned before, the performance assessments for Hanford's low-level solid waste burial grounds, *Performance Assessment for the Disposal of Low-Level Waste in the 200 West Area Burial Grounds* (Wood et al. 1994) and *Performance Assessment for the Disposal of Low-Level Waste in the 200 East Area Burial Grounds* (Wood 1996), are an important source of information and experience. DOE (Cowan 1996 and Frei 1997) has approved both of these performance assessments. A single maintenance plan for these performance assessments has been created (Wood 1997). These PAs are being maintained with the last annual summary being issued in 2003 (Wood 2003).

The Solid Waste PA activity is sponsoring geochemical work; of particular interest to the IDF PA activity staff is the work related to near-field releases.

The Hanford Site has started the process of closing its large underground storage tanks. The *Preliminary Performance Assessment for Waste Management Area C at the Hanford Site* (Mann and Connelly 2003b) is the first of a series of performance assessments that will be created for

the purpose of evaluating the risks associated with closure of the Hanford tank farms. The performance assessment has not yet been formally transmitted to DOE headquarters because of uncertainty on the classification of waste in the tanks. A maintenance plan for the performance assessment activity is being prepared.

### 1.4.3 Composite Analysis (CA)

The *Composite Analysis for the Low-Level Waste Disposal in the 200 Areas of the Hanford Site* (Kincaid et al. 1998) deals with the environmental impact from all waste that will be disposed of in the Central Plateau of the Hanford Site at the time of site closure. This document (known as the CA) was approved (DOE 1999e) and its maintenance plan was issued in 2003 (DOE/RL 2003). The last annual summary was written in 2003 (DOE/RL 2004). Data collection for and production of future versions of the CA will be conducted under the Hanford Groundwater Remediation Project (see Section 1.4.4.2 and 1.4.7).

### 1.4.4 Other Major Assessments

**1.4.4.1 Overview.** The Hanford Site has produced a wide variety of documents estimating environmental impacts, including environmental impact statements and remedial facility investigation reports. The documents described below are activities that have recently occurred or are expected to occur in the future and with which the IDF PA activity will interact.

**1.4.4.2 System Assessment Capability.** The Hanford Groundwater Remediation Project (formerly known as the Hanford Integrated Groundwater / Vadose Zone Program [the Integration Project]) was created to coordinate and integrate the various activities at the Hanford Site dealing with the vadose zone, groundwater, and river media that might be impacted by Hanford Site operations (Bauer 1997). A major part of this program was the creation, in 2001, of a set of computer models called the System Assessment Capability (SAC) that can be used to estimate the cumulative impacts of all Hanford Site activities (DOE/RL 1999a and DOE/RL 1999c). The SAC is also used to generate information for future versions of the Hanford Site Composite Analysis (see Section 1.4.3).

The IDF PA activity staff is actively working with the SAC staff to determine and implement requirements for risk assessments. The relationship between the IDF PA activity staff and the SAC working groups is expected to continue through the life of the two activities.

**1.4.4.3 Tank Farm Vadose Zone.** Some of the tanks which presently contain the waste that will be placed into ILAW packages are known to have leaked. Moreover, during the retrieval phase, additional waste may leak, and not all waste will be retrieved. The Tank Farm Vadose Zone Project team is investigating the amount of leaks, their environmental impacts, and the impact of future releases. The project produces facility investigation reports and will publish remedial facility investigation reports.

The Tank Farm Vadose Zone Project is also actively obtaining data concerning the impact of tank wastes on the vadose zone. The tank farm conditions are much more extreme than any

expected in ILAW disposal; therefore, data obtained from the tank farms should provide conservative limits to the conditions expected during ILAW disposal.

The Hanford Site is starting the process of closing its underground storage tanks. As noted in Section 1.4.3, performance assessments are being created for this effort. A close cooperation between those working on this effort and the IDF PA activity staff is being maintained.

#### **1.4.5 Other Remediation Activities**

The Hanford Site has numerous other cleanup activities for various sites. These include massive liquid discharges, solid waste landfills, and contaminated buildings and grounds. The present plan is to group the sites into a limited number (23) of waste groups and perform limited analysis on representative sites (DOE/RL 1999b). The IDF PA activity staff is now, and will continue to work closely with these activities and, in particular, the 200 Area Remediation activity, which is responsible for activities in the 200 Areas. The IDF PA activity staff will work to understand the activities in other Hanford Site areas that may be of importance to the IDF project.

#### **1.4.6 Recent Environmental Impact Statements**

At the Hanford Site, a number of major environmental impact statements have been produced and are in the process of being written. The *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement* (DOE 1999g) and its associated record of decision established the near-term land use of the Hanford Site. The *Final Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement: Richland, Washington* (DOE 2004b) and its associated record of decision (DOE 2004a) established the IDF. The tank farm closure environmental impact statement is now underway and is expected to extend and/or confirm some of the analyses in the solid waste environmental impact statement (DOE 2004b).

#### **1.4.7 Hanford Groundwater Remediation Project**

This project (formerly the Hanford Integrated Groundwater / Vadose Zone Program) coordinates all activities dealing with the long-term protection of the environment at the Hanford Site. Key elements of this project include:

- 200 Area Remediation Project
- Hanford Groundwater Program
- Hanford Site-Wide Assessment Project
- Characterization of System
- Remediation and Closure Science Activity
- IDF PA Activity
- Tank Farm Vadose Zone Project.

**1.4.7.1 200 Area Remediation Project.** This project remediates all of the facilities in Hanford's Central Plateau not associated with tank waste, particularly cribs and trenches associated with past discharges and buildings. This project also performs field characterizations that are very useful to tank closure activities.

**1.4.7.2 Hanford Groundwater Program.** This program, which is managed by PNNL for the Richland Operations Office, monitors and remediates groundwater underneath the Hanford Site, including that caused by tank farm activities. The Hanford Site presently has very large groundwater plumes (>100 square kilometers). The monitoring activities of this program provide very useful data to closure activities.

**1.4.7.3 Hanford Site-Wide Assessment Project.** This project, which is managed by PNNL, estimates the long-term impacts from all Hanford Site activities. Thus, tank closure activities provide information to the Hanford Site-wide Assessment Project and the Closure Project uses data generated by the Hanford Site-Wide Assessment Project. This project maintains the System Assessment Capability model (Section 1.4.4.2) and maintains and creates new versions of the Hanford Site Composite Analysis report.

**1.4.7.4 Characterization of Systems.** This activity, which is managed by Fluor Hanford, Inc. for the Richland Operations Office, compiles and organizes Hanford data that is useful for environmental assessments. The activity mainly supports the Hanford Site-Wide Assessment Project.

**1.4.7.5 Remediation and Closure Science Program.** This program, which is managed by PNNL for the Richland Operations Office, performs field and laboratory measurements useful for environmental assessments. This program has provided important information to tank closure. It is expected that ties will remain strong.

**1.4.7.6 IDF PA Activity.** The activity is described in this maintenance plan.

**1.4.7.7 Tank Farm Vadose Zone Project.** This activity is described in Section 1.4.4.3.

**This page intentionally left blank.**

## **2.0 PERFORMANCE ASSESSMENT REVIEWS AND REVISIONS**

### **2.1 ANNUAL REVIEW**

#### **2.1.1 Requirements**

The manual for DOE O 435.1, relevant sections of which are quoted in Appendix A, requires the field office (in this case, the Office of River Protection [ORP]) to make an annual determination of the adequacy of the PA and what types of revisions, if any, are needed (DOE 1999b). This determination will be documented in a memorandum consisting of the determination that was made, the basis for the determination, and any specific actions to be taken as a result of the review. The determination shall consider any new relevant information, including the results of data collection and analysis from research, field studies, and monitoring. Appendix B contains the format and contents of this annual review. As required by the "Disposal Authorization Statement for the Department of Energy Hanford Site Low-Level Radioactive Waste Disposal Facilities" (DOE 2003b), this determination shall be provided to the Low-Level Waste Disposal Facility Federal Review Group (LFRG).

To allow ORP to make a determination, the contractor shall provide to ORP information on data collection and analysis from research, field studies, and monitoring.

#### **2.1.2 Status**

An annual summary was produced in 2003 (Mann 2003a) and formerly approved by DOE headquarters (DOE 2003b). This formal approval by headquarters, rather than just by the field office, was caused by the facility's change in mission from only disposing ILAW to disposing ILAW and other radioactive solid waste.

#### **2.1.3 Plans**

The IDF contractor will prepare the annual reviews. Each fiscal year (by December 31), the manager of the Office of River Protection shall issue a letter (to LFRG and to the president of the contractor responsible for preparing the performance assessment) documenting the adequacy of the IDF PA and the need for any revisions. The letter shall summarize any data collection (including that from operations) or analysis that might bring the conclusions of the ILAW PA into question. This letter will contain an attachment prepared by the contractor of the important information obtained since the last determination.

## **2.2 PERFORMANCE ASSESSMENT REVISION**

### **2.2.1 Requirements**

The manual for DOE O 435.1, relevant sections of which are quoted in Appendix A, requires that the performance assessment be revised when significant new information alters the conclusions or conceptual models of the performance assessment (DOE 1999b). The manual specifically mentions changes in waste forms or containers, radionuclide inventories, facility design and operations, closure concepts, or improved understanding.

### **2.2.2 Status**

The ILAW PA has been approved by DOE-HQ (DOE 1999e, DOE 2001, and DOE 2003b). A risk assessment for the IDF (Mann et al. 2003c) was included as part of the 2003 ILAW PA Annual Summary (Mann 2003a). The next PA revision is expected to be issued in 2005. Data collection is complete, with documentation for the data collection appearing in 2004.

### **2.2.3 Plans**

An annual summary will be issued in 2004, reflecting new data collected for the 2005 IDF PA.

The next PA revision is expected to be issued in 2005. It will cover all waste currently projected to be disposed of in the IDF.

The 2005 PA will be revised whenever new data or information is obtained that would change the conclusions of the performance assessment. Examples of such new information are

- Inventories significantly larger than those analyzed
- Waste forms significantly different (i.e., having release rates not considered) than those analyzed
- Changes in facility design or operation that would cause significant increases in release rates
- Changes in the understanding of the natural system that would cause significant increases in the impacts to the environment not already analyzed.

In the cases above, significance is defined in reference to the margin between estimated PA results and the performance objectives established in the PA. For those cases where the margin is less than a factor of 10, then significant changes would be 25%. For those cases where the margin is greater than a factor of 10 but less than 100, significant changes would be a factor of 2. For cases where margins are greater than a factor of 100, significant changes would have to be greater than a factor of 10.

## **2.3 SPECIAL ANALYSES**

### **2.3.1 Requirements**

Special analyses are needed if new information, data, changes in the waste stream to be disposed of, or additional modeling results are generated that indicate the potential for waste disposal practices to fall out of compliance with the PA's performance objectives.

### **2.3.2 Status**

The *Integrated Disposal Facility Risk Assessment* (Mann et al. 2003c) is the only special analysis so far performed. It was included as part of the 2003 Annual Summary (Mann 2003a).

### **2.3.3 Plans**

No special analyses are expected until after the 2005 IDF PA is released. A special analysis will occur if new data are obtained that are not bounded by the previous IDF PA analysis.

**This page intentionally left blank.**

### **3.0 WASTE RECEIPTS**

#### **3.1 REQUIREMENTS**

Section IV.G of the manual for DOE O 435.1 requires that waste acceptance requirements be established (DOE 1999b). These requirements are partially based on the PA analyses.

Traditionally, waste receipts are an important part of PA compliance as the waste to be disposed of is usually not well known at the time of the initial PA analysis. Therefore, continual attention will be paid to the cumulative amount of waste disposed of in the facility, and the effects will be weighed against the PA performance objectives.

#### **3.2 STATUS**

Waste is not expected in the facility until operations begin in 2006.

#### **3.3 PLANS**

The Waste Acceptance Criteria (WAC) will be established based on the 2005 IDF PA. WACs will be maintained to be consistent with the requirements from the currently approved PA.

Once operations begin, the IDF PA activity staff will monitor the receipt of wastes to determine that the waste form and waste inventory requirements of the current IDF PA are being met.

Wastes will be characterized in the following classification:

- I. Mixed Waste (low-level radioactive and hazardous chemicals)**
  - A. ILAW**
    - 1. Waste Treatment Plant Product**
    - 2. Other**
  - B. Melters**
  - C. Other Solid Waste**
- II. Radioactive Waste (does not have hazardous chemicals)**
  - A. Category 1(untreated)**
  - B. Category 3 (macroencapsulated/stabilized)**

This page intentionally left blank.

## 4.0 MONITORING

### 4.1 REQUIREMENTS

Section IV.R(3) of the manual for DOE O 435.1 requires that a monitoring plan be prepared (DOE 1999b). The field office shall use the results from the monitoring activity in its determination of the adequacy of the performance assessment.

### 4.2 STATUS

The *Hanford Site Groundwater Protection Management Plan* (DOE/RL 1995) describes the monitoring of groundwater at the Hanford Site. A pre-operational monitoring plan for the ILAW disposal facility (Horton et al. 2000) has been issued and approved (Boston 2000).

Currently, the only contamination found in groundwater underlying the IDF site is tritium. The source of this contamination is from discharges from the PUREX reprocessing plants in the 1950s, 60s, and 70s.

### 4.3 PLANS

An operation monitoring plan is being written for the IDF. Once monitoring results are obtained, they will be reported and used in annual summaries and PA updates.

**This page intentionally left blank.**

## **5.0 OTHER OPERATIONAL ACTIVITIES**

### **5.1 REQUIREMENTS**

The manual for DOE O 435.1, relevant sections of which are quoted in Appendix A, requires that other operational information be included in the PA analysis (DOE 1999b). For the IDF PA, this information could include how the facilities are built, how the waste packages are placed (may affect waste density), how voids are filled, and whether any accidents occur (may affect waste form release performance).

### **5.2 STATUS**

Since no new facilities have been constructed or old facilities have yet been modified, no waste has been received. Hence, no information from operations has been received.

### **5.3 PLANS**

Once construction and waste receipts begin, the IDF PA activity will monitor the information produced by the operations activity. Such information will be reported and used in annual summaries and PA updates.

**This page intentionally left blank.**

## 6.0 TESTING AND RESEARCH ACTIVITIES

### 6.1 REQUIREMENTS

The manual for DOE O 435.1, relevant portions of which are quoted in Appendix A, requires that the PA activity conduct research and fill activities to address uncertainties or data gaps in existing knowledge (DOE 1999b).

### 6.2 STATUS

The IDF PA activity staff has collected large amounts of data since the issuance of the 2001 ILAW PA. This knowledge will be collected in a series of data packages for the 2005 IDF PA:

- waste form performance
- geology
- recharge
- hydraulics
- geochemistry
- inventory
- disposal facility design

This knowledge is based on laboratory experiments (for example, testing of glass samples and measurement of soil sample properties), field experiments (for example, lysimeter measurements, boreholes), and modeling studies (recharge, effect of homogeneities, and waste form performance).

### 6.3 PLANS

Because of the uncertainties in estimating performance over the long times considered in the IDF PA (1,000 years, 10,000 years, and longer), scientific understanding is crucial to acceptance of the IDF PA. Future activities are documented in Section 7.8 of the 2001 ILAW PA and will be included in equivalent sections in future PAs. The activities include work in understanding waste form performance.

As stated in the "Maintenance Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses" (DOE 1999d), cognizance of research and development activities in the DOE complex will be monitored and analyzed for the implications to disposal in IDF.

Specific testing and research activities driven by ORP annual reviews will be incorporated into multi-year work plans and approved by ORP.

**This page intentionally left blank.**

## **7.0 INTERFACE AND INTEGRATION ACTIVITIES**

### **7.1 REQUIREMENTS**

The manual for DOE O 435.1, relevant sections of which are quoted in Appendix A, requires that the PA activity monitor information that may alter the conceptual model(s) used in the PA (DOE 1999b). As noted in Section 1.4 (Related Hanford Site Activities), there are a variety of Hanford Site activities that could provide this type of information.

### **7.2 STATUS**

The Richland Operations Office of DOE (Bauer 1997) set up the Hanford Integrated Groundwater / Vadose Zone Program (now called the Hanford Groundwater Remediation Project) to coordinate and integrate the various activities at the Hanford Site dealing with the vadose zone, groundwater, and river media that might be impacted by Hanford Site operations. The IDF PA activity has active contacts in each of the Integration Project's major activities:

- 200 Area Remediation
- Characterization of Systems
- Data Management
- Hanford Groundwater Program
- Regulatory Path Forward
- System Assessment Capability

In addition, the IDF PA maintains close coordination with the activities not strictly underneath the Hanford Groundwater Remediation Project's control, i.e., the Tank Farm Vadose Zone Project and the Solid Waste Burial Ground PA activity.

### **7.3 PLANS**

The IDF PA activity will stay fully involved with the Hanford Site integration activities. See the discussion in Section 1.4. The IDF PA activity is committed to finding information that might affect conceptual models or results important to the IDF PA activity.

**This page intentionally left blank.**

## 8.0 REFERENCES

- Bauer, LK. 1997. "Site-Wide Groundwater / Vadose Zone Integration", letter from L.K. Bauer (assistant Manager for Environmental Restoration) to S.D. Liedle (President, Bechtel Hanford, Inc.) [similar letters were sent to other contractor presidents], U.S. Department of Energy, Richland, Washington, December 3, 1997.
- Boston, HL. 2000. "Approval and Implementation of the Hanford Site Remote-Handled Immobilized Low-Activity Waste (ILAW) Disposal Facility Preoperational Monitoring Plan," Memorandum from H. L. Boston, (Acting Manager), memorandum to Carolyn L. Huntoon (Assistant Secretary), Office of River Protection (ORP) 00-PRD-071, U.S. Department of Energy, Office of River Protection, Richland, Washington, November 1, 2000.
- Cowan, SP. 1996. "Conditional Acceptance of the Hanford 200 West Area Burial Ground Performance Assessment", memorandum to Charles Hansen, U.S. Department of Energy, Washington, D.C., June 27, 1996.
- DOE O 435.1. "Radioactive Waste Management," DOE Order 435.1, U.S. Department of Energy, Washington, DC, July 9, 1999.
- DOE 1999a. "Radioactive Waste Management," DOE Order 435.1, U.S. Department of Energy, Washington, D.C., July 9, 1999.
- DOE 1999b. "Radioactive Waste Management Manual," DOE M 435.1-1, U.S. Department of Energy, Washington, D.C., July 9, 1999.
- DOE 1999c. "Implementation Guide for Use with DOE M 435.1-1," DOE G 435.1-1, U.S. Department of Energy, Washington, D.C., July 9, 1999.
- DOE 1999d. "Maintenance Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses," DOE G 435.1-3, U.S. Department of Energy, Washington, D.C., November 10, 1999.
- DOE 1999e. Letter from J. Fiore (Acting Deputy Assistant Secretary for Environmental Restoration) and M. Frei (Acting Deputy Assistant Secretary for Waste Management) to Manager for Hanford Office of River Protection and Manager for Richland Operations, "Conditional Acceptance of the Immobilized Low-Activity Tank Waste Disposal Facility Performance Assessment and the Hanford Site 200 Plateau Composite Analysis," U.S. Department of Energy, Washington, D.C., dated October 20, 1999.

DOE 1999f. "Disposal Authorization Statement for the Department of Energy Hanford Site Low-Level Radioactive Waste Disposal Facilities," attachment to the letter from Carolyn L. Huntoon (Assistant Secretary for Environmental Management, U.S. Department of Energy) to John T. Conway (Chairman, Defense Nuclear Facilities Safety Board), U.S. Department of Energy, Washington, D.C., dated October 25, 1999.

DOE 1999g. *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement*, DOE/EIS-0222-F, U.S. Department of Energy, Richland, Washington, September 1999. The Record of Decision was published in the *Federal Register* on November 12, 1999 (Vol. 64, pages 61615-61625).

DOE 2001. "Disposal Authorization for the Hanford Site Low-Level Waste Disposal Facilities – Revision 2," Memorandum from Randall S. Scott (Acting Deputy Assistant Secretary for Project Completion, Office of Environmental Management) to Harry L. Boston (Manager, Office of River Protection) and Keith A. Klein (Manager, Richland Operations Office), U.S. Department of Energy, Washington, D.C., November 1, 2001

DOE 2003a. "Hanford Immobilized Low-Activity Waste Performance Assessment: 2001 Version DOE/ORP-2000-24, Rev. 0," Memorandum from Mark W. Frei (Acting Deputy Assistant Secretary for Project Completion and Deputy Assistant Secretary for Site Closure to Roy J. Schepens, Manager, Office of River Protection, and to Keith A. Klein, Manager, Richland Operations Office, U.S. Department of Energy, Washington, D.C., August 6, 2003.

DOE 2003b. "Review of the Annual Summary of the Hanford Immobilized Low-Activity Waste Performance Assessment for 2003," Memorandum from Mark W. Frei (Acting Deputy Assistant Secretary for Project Completion) to Roy J. Schepens (Manager, Office of River Protection) and Keith A. Klein (Manager, Richland Operations Office), U.S. Department of Energy, December 12, 2003.

DOE 2004a. "Record of Decision for the Solid Waste Program, Hanford Site, Richland, WA: Storage and Treatment of Low-Level Waste and Mixed Low-Level Waste; Disposal of Low-Level Waste and Mixed Low-Level Waste, and Storage, Processing, and Certification of Transuranic Waste for Shipment to the Waste Isolation Pilot Plant," *Federal Register*, Vol. 69, Number 125, pages 39449-39455, Washington, D.C., June 30, 2004.

DOE 2004b. *Final Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement Richland, Washington*, DOE/EIS-0286F, U.S. Department of Energy, Richland Operations Office, Richland, Washington, January 2004.

DOE-RL 1995. *Hanford Site Ground Water Protection Management Plan*, DOE-RL-89-12, Rev. 2, U.S. Department of Energy, Richland, Washington, July 1995.

DOE/RL 1999a. *Groundwater/Vadose Zone Integration Project, Summary Description*, DOE/RL-98-48, Vol. I, Rev. 0, U.S. Department of Energy, Richland, Washington, June 1999.

DOE/RL 1999b. *200 Areas Remedial Investigation / Feasibility Study Implementation Plan – Environmental Restoration Program*, DOE/RL-98-28, U.S. Department of Energy, Richland, Washington, April 1999.

DOE/RL 1999c. *Groundwater/Vadose Zone Integration Project, Science and Technology Summary Description*, DOE/RL-98-48, Vol. III, Rev. 0, U.S. Department of Energy, Richland, Washington, June 1999.

DOE/RL 2003. *Maintenance Plan for the Composite Analysis of the Hanford Site, Southeast Washington*, DOE/RL-2000-29, Revision 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL 2004. *Annual Status Report (FY 2003): Composite Analysis of Low-Level Waste Disposal in the Central Plateau at the Hanford Site*, DOE/RL-2004-12, U.S. Department of Energy, Richland Operations Office, Richland, Washington, January 2004.

Ecology et al. 1989. *Hanford Facility Agreement and Consent Order*, Washington State Department of Ecology, United States Environmental Protection Agency, United States Department of Energy, as amended.

The current version is the fifth amendment 89-10. The document is available from any of the parties.

- [1. Appendix D lists the activities and associated milestones. Activities 45 (closure of single-shell tanks), 50 (pretreatment processing), 60 (vitrification of Hanford low-level waste), and 90 (disposal of the immobilized low-activity waste) cover areas of concern for this performance assessment.]
- [2. Activity D lists the activities and associated milestones. Activity 50 deals with pretreatment processing.]
- [3. Milestone 45-0 in Appendix D describes retrieval criteria.]

Frei, MW. 1997. "Conditional Acceptance of the Hanford 200 East Area Burial Ground Performance Assessment", letter from Mark W. Frei (Acting Deputy Assistant Secretary for Waste Management, Department of Energy) to Charles Hansen (Assistant Manager for Waste Management, Richland Operations Office) dated June 30, 1997.

Girres, CK. 2003. *Hanford Site Solid Waste Acceptance Criteria*, HNF-EP-0063, Revision 9, Fluor Hanford Company, Richland, Washington, October 2003.

- Horton, DG, SP Reidel, Yi-Ju Chien, and RM Mitchell. 2000. *Remote-Handled Low-Activity Waste Disposal Facility Preoperational Monitoring Plan*, RPP-6877, Revision 0, prepared by Pacific Northwest National Laboratory for CH2M HILL Hanford Group, Inc., Richland, Washington, September 2000.
- Kincaid, CT, JW Shade, GA Whyatt, MG Piepho, K Rhoads, JA Voogd, JH Westsik, Jr., KA Blanchard, and BG Lauzon. 1995. *Performance Assessment of Grouted Double-Shell Tank Waste Disposal at Hanford*, WHC-SD-WM-EE-004, Revision 1, Westinghouse Hanford Company, Richland, Washington, May 1995.
- Kincaid, CT, MP Bergeron, CR Cole, MD Freshley, DL Strenge, PD Thorne, LW Vail, and SK Wurnster. 1998. *Composite Analysis for the Low-Level Waste Disposal in the 200 Area Plateau of the Hanford Site*, PNNL-11800, Pacific Northwest National Laboratory, Richland, Washington, March 1998.
- Mann, FM, RJ Puigh II, PD Rittmann, NW Kline, JA Voogd, Y Chen, CR Eiholzer, CT Kincaid, BP McGrail, AH Lu, GF Williamson, NR Brown, and PE LaMont. 1998. *Hanford Immobilized Low-Activity Tank Waste Performance Assessment*, DOE/RL-97-69, Rev. 0, U.S. Department of Energy, Richland, Washington, March 1998.
- Mann, FM, KC Burgard, WR Root, RJ Puigh, SH Finfrock, R Khaleel, DH Bacon, EJ Freeman, BP McGrail, SK Wurstner, and PE LaMont. 2001. *Hanford Immobilized Low-Activity Waste Performance Assessment: 2001 Version*, DOE/ORP-2000-24, Revision 0, Office of River Protection, Department of Energy, Richland, Washington, August 2001.
- Mann, FM. 2003a. *Annual Summary of the Immobilized Low-Activity Waste Performance Assessment for 2003 Incorporating the Integrated Disposal Facility Concept*, DOE/ORP-2000-19, Revision 3, U.S. Department of Energy, Office of River Protection, October 2003.
- Mann, FM and M Connelly. 2003b. *Preliminary Performance Assessment for Waste Management Area C at the Hanford Site*, Washington, DOE/ORP-2003-11, U.S. Department of Energy, Office of River Protection, September 2003.
- Mann, FM, RJ Puigh, SH Finfrock, R Khaleel, and MI Wood. 2003c. *Integrated Disposal Facility Risk Assessment*, RPP-15834, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington, June 2003.
- Stewart, GH, WT Farris, DG Huizenga, AH McMakin, GP Streile, and RL Treat. 1987. *Long-Term Performance Assessment of Grouted Phosphate/Sulfate Waste from N Reactor Operations*, PNL-6512, Pacific Northwest Laboratory, Richland, Washington, April 1987.

Wood, MI, R Khaleel, PD Rittmann, AH Lu, SH Finrock, RJ Serne, and KJ Cantrell. 1994. *Performance Assessment for the Disposal of Low-Level Waste in the 200 West Area Burial Grounds*, WHC-EP-0645, Westinghouse Hanford Company, Richland, Washington, November, 1994.

Wood, MI, R Khaleel, PD Rittmann, AH Lu, SH Finrock, and TH DeLorenzo. 1995. *Environmental Remediation Disposal Facility Performance Assessment*, BHI-00169, Revision 00, Bechtel Hanford Company, Richland, Washington, August 1995.

Wood, MI. 1996. *Performance Assessment for the Disposal of Low-Level Waste in the 200 East Area Burial Grounds*, WHC-EP-0875, Westinghouse Hanford Company, Richland, Washington, September 1996.

Wood, MI. 1997. *Program Plan for Maintenance of Hanford Burial Ground Performance Assessment (PA) Analyses*, Letter Report from Waste Management Federal Services of Hanford, Inc. to Department of Energy-Richland Office, Richland, Washington.

Wood, MI. 2003. "Performance Assessment Review Report 2002 & 2003 Annual Review of the 200W & 200E Area Performance Assessments, FH-0304003 (letter to Keith A. Kline), Fluor Hanford Company, October 17, 2003.

**This page intentionally left blank.**

**APPENDIX A**

**DOE GUIDANCE ON PERFORMANCE ASSESSMENT MAINTENANCE**

**This page intentionally left blank.**

## APPENDIX A

## DOE GUIDANCE ON PERFORMANCE ASSESSMENT MAINTENANCE

The following text, through the end of this appendix, is quoted from the *Implementation Guide for use with DOE M 435.1-1* (DOE 1999c). The text in bold also appears in the *Radioactive Waste Management Manual* (DOE 1999b) and are the actual requirements for maintaining a performance assessment. Further guidance can be found in the *Maintenance Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses* (DOE 1999d).

**“IV. P.(4) Performance Assessment and Composite Analysis Maintenance. The performance assessment and composite analysis shall be maintained to evaluate changes that could affect the performance, design, and operating bases for the facility. Performance assessment and composite analysis maintenance shall include the conduct of research, field studies, and monitoring needed to address uncertainties or gaps in existing data. The performance assessment shall be updated to support the final facility closure. Additional iterations of the performance assessment and composite analysis shall be conducted as necessary during the post-closure period.**

- (a) **Performance assessments and composite analyses shall be reviewed and revised when changes in waste forms or containers, radionuclide inventories, facility design and operations, closure concepts, or the improved understanding of the performance of the waste disposal facility in combination with the features of the site on which it is located alter the conclusions or the conceptual model(s) of the existing performance assessment or composite analysis.**

**Objective:**

The objective of these requirements is to ensure that performance assessments and composite analyses are updated as appropriate, whenever changes in their bases (assumptions, parameters, etc.) are contemplated or effected in order to maintain the validity and effectiveness of the controls which are based on the performance assessment and composite analysis.

**Discussion:**

As discussed in Section I.2.F.(15) of the guidance for Chapter I, General Requirements, since a low-level waste disposal facility will be in operation for many years, and waste receipts and knowledge concerning the disposal facility environs could change, maintaining the performance assessment and composite analysis through a regular schedule of evaluations is required by the manual.

The performance assessment provides a means whereby the long-term efficacy of the disposal facility is evaluated and provides input to disposal facility design, operational requirements, and waste acceptance criteria. The composite analysis is a planning tool to ensure that low-level waste disposal, in consort with other activities at the site, is not likely to compromise future radiological protection of the public. Because the performance assessment and composite analysis results are projections based on estimated waste and facility characteristics, they are technically uncertain. A maintenance program is needed to, over time, improve confidence in the results of the analysis and in the long-term plans for protecting public health and safety. Through the conduct of an assessment maintenance program, site operators can technically justify reducing the conservatism in the analysis based on acquiring data which support revising the analyses. The results of the revised performance assessment and composite analysis can result in revised waste acceptance criteria which could result in a lessening of constraints on waste receipts, less costly remediation alternatives, or in revised land-use controls.

Acquisition and consideration of field data represents a necessary component of the maintenance program. Performance assessment and composite analysis development and refinement represents a continuous process during the operational life of a disposal facility. Over the lifetime of the disposal facility, the performance assessment and composite analysis must be maintained and upgraded as additional information about the waste, environmental setting, and site is obtained. At closure of the disposal facility, a final performance assessment which analyzes all of the waste that has been disposed must be prepared and approved. During the post-closure period, it may also be necessary to revise the performance assessment and composite analysis according to the criteria stated above.

As discussed above, the improvement of performance assessments, the addition of the composite analysis to the required evaluations of low-level waste disposal facilities, and their reviews and approvals has been the aim of much of the improvements to low-level waste management resulting from Defense Nuclear Facilities Safety Board Recommendation 94-2. Similarly, maintenance of performance assessments and composite analyses has also been modified to improve the upkeep of the analyses and controls based on the assessments. Consequently, detailed guidance on maintaining performance assessments and composite analyses is being developed for inclusion in DOE G 435.1-3, Maintenance Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses. The Maintenance Guide will need to be consulted for additional detailed discussions of the maintenance of performance assessments and composite analyses once issued.

Compliance with this requirement is demonstrated by the implementation of a site-specific performance assessment and composite analysis maintenance program that includes research projects, field studies, and the results of monitoring to update the analyses.

- (b) **A determination of the continued adequacy of the performance assessment and composite analysis shall be made on an annual basis, and shall consider the results of data collection and analysis from research, field studies, and monitoring.**
- (c) **Annual summaries of low-level waste disposal operations shall be prepared with respect to the conclusions and recommendations of the performance assessment and composite analysis and a determination of the need to revise the performance assessment or composite analysis.**

**Objective:**

The objective of these requirements is to ensure that the bases of the performance assessment and composite analysis (e.g., assumptions, parameters, waste inventory) remain valid and to ensure that results of testing, research, and development, and monitoring are considered in this determination and summary.

**Discussion:**

Because the analyses in the performance assessments and composite analyses are based on projections of waste receipts and parameter values that predict site behavior, annual summaries of actual disposal operations that include actual waste receipts and results of site research projects and monitoring, can assist in calibrating the performance assessment and composite analysis to be more accurate as the life of the facility goes on. The annual summaries are to tie the annual summaries to the conclusions of the performance assessment and composite analysis, and determine whether they continue to be the correct conclusions. As more and more of these annual summaries are factored appropriately into the maintenance of the performance assessment and composite analysis, the more the results are based on actual facility performance, and the more the conclusions can be relied on to provide a reasonable expectation that the performance objectives will continue to be met.

Performance assessment and composite analysis maintenance includes the routine review and revision, as appropriate, of the analyses. Reviews provide a mechanism for routine assessment of the controls derived from the analyses on waste disposal, source remediation, or land-use controls so that potential problems are identified and managed. The revisions ensure that there is cohesive documentation providing a reasonable expectation of meeting the performance measures. This use of the analyses is similar to the use of a safety analysis report. The assumptions and analyses in the performance assessment are used to establish a performance envelope and are translated into administrative and engineering controls (e.g., procedures, waste acceptance criteria, designs, land-use controls).

The reviews should include an assessment of relative test, research and development, and monitoring data that may have been obtained. This part of the review is two-fold. First, it ensures that the conceptual model(s), assumptions, parameters, etc. remain valid. Second, it enhances

confidence in the model results and may result in a lessening of the degree of conservatism in the analyses. The annual reviews should be documented and retrievable.

As discussed above, the improvement of performance assessments, the addition of the composite analysis to the required evaluations of low-level waste disposal facilities, and the reviews and approvals for these analyses are among the improvements to low-level waste management resulting from Defense Nuclear Facilities Safety Board Recommendation 94-2. Similarly, maintenance of performance assessments and composite analyses has also been modified to improve the upkeep of the analyses and controls based on the assessments.

Compliance with this requirement is demonstrated by a documented process that results in annual summaries of the low-level waste disposal operations and a determination of the continued adequacy of the analyses.

**Supplemental References:**

1. DOE, 1996. Maintenance of US Department of Energy Low-Level Waste Performance Assessments, U.S. Department of Energy, Washington, D.C., September 1996.
2. DOE. Maintenance Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses, DOE G 435.1-3, U.S. Department of Energy, Washington, D.C. (Under preparation.)”

**APPENDIX B: FORMAT AND CONTENTS OF ANNUAL SUMMARY**

This page intentionally left blank.

**CONTENTS**

B.1 OVERVIEW .....B-5  
B.2 SUMMARY STATEMENT .....B-5  
B.3 WASTE RECEIPTS .....B-6  
B.4 MONITORING.....B-6  
B.5 RESEARCH AND DEVELOPMENT .....B-6  
B.6 SUMMARY OF CHANGES.....B-7  
B.7 RECOMMENDED CHANGES .....B-7

**This page intentionally left blank.**

## B.1 OVERVIEW

Section 2.2 of the *Maintenance Guide for U.S. Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses* (DOE 1999d) provides the format and contents of the Annual Summary. The items covered will include assessments of whether conclusions of the performance assessment have changed. In addition, the following items will be included:

- Waste receipts
- Monitoring Results
- Research and Development Results
- Summary of Changes
- Recommended Changes

## B.2 SUMMARY STATEMENT

The annual summary report shall contain a summary stating if the information that was reviewed resulted in any changes to the conclusion of the performance assessment (i.e., whether, in the light of the new information reviewed, there is still a reasonable expectation that the performance objectives of DOE M 435.1-1 will be met). This statement should reflect one of four possible scenarios:

- 1) there is no change to the conclusion of the performance assessment;
- 2) the conclusions remain valid, but new information indicates less conservatism in the results than previously believed;
- 3) the conclusions remain valid, but new information indicates more conservatism in the results than previously believed;
- 4) the conclusions are no longer valid.

## B.3 WASTE RECEIPTS

The assessment of waste receipts should summarize the waste receipt information reviewed during the annual review. The primary purpose of this section is to inform Headquarters how the waste received over the past year compares to what was analyzed in the performance assessment. The disposal of radionuclides that require special waste forms should be summarized.

Wastes will be classified as follows:

- I. Mixed Waste (low-level radioactive and hazardous chemicals)
  - A. ILAW
    1. Waste Treatment Plant Product
    2. Other
  - B. Melters
  - C. Other Solid Waste
- II. Radioactive Waste (does not have hazardous chemicals)
  - A. Category 1 (untreated)
  - B. Category 3 (macroencapsulated/stabilized)

#### **B.4 MONITORING**

The results of monitoring required under the monitoring plan, as well as any other monitoring to be performed, should be summarized and interpreted. The interpretation should address whether the monitoring results indicate that the facility is performing as expected, based on the performance assessment. The interpretation should also address the consistency of the monitoring results with the conceptual model(s) that form the basis of the performance assessment. Variances should be discussed, particularly with regard to their relevance to the conclusion of the performance assessment.

#### **B.5 RESEARCH AND DEVELOPMENT**

The annual report should summarize the research and development results that were conducted and evaluated, and an interpretation of the significance of these results. Research and development efforts that were reviewed should be categorized as

- 1) research and development required by the facility's disposal authorization statement,
- 2) research and development contained in the Site-Wide Radioactive Waste Management Plan, but not required by the disposal authorization statement,
- 3) ILAW-disposal related research and development not contained in the Site-Wide Radioactive Waste Management Plan,

- 4) other Hanford Site research and development not contained in the Site-Wide Radioactive Waste Management Plan,
- 5) off-site research and development contained in the database maintained by the Mixed Low-Level Waste Center of Excellence, and
- 6) other off-site research and development efforts.

The annual summary should present the status of IDF-related research and development, including those completed during the previous year, those that are ongoing, those that will be started during the next year, and future efforts included in the Project Baseline Summaries. The evaluation of significance should indicate whether the results indicate a change to the conclusions of the performance assessment, and whether the results indicate more or less conservatism in the performance results.

## **B.6 SUMMARY OF CHANGES**

The annual summary shall contain a section that summarizes the changes affecting the performance assessment that have occurred over the past year, e.g., changes to the disposal facility design, operations, or maintenance program, as well as expected changes to future conditions, such as site land-use plans. This section should include the status of information needs (e.g., data gaps, uncertainties) identified in the performance assessment and previous annual reviews. The status of this information shall be categorized as follows:

- 1) previously existing information needs that have been satisfied by monitoring and research and development efforts completed during the previous year,
- 2) previously existing information needs that are no longer relevant due to changes in facility design, operations, or expected future conditions, and
- 3) new information needs identified as a result of the annual review, including those resulting from changes in facility design operation, or expected future conditions.

## **B.7 RECOMMENDED CHANGES**

The annual summary shall advise DOE Headquarters of planned or contemplated changes in IDF design or operations, and in the performance assessment maintenance program. Implementation of these changes does not require Headquarters approval unless they affect conditions specified in the disposal authorization statement. The discussion of the recommended changes should include the expected significance of the changes with respect to the performance assessment results and conclusions. If significant changes to the results or conclusions are expected, the summary should recommend whether or not the performance assessment should be revised. This section should also address recommended changes to monitoring and research and development activities associated with the IDF and performance assessment. Such changes to monitoring or research and development activities required by the disposal authorization statement should be highlighted because they will require Headquarters approval.

**This page intentionally left blank.**