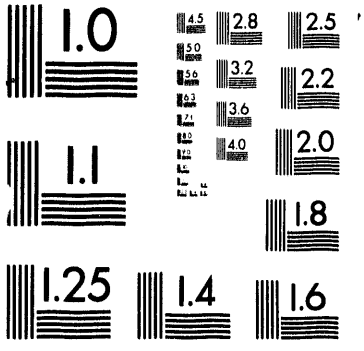
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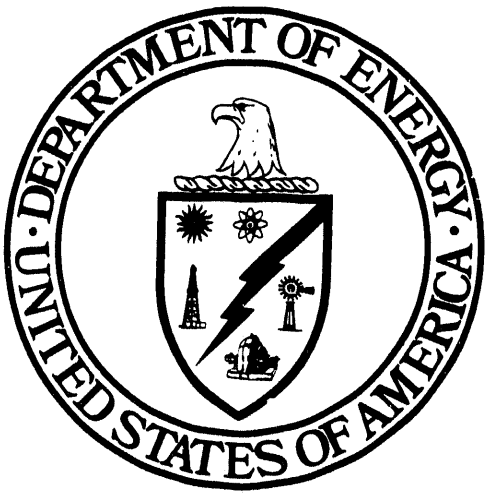
DOE/EH-0348

Environmental Audit of the Laboratory for Energy-Related Health Research (LEHR)



U.S. Department of Energy
Office of Environmental Audit
Washington, DC 20585

May 1993

PREFACE

PREFACE

U.S. DEPARTMENT OF ENERGY
ENVIRONMENTAL AUDIT
CONDUCTED AT THE
LABORATORY FOR ENERGY-RELATED HEATH RESEARCH (LEHR)

The Secretary of Energy's July 20, 1993, Environment, Safety and Health Policy establishes daily excellence in the protection of the worker, the public, and the environment as the hallmark and highest priority of all DOE activities. That policy also calls for a proactive program of continuous improvement to move the Department beyond minimal compliance with standards. In furtherance of that policy, the Office of Environment, Safety and Health (EH) has established, as part of the internal oversight responsibilities within DOE, a program within the Office of Environmental Audit (EH-24), to conduct environmental assessments of DOE programs and operating facilities. The ultimate goal of this program is enhancement of environmental protection and minimization of risk to public health and the environment through systematic and periodic evaluations of the Department's environmental programs within line organizations.

Through its environmental audit program, EH-24 is committed to helping establish DOE as a model of responsible environmental stewardship. In addition, this program will serve to reinforce the Secretary's goal of building on the efforts currently ongoing to attain and maintain compliance in cooperation with the regulatory authorities and other affected stakeholders.

This document contains the results of the Laboratory for Energy-Related Health Research, Environmental Restoration (LEHR-ER) Project. This audit was conducted by EH-24 from May 10 through May 24, 1993. The audit included a review of LEHR operations and facilities supporting DOE-sponsored activities. The objective of the audit is to advise the Secretary of Energy, through the Assistant Secretary for Environment, Safety and Health, as to the compliance status of DOE facilities with regard to environmental requirements, adequacy of DOE environmental management programs, and corrective actions to address identified problem areas.

May 1993
Washington, DC

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LABORATORY FOR ENERGY-RELATED HEALTH RESEARCH (LEHR)

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This report documents the results of the environmental audit conducted at the Laboratory for Energy-Related Health Research, Environmental Restoration (LEHR-ER) Project at University of California-Davis (UCD), Davis, California. The audit was conducted by the U.S. Department of Energy's (DOE's) Office of Environmental Audit (EH-24), beginning May 10, 1993, and ending May 24, 1993.

The scope of the audit at the LEHR-ER was comprehensive, addressing environmental activities in the technical areas of air; surface water/drinking water; groundwater and soils/sediment/biota; waste management; toxic and chemical materials; inactive waste sites; radiation; quality assurance; and environmental management. Specifically assessed was the compliance of LEHR-ER operations and activities with Federal, state, and local regulations; DOE Orders; and best management practices (BMPs).

Onsite activities included inspection of LEHR-ER facilities and operations; review of site documents; interviews with DOE and contractor/subcontractor personnel; and reviews of previous appraisals. Using these sources of information, the environmental audit team developed findings, which fell into two general categories: compliance findings and best management practice findings. Each finding also identifies apparent causal factor(s) that contributed to the finding and will assist line management in developing "root causes" for implementing corrective actions.

The audit team identified some strengths in the LEHR-ER Project. These include: (1) LEHR-ER Project personnel are capable and professional and are committed to meeting environmental protection goals and requirements; and (2) the coordination and implementation of health and safety activities relating to the characterization activities at the LEHR site is well coordinated and comprehensive in scope.

The overall conclusion of the audit is that LEHR-ER Project has recently made some progress in developing and implementing environmental protection programs; however, complete implementation of DOE and Federal and state regulatory requirements have not been achieved.

The inadequate implementation of environmental requirements and activities at the LEHR-ER was most notable in the area of waste management. The lack of a program to address the roles and responsibilities for all wastes has resulted in failure to meet RCRA requirements. An overall tendency toward informality of operations was also identified. There is inadequate policy implementation in that many of the procedures have not been fully developed or implemented in several areas.

A total of 24 findings were identified in this audit. Sixteen of these represent conditions which, in the opinion of the audit team, do not meet the requirements of Federal or state regulations, and applicable DOE Orders. Eight (8) findings reflect a lack of adherence to BMPS. None of the findings identified by the audit team appear to pose significant near term threats to public health and the environment.

The "key findings" identified by the audit team are summarized as follows:

Waste Management. LEHR-ER has not developed a comprehensive hazardous and mixed waste management program to direct and control hazardous and mixed waste management activities, and consequently, has resulted in many deficiencies in waste management area.

Formality of Operations. In the areas of groundwater and waste management, LEHR-ER has not developed the formalized programs and plans required by DOE Orders. The followup system for the environmental appraisal program, the internal and external communications, and the review of environmental data have not been fully formalized. DOE guidance for development and implementation of conduct of operations and self-assessment program has not been fully addressed.

SECTION 1.0

INTRODUCTION

1.0 INTRODUCTION

This report documents the results of the Comprehensive Environmental Baseline Audit (abbreviated as environmental audit) of the Laboratory for Energy-Related Health Research (LEHR-ER) Project located at the University of California-Davis (UCD), Davis, California (see Figures 1-1 and 1-2). The LEHR-ER Project includes current DOE environmental restoration activities. The audit was conducted from May 10 through May 24, 1993, by the Office of Environmental Audit (EH-24).

DOE 5482.1B, "Environment, Safety and Health Appraisal Program," establishes the mission of EH-24 to provide comprehensive, independent oversight of Department-wide environmental programs on behalf of the Secretary of Energy. The ultimate goal of EH-24 is enhancement of environmental protection and minimization of risk to public health and the environment. EH-24 accomplishes its mission using systematic and periodic evaluations of the Department's environmental programs within line organizations, and through use of supplemental activities which serve to strengthen self-assessment and oversight functions within program, field, and contractor organizations.

These evaluations function as a vehicle to apprise the Secretary and Program Office Officials of the current status and vulnerabilities of Departmental environmental activities and environmental management systems. Several types of evaluations have been conducted, including:

- Comprehensive baseline environmental audits (frequently conducted as a component of Environment, Safety and Health (ES&H) Tiger Team Assessments);
- Periodic routine reaudits;
- Environmental management assessments; and
- Special issue reviews.

The purpose, scope, and approach of this environmental audit is described below.

1.1 PURPOSE

The purpose of the environmental audit is to provide the Secretary of Energy with concise information pertaining to the following issues:

- Compliance status with environmental laws and regulations;
- Compliance with DOE directives which address environmental programs;
- Adherence to best management and accepted technical practices (BMPs);
- DOE vulnerabilities and liabilities associated with compliance status, environmental conditions, and management practices;

- Identification of causal factors associated with each deficiency to determine root causes;

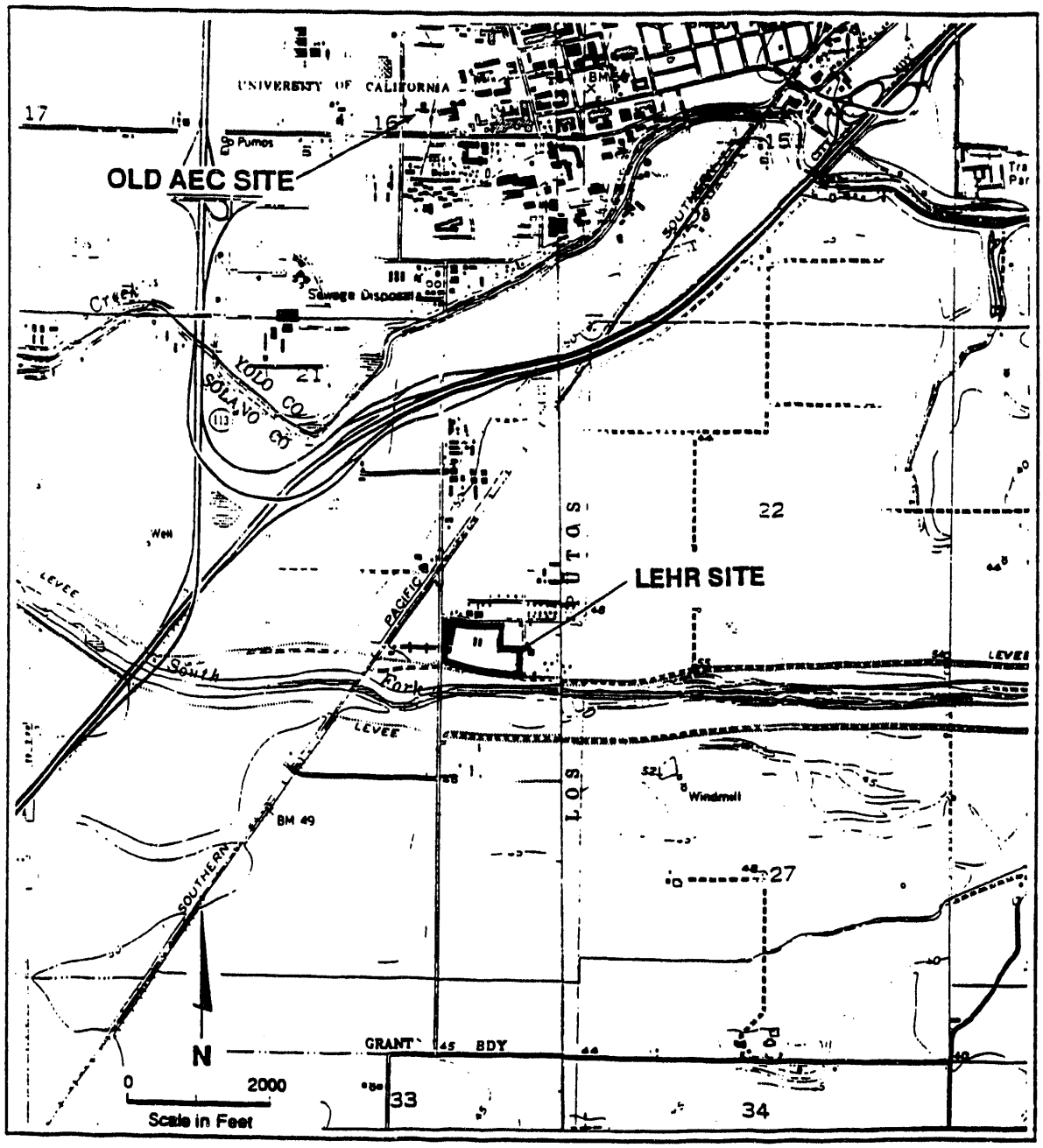


Figure 1-1. Site Vicinity Map

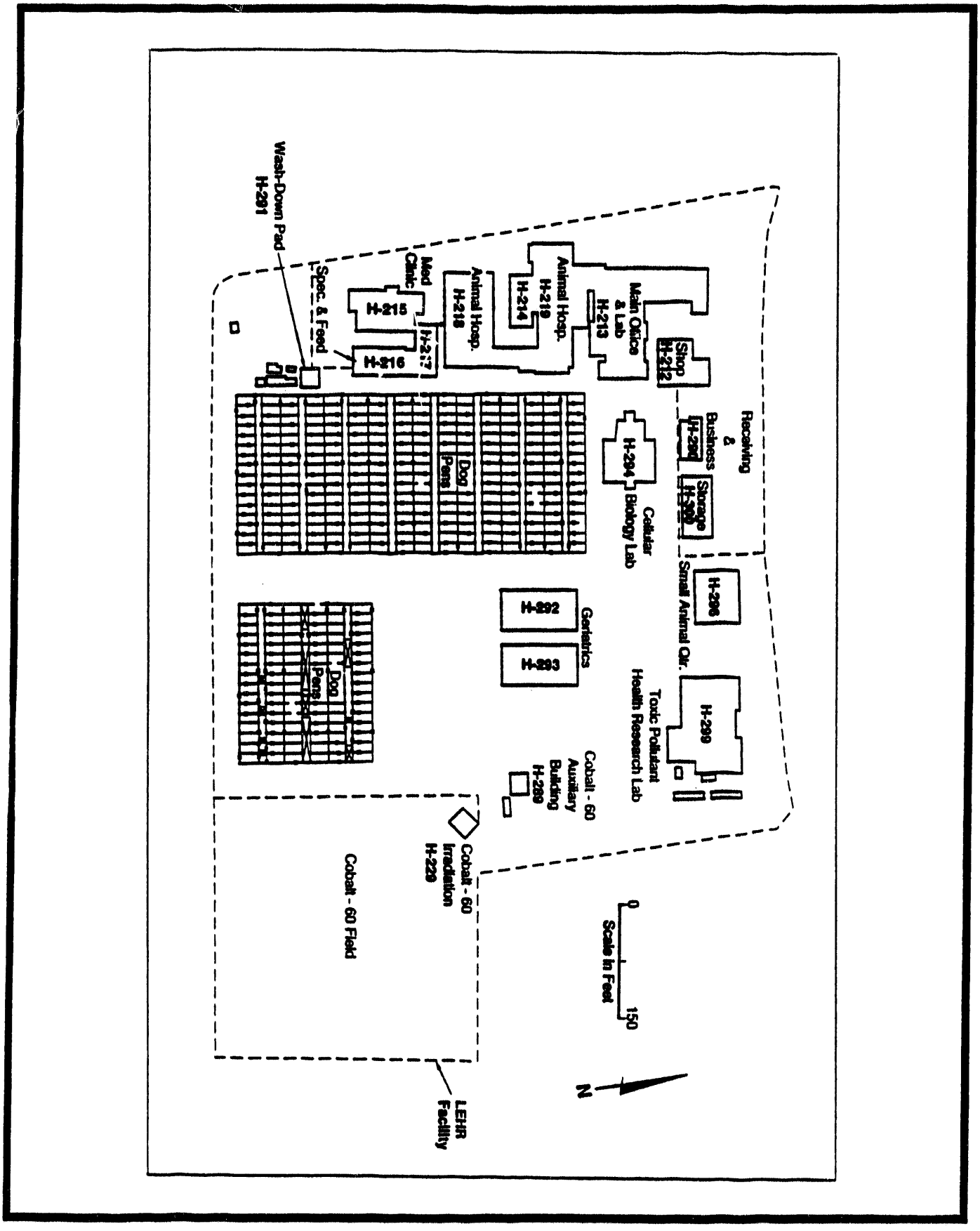


Figure 1-2. Site Structures

- Adequacy of environmental programs and plans;
- Special issues; and
- Noteworthy practices.

The information gathered during this assessment and embodied in this report will assist DOE in determining patterns and trends in environmental deficiencies, as well as probable causal factors contributing to the observed deficiencies. Line management is expected to fully utilize this information to develop corrective actions, to make appropriate modifications to internal self-assessment programs to prevent recurrence, and to supplement their formalized lessons learned programs to ensure broad applications to other operations, programs, and facilities.

1.2 SCOPE

The scope of the environmental audit was comprehensive, addressing all environmental media and Federal, state, and local regulations, with the exception of environmental programs pertaining to the National Environmental Policy Act. Also addressed were DOE Orders and formalized facility or program operating procedures, as well as BMPs. The technical disciplines addressed were air; surface water/drinking water; groundwater and soils/sediment/biota; waste management; toxic and chemical materials; quality assurance; radiation; and inactive waste sites. In addition, the environmental audit included a review of the environmental monitoring programs and related sampling and analysis, the effectiveness of environmental management programs including the oversight of the LEHR-ER by the DOE San Francisco Operations Office (SF), and the Headquarters Office of the Assistant Secretary for Environmental Restoration and Waste Management (EM).

The audit team recognizes that it is beyond the scope of its authority to distribute liabilities between DOE and UCD. No specific assignment of DOE liability is implied by any of the findings in this report. This is because both historical and circumstantial factors that can affect ultimate assignment of responsibility for environmental restoration are unique. Over the history of the property, both DOE directed research activities and independent UCD activities have resulted in onsite disposals and releases of contaminants. The proximity of those activities and natural features which could affect the subsurface migration of contaminants suggest that it will be technically difficult to assign responsibility for soil and groundwater restoration. Both DOE and UCD recognize their potential future shared responsibilities for restoration of the site and have agreed that DOE will pursue a comprehensive program to complete characterization of DOE areas and complete sufficient characterization of non-DOE areas to determine liability. DOE's assumption of the role of completing site characterization is not an indication of any liability.

1.3 APPROACH

The environmental audit was conducted in accordance with the DOE Environmental Audit Program Guidance (DOE/EH-0232, January 1992), and the DOE Environmental Audit Manual (DOE/EH-0125, January 1990), and followed accepted audit techniques. The audit was conducted by a team of professionals managed by a DOE Headquarters Audit Team Leader and a Deputy Team Leader from EH-24, and staffed by contractor technical

support personnel. The names, areas of responsibility, affiliations, and biographical sketches of the team members are provided in Appendix A. The audit included three phases: planning, onsite activities, and reporting.

During the planning phase, a memorandum was sent to the LEHR-ER announcing the environmental audit and requesting information about the selected sites and the program in general. A pre-audit site visit was conducted March 23-24, 1993. The site's response to the information request memorandum combined with the pre-audit site visit formed the basis for the Environmental Audit Plan (see Appendix B), including the onsite agenda. Once onsite, the audit team modified the original agenda as more information was obtained and additional areas of interest were identified. The final daily activity schedule is contained in Appendix C.

Onsite activities were conducted from May 10 through May 24, 1993, and included interviews with both DOE and contractor/subcontractors personnel; document reviews, including previous audits and self-assessment reports; physical inspection of facilities; observation of field sampling activities, and observation of certain operations. Lists of site documents reviewed and interviews performed are provided in Appendices D and E, respectively. The audit team conducted daily debriefings that were open to DOE and site personnel. Using these sources of information, the audit team developed findings as discussed in Sections 2.0 and 3.0 of this report.

The problems identified are categorized as either compliance findings or BMP findings. Compliance findings are conditions that, in the judgment of the audit team, may not satisfy environmental regulations, applicable DOE Orders, internal environmental policies and formal procedures, enforcement actions, permit conditions, or compliance agreements with regulatory agencies. BMP findings are derived from regulatory agency guidance, accepted industry practice or technical standards, draft DOE Orders or guidance, and professional judgment.

Within the "compliance" and "BMP" categories, each finding is prefaced by a performance objective(s) according to the DOE Performance Objectives and Criteria for Conducting DOE Environmental Audits (DOE/EH-0229). The performance objectives specify the particular compliance or BMP standards that were not being met. The findings are not arranged in order of significance.

Site activities were reviewed for any noteworthy practices, activities, or programs that may have general application to DOE facilities and may warrant documentation for the purpose of information transfer among DOE facilities.

In an effort to understand why a finding was identified, a systematic approach was implemented to perform an "apparent causal factor" analysis (see Appendix F for definitions of causal and contributing factors). This approach is initiated by a series of "why?" questions concerning the cause(s) of a finding. The apparent cause(s) are compiled and reasons for the selection of specific cause(s) developed are provided within the supporting information for each finding. The causal factors are then used to determine the full scope of corrective action required to correct identified findings and to prevent recurrence.

It is the intent of this environmental audit to identify the causal factors that contributed to the observed environmental deficiencies. When developing root causes, an identification of the apparent causal factors contributing to each finding is essential. If one or more of these causal factors can be identified as contributing to a specific finding, it will be included in the supporting information for each finding. The apparent causal factors are then used to determine the corrective actions required to correct identified findings.

1.4 HISTORICAL BACKGROUND AND FACILITY DESCRIPTION

The LEHR facility is located on a 15-acre site approximately 1 mile south of the main campus of UCD. UCD owns the LEHR property and leases the site to DOE. The land surrounding the LEHR site is used for agriculture and various UCD research activities. The LEHR facility consists of 16 buildings, including a main administration and office building, two animal hospitals, laboratory and support buildings, waste treatment facilities, and numerous outside dog pens.

LEHR was a research facility for more than 30 years where scientists studied the health effects of exposure to low levels of radiation. Research activities potentially contaminated five buildings, outdoor pens/cages, and a tank trailer, and generated low level radioactive waste contained in 18 underground tanks. Some chemical and radioactive contaminants have been detected in the onsite groundwater wells.

Funding for the DOE-related research work, except for limited data evaluation, was terminated in 1988. Prior to that date, DOE decided to decontaminate and decommission the facility, including the proper disposal of onsite waste, remediation of the soil and groundwater if required, and to turn the restored facilities and property over to the UCD for unrestricted use. Eleven uncontaminated buildings at LEHR have been returned to UCD and are being used for university research and office space.

The LEHR-ER Project has a number of separate contamination issues to address. Portions of five buildings are known to be contaminated predominantly with low-levels of radioactive materials and asbestos: Animal Hospital 1 and Animal Hospital 2; the Imhoff effluent treatment facility located between the two animal hospitals; settling tanks under the Imhoff facility; and the radium septic tanks between the Imhoff facility and Animal Hospital 2. The sludge was removed from these tanks, solidified, packaged, and transported to the DOE Hanford Site for disposal in 1992. The drain-field piping for the Imhoff settling tanks and the radium drain field and seepage pits are contaminated with radioactive materials. The soils adjacent to these areas have radioactive materials in excess of background levels.

Onsite disposal of radioactive wastes are known to have occurred at several locations on the property. Waste was buried in shallow, unlined trenches and pits on the south, southwest, and central areas. Also, drums of solvents, pesticides, and possibly other chemicals were stored outside under covered drum racks. Spillage could have occurred during the period that these materials were in use.

One inactive landfill, with three units (two units on the LEHR site, and one unit off the LEHR site) occupies portions of the facility. The landfill was operated by UCD until 1967, when landfill operations were moved to another location outside the LEHR site. The landfill was used for disposal of general university solid wastes, including laboratory

wastes from the campus and LEHR. The impact of the landfill on the soil and groundwater is under investigation by UCD with oversight by the California Regional Water Quality Control Board. Data obtained during this investigation indicate that landfill is leaking. Potential commingling of waste and the DOE and UCD shared responsibility will be determined and negotiated by the DOE and the University.

Groundwater below the site is known to contain some chemicals (e.g., nitrates, chromium VI, chloroform) above U.S EPA primary Maximum Contaminant Levels (MCLs). The radioactive materials tritium and carbon-14 have been measured in groundwater above and below EPA primary MCLs, respectively. Two water-bearing zones have been investigated to date at the site.

The additional waste issues that are part of the LEHR-ER Project include an approximately 104-curie sealed ^{60}Co source and a tank trailer contaminated with radioactive materials. The ^{60}Co source has been moved to the General Electric Company at Pleasanton, California, in January 1993 for reuse. The tank trailer was used to contain overflow from the Imhoff facility and radium septic tanks. Removal and disposal of the liquid contents and decontamination and disposal of the tank trailer will be addressed in future studies.

1.5 ENVIRONMENTAL PROGRAMS AND ORGANIZATION

EM, within DOE Headquarters is the Program Office responsible for establishing environmental policy and program goals and objectives for LEHR-ER (see Figure 1-3, DOE/LEHR-ER Project Organization). SF is responsible to EM for field oversight of LEHR-ER and implementing programs in accordance with the goals, objectives, and budgets, established by EM. The SF manger has assigned overall responsibility for carrying out these responsibilities to the Assistant Manager for Environmental Manag. nent and Support (AMEMS). AMEMS has subsequently assigned responsibilities and authorities for managing activities at SF to the LEHR-ER Program Manager through the Division Director, Environmental Restoration and Waste Management, and Branch Chief, Environmental Restoration Branch.

Environmental Management Operations (EMO) is the prime contractor for the LEHR-ER and has direct responsibility for conducting environmental protection activities subject to DOE direction and approval. The EMO Project Manager is assisted by three subcontractors. (see Figure 1-4, LEHR-ER Organizational Chart). The subcontractors are: (1) Soil and Groundwater Subcontractor (S&GSC), Dames and Moore, Inc.; (2) Decontamination and Decommissioning Subcontractor (D&DSC) Bechtel National Inc.; and (3) Onsite Support Subcontractor (OSSC), UCD. EMO has a staff of two people full time onsite (Project Manager and Assistant Project Manager) and 10 people part-time at Richland, Washington, as needed, to provide quality assurance, health and safety, technical review, and other functions. UCD has a dual role, of providing an oversight of the project through a steering committee and a technical advisory committee and as an onsite subcontractor to provide project support in planning and coordination, technical review, community relations, regulatory interface, quality assurance, environmental monitoring, health and safety, and waste management support.

DOE/LEHR-ER Project Organization

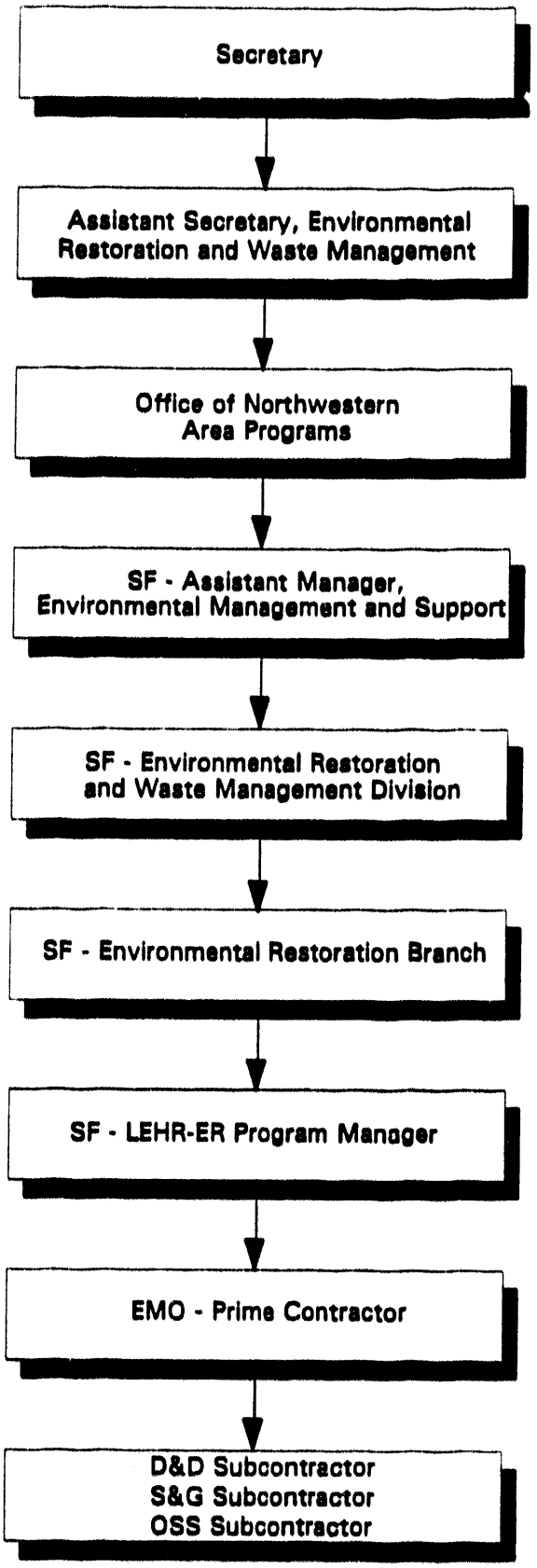


Figure 1-3. DOE/LEHR-ER Project Organization

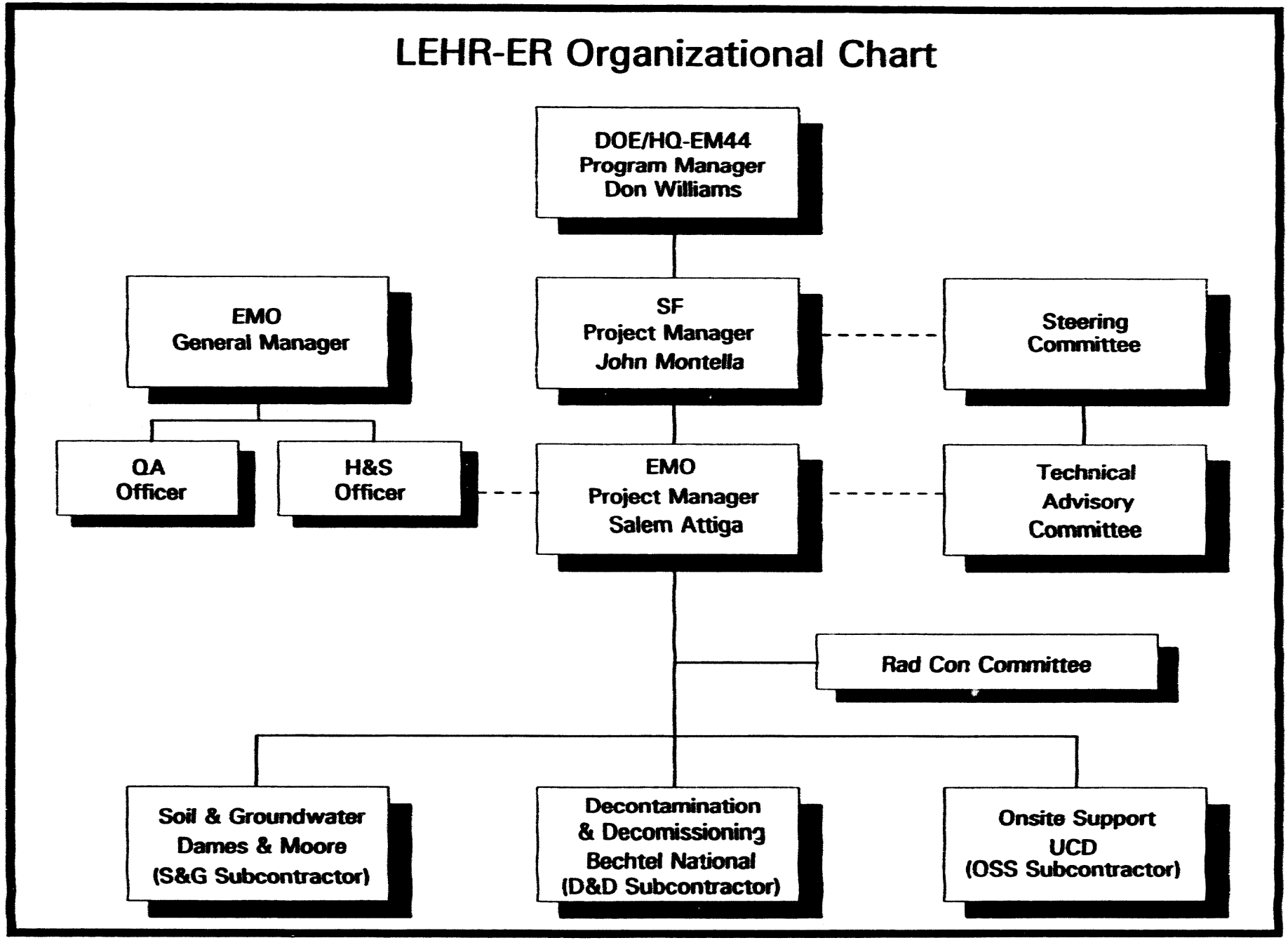


Figure 1-4. LEHR-ER Organization

SECTION 2.0

SUMMARY OF ENVIRONMENTAL AUDIT RESULTS

2.0 SUMMARY OF ENVIRONMENTAL AUDIT RESULTS

This section of the report summarizes the results and conclusions of the Office of Environmental Audit's (EH-24's) Comprehensive Baseline Environmental Audit of LEHR-ER which was conducted between May 10 and May 24, 1993.

The overall conclusion of the audit is that the LEHR-ER Project has recently made some progress in developing and implementing environmental protection programs; however, complete implementation of DOE and Federal and state regulatory requirements has not been achieved. The inadequate implementation of environmental requirements and activities at the LEHR-ER was most notable in the area of waste management. The lack of a program to address the roles and responsibilities for all wastes has resulted in failure to meet Resource Conservation and Recovery Act (RCRA) requirements. An overall tendency toward informality of operations was also identified. There is inadequate policy implementation in that many of the procedures have not been fully developed or implemented in several areas.

The audit team identified some strengths in the LEHR-ER Project. These include: (1) LEHR-ER Project personnel are capable and professional and are committed to meeting environmental protection goals and requirements; and (2) the coordination and implementation of health and safety activities relating to the characterization activities at the LEHR site are well coordinated and comprehensive in scope.

During the audit, 24 findings were identified. Sixteen of the findings are considered to represent situations where conditions or practices do not meet the requirements of Federal, state, local laws and regulations, DOE Orders and directives and, thus, are termed "compliance findings." Eight findings reflect a lack of adherence to "best management practices" (BMPs). However, none of the findings identified by the audit team appear to pose near term threats to public health and the environment. The number of compliance findings and best management practice findings by environmental audit discipline are depicted in Figure 2-1 and finding titles are shown in Table 2-1.

2.1 KEY FINDINGS

The key findings presented below are, in the judgment of the audit team, findings or groups of findings that are integral to understanding the nature and scope of the environmental issues existing at LEHR-ER. The key findings identified during the audit are:

Waste Management: To date, LEHR-ER has not developed or implemented a comprehensive hazardous and mixed waste management program that adequately addresses all aspects of hazardous and mixed waste management. Consequently, the LEHR's incomplete approach to hazardous and mixed waste management has resulted in not revising the Part A permit application, not developing a written closure plan, not filing any annual reports with EPA or the State of California, and not characterizing all of its waste. In addition, the roles, responsibilities, and accountability have not been clearly defined and communicated throughout the organization. The major causes for this key finding include a lack of policy implementation and site specific procedures. These deficiencies can be minimized if a comprehensive hazardous management program that

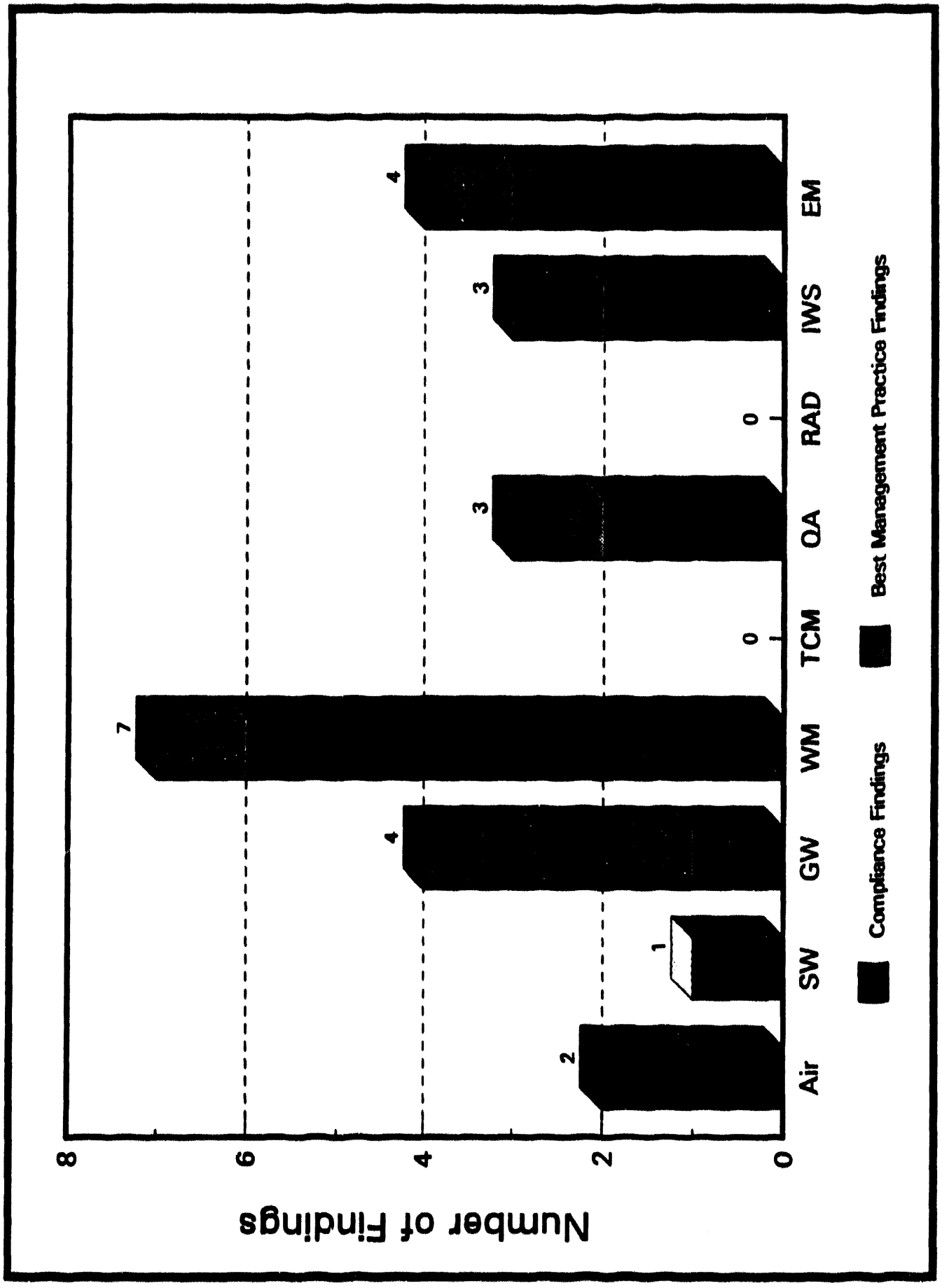


Figure 2-1. Total Findings by Discipline

Table 2-1
Environmental Audit Team Findings

Finding Number	Title of Finding	Page
	Air (A)	
A/CF-1	Air Emissions Monitoring	3-5
A/BMPF-1	Offsite Airborne Release Dose Calculations	3-6
	Surface Water/Drinking Water (SW)	
SW/CF-1	Stormwater Discharge Identification in Annual Site Environmental Report and Notification of NPDES and Stormwater Permittee	3-10
	Groundwater and Soils/Sediment/Biota (GW)	
GW/CF-1	Comprehensive Groundwater Protection Management Program and Groundwater Monitoring Plan	3-16
GW/BMPF-1	Characterization of the Third Hydrostrategraphic Unit	3-18
GW/BMPF-2	Monitoring Well Screen Intervals	3-19
GW/BMPF-3	Groundwater Conductivity Study	3-21
	Waste Management (WM)	
WM/CF-1	Hazardous and Mixed Waste Program	3-27
WM/CF-2	Submission of Revised Part A Permit Application	3-29
WM/CF-3	Waste Characterization	3-31
WM/CF-4	Closure Plans	3-34
WM/CF-5	Annual Report	3-35
WM/CF-6	Preparation of a Contingency Plan	3-36
WM/BMPF-1	Operating Records and Inspection Records	3-37
	Toxic and Chemical Materials (TCM)	
No findings identified	N/A	N/A
	Quality Assurance (QA)	
QA/CF-1	Interlaboratory Performance Evaluation Programs	3-42
QA/CF-2	General Quality Assurance Practices	3-44
QA/BMPF-1	Annual Site Environmental Report	3-45

Table 2-1
Environmental Audit Team Findings

Finding Number	Title of Finding	Page
Radiation (RAD)		
No findings identified	N/A	N/A
Inactive Waste Sites (IWS)		
IWS/CF-1	Scope and Methodologies Employed in Preliminary Assessment/Site Inspection Studies	3-56
IWS/CF-2	Health and Safety Plans for Site Characterization Studies	3-58
IWS/BMPF-1	Environmental Data Quality Objectives and Sampling and Analysis Plans	3-59
Environmental Management (EM)		
EM/CF-1	Self-Assessment Program	3-64
EM/CF-2	Formality of Environmental Programs	3-65
EM/CF-3	Environmental Appraisal Program	3-67
EM/BMPF-1	Internal and External Communications	3-68

ensures compliance with RCRA requirements is developed and fully implemented.

Formality of Operations: In the areas of groundwater and waste management, LEHR-ER lacks the formality of documentation as required by DOE 5400.1 and DOE 5400.3. Internal and external communications and followup on corrective actions identified in the environmental appraisal program have not been formalized. DOE guidance for development and implementation of conduct of operations and the self-assessment programs has not been fully addressed. There is informality in review of environmental data. This has been primarily caused by inadequate policy implementation and that many of the procedures have not been developed or implemented.

2.2 FINDINGS SUMMARY

The following paragraphs briefly describe the findings in each of the disciplines included in the LEHR-ER Environmental Audit. The number of findings identified during an environmental audit is not directly proportional to the level of environmental protection offered by a facility or program. This is exemplified by the situation where a facility with no program in a particular area may have a single overall finding on the absence of that program; however, a facility with a sound program in one particular area may have multiple findings on relatively minor components of the program.

Air:

One compliance finding and one best management practice finding were identified in the air portion of the audit. The compliance finding addresses the air emissions monitoring program and the best management practice finding addresses the use of the most technically valid meteorological data in offsite airborne release calculations.

Surface Water:

There is one compliance finding in the surface water portion of the audit. LEHR-ER's 1991 Annual Site Environmental Report was inadequate because it did not demonstrate facility compliance with stormwater reporting requirements.

Groundwater and Soils/Sediment/Biota:

One compliance finding and three best management practices were identified. The compliance finding addresses the lack of a formal groundwater protection plan. The best management practice findings relate to necessary additional studies to justify previous technical decisions on well screen intervals, additional characterizations of the third hydrostratigraphic unit (HSU), and the application of more reliable methodologies for determination of aquifer conductivity.

Waste Management:

The waste management portion of the environmental audit identified six compliance findings and one best management practice finding. Three compliance findings relate to the requirements governing a facility with interim status, including filing a revised Part A permit application to cover changes in operations, filing annual reports, and developing a written closure plan for the facilities. The other compliance findings address

characterization of wastes, development of a contingency plan, and development of a comprehensive hazardous and mixed waste management plan. The best management practice finding addresses the need to formalize the operating record, including inspection records, for the mixed waste storage facilities.

Toxic and Chemical Materials:

There are no findings in the toxic and chemical materials portion of the environmental audit.

Inactive Waste Sites:

Two compliance findings and one best management finding were identified. The compliance findings relate to inadequacies of scope and methodologies of DOE-sponsored site characterization studies relative to applicable Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements and inadequate Health & Safety plans. The best management practice finding relates to establishing consistent data quality objectives for all sampling activities relating to the LEHR site.

Radiation:

No findings were identified in the radiation portion of the audit.

Quality Assurance:

There are three QA findings: two compliance findings and one best management practice finding. The compliance findings address the following areas: general quality assurance practices and interlaboratory performance evaluation programs. The best management practice finding addresses the QA section of the annual site environment report for Calendar Year 1991.

Environmental Management:

The environmental management component of the audit identified three compliance findings and one best management practice finding. The compliance findings address the environmental appraisal program, formality of environmental programs, and the self-assessment program. The best management practice finding addresses internal and external communications.

2.3 CAUSAL FACTORS SUMMARY

In an effort to understand why a finding occurred, a systematic approach was initiated to perform a "root cause" analysis. This is a two-step process which first identifies the likely underlying reasons the audit team believes contributed to each specific finding. This is completed by asking a series of "why" questions to determine the apparent cause(s) for the findings. These "causal factors" and related rationale(s) are identified at the end of the discussion section of the appropriate finding. The next step is for line management to identify the "root cause(s)" for the findings. Root causes are the most basic fundamental causes which, if corrected, will prevent recurrence of the issues of concern.

The causal factors considered by the audit team are defined in Appendix F of this report. The team identified seven (7) causal factors it believes contributed to occurrence of the findings (see Table 2-2 and Figure 2-2). The three (3) causal factors that appeared most frequently are policy implementation, procedures, and policy. Each of these causal factors is discussed below.

Policy Implementation - appeared most frequently as a causal factor in 13 of the 24 (54 percent) findings. This was evident in all disciplines except air and quality assurance. LEHR-ER's policy implementation to ensure full compliance with Federal and state regulations, DOE Orders or LEHR-ER procedures was either lacking or inadequate.

Procedures - appeared as a causal factor in 11 of the 24 (46 percent) findings. This was evident in all disciplines except surface water. LEHR-ER's procedures to ensure implementation of Federal and state regulations, DOE Orders, and LEHR-ER policies were either lacking or inadequate.

Policy - appeared as a causal factor in 5 of the 24 (21 percent) findings. This was evident in groundwater, quality assurance, and inactive waste sites disciplines. Lack of policy was evident at both SF and LEHR-ER levels and contributed to 5 findings.

The following section presents in detail the 24 findings identified during this audit. It also provides an overview of each audit discipline. Finally, it discusses, in greater detail, the causal factors that contribute to the findings.

TABLE 2-2

SUMMARY OF PROBABLE CAUSAL AND CONTRIBUTING FACTORS IDENTIFIED BY AUDIT FINDING

FINDING NUMBER	CAUSAL AND CONTRIBUTING FACTORS													
	Policy	Policy Implementation	Procedures	Personnel	Resources	Training	Change	Risk	Design	Human Factors	Barriers and Controls	Supervision	Quality Assurance/Control	Contributing Factor Appraisals/Audits/Reviews
Air (A)														
A/CF-1			✓						✓					
A/BMPF-1			✓									✓		
Surface Water/Drinking Water (SW)														
SW/CF-1		✓												
Groundwater and Soils/Sediment/Biota (GW)														
GW/CF-1		✓	✓											
GW/BMPF-1	✓													
GW/BMPF-2	✓													
GW/BMPF-3		✓												
Waste Management (WM)														
WM/CF-1		✓												✓
WM/CF-2		✓	✓											
WM/CF-3		✓												
WM/CF-4		✓	✓											
WM/CF-5		✓	✓											
WM/CF-6		✓												
WM/BMPF-1						✓						✓		

TABLE 2-2

SUMMARY OF PROBABLE CAUSAL AND CONTRIBUTING FACTORS IDENTIFIED BY AUDIT FINDING (Continued)

FINDING NUMBER	CAUSAL AND CONTRIBUTING FACTORS													
	Policy	Policy Implementation	Procedures	Personnel	Resources	Training	Change	Risk	Design	Human Factors	Barriers and Controls	Supervision	Quality Assurance/Control	Contributing Factor Appraisals/Audits/Reviews
Toxic and Chemical Materials (TCM)														
No Findings Identified														
Quality Assurance (QA)														
QA/CF-1	✓													
QA/CF-2			✓											
QA/BMPF-1			✓											
Radiation (RAD)														
No Findings Identified														
Inactive Waste Sites (IWS)														
IWS/CF-1	✓													
IWS/CF-2		✓	✓											
IWS/BMPF-1	✓													
Environmental Management (EM)														
EM/CF-1		✓												
EM/CF-2		✓	✓											
EM/CF-3		✓												
EM/BMPF-1			✓											
Totals	5	13	11	0	0	1	0	0	1	0	0	2	0	1

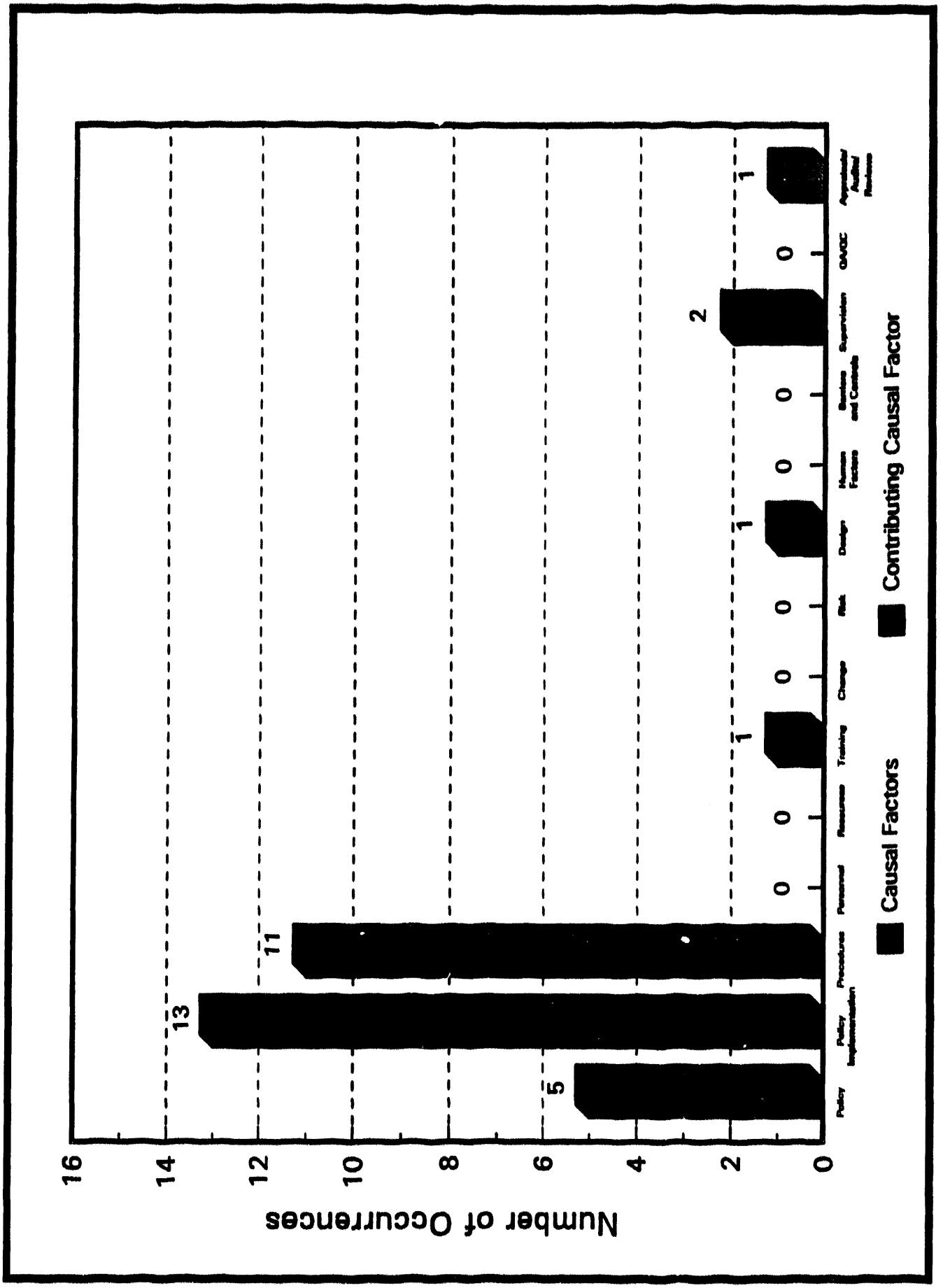


Figure 2-2. Number of Findings Per Causal Factor

SECTION 3.0

ENVIRONMENTAL AUDIT FINDINGS

3.0 ENVIRONMENTAL OVERVIEWS AND AUDIT FINDINGS

The audit findings presented in the following pages are not necessarily in order of importance. They are grouped by area of investigation, as listed in the Performance Objectives and Criteria for Conducting DOE Environmental Audits (DOE/EH-0229), and are preceded by an overview. The overview describes the approach taken by the technical specialist in conducting that portion of the audit; LEHR-ER programs and activities related to the area of investigation; characterization of the strengths and weaknesses of LEHR-ER activities; and a brief summary of the findings.

Each finding is organized into three sections: the performance objective, the finding statement, and a discussion. The performance objectives specify the particular practices or standards against which the finding is being evaluated, as described in the DOE/EH-0229 report listed above. The discussion details the facts and observations supporting the finding. The discussion also provides a summary of the causal factors for the deficiency.

Within each finding, references to other findings, interviews, and documents are presented parenthetically. An example of a referenced finding is: "(see Finding A/CF-1 or A/BMPF-1)," in which "A" reflects "Air," "CF" reflects "Compliance Finding," "BMPF" reflects the "best management practices finding," and "1" is the finding number. Other abbreviations used to identify findings are as follows:

A	Air
SW	Surface Water/Drinking Water
GW	Groundwater and Soils/Sediment/Biota
WM	Waste Management
TCM	Toxic and Chemical Materials
QA	Quality Assurance
RAD	Radiation
IWS	Inactive Waste Sites
EM	Environmental Management

These abbreviations are used so that the reader can more easily determine the specific areas of investigation from which the finding was derived.

Several of the technical specialists on the audit team covered more than one of the areas listed above. As such, interviews and document reviews quite often were completed with multiple areas of responsibility in mind. In order to reduce unnecessary duplication when referencing interviews and documents, they are identified as follows. An example of a referenced interview is (I-WM-1) where "I" signifies an interview, "WM" represents an individual audit area (i.e., "waste management" in this example), and "1" is the specifically assigned sequential interview number. Documents referenced for this environmental audit are numbered starting with "LEHR," and followed by a sequential number. The lists of documents reviewed and interviews conducted are presented in Appendices D and E, respectively. Additionally, apparent causal factors are discussed for each finding and are defined in Appendix F.

3.1 AIR

3.1.1 Overview

The purpose of the air portion of the environmental audit was to evaluate facility compliance with regulations promulgated by the U.S. Environmental Protection Agency (EPA), including the Clean Air Act (CAA) and the National Emissions Standards for Hazardous Air Pollutants (NESHAPs); State of California air pollution regulations; the Yolo/Solano Air Pollution Control District rules and regulations; DOE Directives; and best management practices, which are generally accepted standard procedures used by both industry and government. Table 3-1 lists the regulations and guidelines used in this portion of the audit.

The general approach to the air assessment at LEHR-ER included an examination of air sources and emission controls; observation of ambient air sampling and exhaust stack testing procedures; interviews with site personnel responsible for air sampling and reporting; and review of standard operating procedures (SOPs), monitoring plans, regulations, and site reports relating to air issues.

Air emissions from LEHR-ER consist primarily of air exhausted from the interior of buildings undergoing decontamination and decommissioning (D&D) operations. Contaminants potentially released during D&D include radionuclide particulates and asbestos (only during asbestos removal operations). All air exhausts during D&D are filtered by a double high efficiency particulate air (HEPA) system prior to release to the environment (I-A-1). Other potential sources of air releases include emission from LEHR-ER vehicles and industrial equipment and fugitive dusts liberated from outdoor areas of the site, such as the DOE trench area. There are no site refueling operations that require emissions release permits. The wheel-mounted portable diesel generator used by the D&DSC is exempt from emissions permitting under Yolo/Solano County requirements (I-A-1) (LEHR-274).

The site D&D activities involving asbestos removal were permitted under state and local permits (LEHR-159 and LEHR-272). Asbestos removal operations were completed in December 1992 (I-A-1).

LEHR-ER files an annual report with DOE to verify site emissions according to NESHAPs requirements. Routine air effluent monitoring is conducted according to the guidelines in the LEHR Environmental Monitoring and Surveillance Plan (LEHR-014). The sampling is done by a contractor to the EMO and consists of rooftop monitoring of emissions from the HEPA filtered exhaust stacks. The sample data is used to confirm the AIRDOS/CAP-88 method modelled emissions data as reported under NESHAPs guidelines (LEHR-014, Section 2.2).

In-stack monitoring of emissions from the HEPA exhausts is done by a health physics subcontractor to the D&D operations. Exhaust stacks are continuously sampled employing equipment with air drawn though a glass fiber filter. The collected radionuclide particulates are analyzed in an onsite laboratory maintained by the D&D contractor. Sample data from the exhaust stack monitoring is reported to the D&D contractor. There is minimal risk from LEHR-ER emissions to onsite/offsite populations as indicated by the modelled NESHAPs data. Overall, the engineered controls and procedural requirements of current D&D activities (i.e., HEPA filtered exhausts) appear sufficient to prevent

TABLE 3-1
LIST OF AIR
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Titles	Authority
DOE 5400.1	General Environmental Protection Program	DOE
DOE/EH-0173T	Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance	DOE
40 CFR 50-88	Clean Air Act Implementing Regulations	EPA
40 CFR 61	National Emissions Standards for Hazardous Air Pollutants (NESHAPs)	EPA
NQA-1	Quality Assurance Program Requirements for Nuclear Facilities	ANSI/ASME
EPA-450/4-87-013	On-Site Meteorological Program Guidance for Regulatory Modeling Applications	EPA
Titles III-IV	Clean Air Act Amendments of 1990	EPA
California Code of Regulations Titles 17 and 26	California Air Pollution Control Regulations	CARB
Yolo/Solano County Rules and Regulations	Yolo/Solano County Rules and Regulations (March 1990)	Yolo/Solano Air Pollution Control District

potential airborne particulate emission from leaving the LEHR-ER site. A deficiency in the LEHR-ER program is that the air monitoring as conducted by LEHR-ER (i.e., rooftop monitoring) does not occur at the point specified in the environmental monitoring plan.

One compliance finding and one best management practice finding were identified in the air portion of the audit. The compliance finding addresses the air emissions monitoring program and the best management practice finding addresses the use of the most technically valid meteorological data.

3.1.2 Compliance Finding

A/CF-1: Air Emissions Monitoring

Performance Objective: 40 CFR 61, Subpart H, "National Emission Standard for Radionuclides other than Radon from DOE Facilities," Paragraph 61.93(b)(4)(i), requires periodic confirmatory measurements to verify low emissions for release points that have a potential to release radionuclides to the air.

DOE 5400.1, "General Environmental Protection Program," Chapter IV, Section 5, requires that effluent monitoring programs verify compliance with applicable Federal, state, and local regulations.

DOE 5400.5, "Radiation Protection of the Public and the Environment," Chapter 2 Section 6(b)(1), states that "Analytical models used for dose calculations shall be appropriate for characteristics of emissions."

Section 2.2, Addendum I, of the LEHR Environmental Monitoring and Surveillance Plan (LEHR-014) requires that air sampling will be conducted at the release stack or release location from the building.

Finding: As observed by the audit team, air effluent monitoring exhaust stack AH-1B is not done at the release point of the stack as required by the LEHR Environmental Monitoring and Surveillance Plan.

Discussion: The Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance (DOE/EH-0173T) requires facilities to submit annual reports to DOE that demonstrate compliance with National Emission Standard for Hazardous Air Pollutants (NESHAPs) limitations. Section 2.2, Addendum I, of the LEHR Environmental Monitoring and Surveillance Plan (LEHR-014) identifies that air effluent monitoring is conducted "either at the release stack or release location from the building" and that the sampling "fills [sic] the requirements of NESHAPs periodic confirmatory sample requirements." The air effluent monitoring program consists of rooftop area monitoring around the high efficiency particulate air filter (HEPA) exhaust stacks on buildings AH-1 and AH-2. As observed by the audit team, the sample from stack AH-1B was collected at a distance of 2-3 meters from the exhaust stack as determined by the sampler's interpretation of wind direction indicated by a windsock located on an adjacent building. In addition, the sample was collected below the release point of the stack. At the time of the audit, the samples were collected under draft standard operating procedures (SOPs) (I-A-3). Based on visual observations of the audit team, this sampling does not meet the requirements for monitoring at the release point, as required by the LEHR Monitoring and Surveillance Plan.

The apparent causal factors for this finding are inadequately developed procedures in conducting air sampling under a draft SOP, and inadequate design of the sample collection to allow for monitoring at the stack release point.

3.1.3 Best Management Practice Finding

A/BMPF-1: Offsite Airborne Release Dose Calculations

Performance Objective: Best management practice suggests that the most scientifically valid meteorological data be used when calculating airborne environmental dose exposures using the AIRDOS/CAP-88 model and that environmental plans reflect the use of the appropriate data.

Finding: The Environmental Monitoring and Surveillance Plan does not reflect the use of the appropriate meteorological station data for calculating emissions derived from AIRDOS/CAP-88 models.

Discussion: The EPA AIRDOS/CAP-88 computer models require technically valid data to be used for the calculations. The intent is to demonstrate the airborne radiological dose to the offsite population. The AIRDOS/CAP-88 models require meteorological data to be input in the supported STAR format. The Air Emissions Annual Report for Calendar Year 1991 (LEHR-015) cites the use of STAR data from the National Weather Service Station at UC-Berkeley; the Environmental Monitoring and Surveillance Plan Addendum 1 (LEHR-014) specifies the use of the data from the UCD Climatological Station; LEHR Environmental Walk-Through (LEHR-083) SF indicates the use of data from the Sacramento National Weather Service Station. UC-Berkeley is located over 50 miles west of LEHR and lies within a coastal weather regime. Meteorological data from Berkeley does not approximate the weather conditions at LEHR, which is located in the Sacramento Valley.

During the audit, the Air Emissions Annual Report for Calendar Year 1992 was issued using the most appropriate meteorological data. The Environmental Monitoring and Surveillance Plan will need to be revised to reflect the change.

However, the weather stations at UCD and Sacramento are located within the same general meteorologic regime as LEHR and either one can be used for the AIRDOS model.

The apparent causal factors for this finding are inadequate procedures for using consistent and valid meteorological data in modelling emissions from LEHR-ER and supervision to ensure that a consistent data source is used.

3.2 SURFACE WATER/DRINKING WATER

3.2.1 Overview

The purpose of the surface water portion of the LEHR-ER Environmental Audit was to evaluate compliance with Federal, State of California, and local water pollution control regulations established in conformance with the Clean Water Act (CWA) and with drinking water requirements established under the Safe Drinking Water Act (SDWA). The audit also evaluated adherence to DOE Orders and best management practices (BMPs) which are generally accepted standard procedures used in industry and government. Table 3-2 lists the relevant regulations and guidance.

The approach to the surface water portion of the audit included observation of surface water migration pathways (i.e., sanitary and stormwater conduits) at LEHR-ER, observation of surface water sampling locations, interviews with site personnel about stormwater discharge, the protection of sanitary sewers from contamination during D&D operations, surface water monitoring procedures, and review of documents including UCD National Pollutant Discharge Elimination System (NPDES) stormwater permits, surface water monitoring plans, and site drainage maps.

Potable water is provided to the LEHR-ER site by UCD from the University's drinking water system. The UCD facility is considered a "large" water system under California law and is responsible to comply with regulations regarding water purification and sampling (I-SW-5). Domestic water for the UCD water system is obtained from deep (1,100 - 1,400 ft. depth) wells located on campus north of LEHR. Bottled drinking water, obtained from a local commercial water supplier is also supplied to some offices at the site as a matter of personal preference and to LEHR-ER Project trailers since they are not connected to any water source. LEHR-ER is not subject to reporting requirements for drinking water.

Sanitary waste water from LEHR-ER is collected by the UCD sewer system and treated at the UCD wastewater treatment plant located approximately 1.5 miles north of LEHR. The wastewater treatment plant discharges treated secondary effluent to the South Fork of Putah Creek immediately west of LEHR, under the conditions of NPDES permit CA 007785. UCD has not imposed any pretreatment discharge requirements on LEHR-ER (I-SW-5).

Sanitary drains located inside LEHR-ER buildings undergoing D&D have been sealed to prevent potential contaminants from migrating to the sewer system. Sanitary wastes from washrooms comprise the only wastewater effluent from LEHR-ER facilities.

Stormwater runoff from LEHR-ER is routed toward two discharge points. Runoff from the paved portions of the ^{60}Co field is collected along with sanitary discharge in the sewer system which feeds the UCD wastewater treatment plant. Stormwater from the paved areas around site buildings undergoing D&D and from a very limited portion of the DOE trench area, is collected in a sump and pumped via a conduit under Old Davis Road, where the stormwater discharges into a channel of the South Fork of Putah Creek just downstream of the discharge point of the UCD Wastewater Plant (I-SW-7). Given the topography of the western portion of LEHR, the majority of stormwater collected by the sump is derived from paved areas. The majority of the DOE trench area slopes away from the sump and according to site personnel, no runoff has been observed to migrate

TABLE 3-2
LIST OF SURFACE WATER/DRINKING WATER REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Titles	Authority
DOE 5400.1	General Environmental Protection Program	DOE
40 CFR 112	Oil Pollution Prevention	EPA
40 CFR 122	National Pollutant Discharge Elimination System	EPA
40 CFR 141	National Primary Drinking Water Regulations	EPA
Federal Register November 19, 1990	Final Stormwater Discharge Requirements	EPA

from the trench area toward the sump (I-SW-1 and I-SW-2). There are no overland stormwater runoff migration pathways from LEHR-ER.

The NPDES permit for the UCD wastewater discharge covers stormwater discharge from the portion of the LEHR-ER that drains to the sanitary system (LEHR-031). The UCD Notice of Intent General Permit to Discharge Stormwater, March 26, 1992, does not identify the stormwater discharge from the west side of LEHR-ER (LEHR-275).

Surface water is monitored quarterly according to the guidelines in the LEHR-ER Environmental Monitoring and Surveillance Plan (LEHR-014). Stream samples are collected from South Fork Putah Creek locations both upstream and downstream of the LEHR-ER. Plans to sample stormwater runoff from LEHR are being developed.

Overall, the potential for offsite migration of water-borne contaminants from LEHR-ER via sanitary and/or stormwater discharge is low. However, LEHR-ER has not adequately addressed the regulatory status of stormwater discharge to the South Fork of Putah Creek.

The plugging of floor drains in buildings under decontamination and decommission activities is a positive aspect of LEHR-ER protection of surface water resources.

There is one compliance finding in the surface water portion of the audit. LEHR's 1991 Annual Site Environmental Report was inadequate because it did not demonstrate facility compliance with stormwater reporting requirements.

3.2.2 Compliance Finding

SW/CF-1: **Stormwater Discharge Identification in Annual Site Environmental Report and Notification of NPDES and Stormwater Permittee**

Performance Objective: DOE 5400.1, "General Environmental Protection Program," Chapter II, Section 4a, requires the preparation of an Annual Site Environmental Report to "confirm compliance with environmental standards and requirements." The February 13, 1992, supplement to DOE 5400.1, "Final Guidance for the Preparation of Site Environmental Reports for Calendar Year 1991," identifies National Pollutant Discharge Elimination System (NPDES) as one of the environmental standards to be covered by the report.

Best management practices suggests that a facility notify the responsible site NPDES and stormwater permit holder about potential stormwater discharge issues from that facility.

Finding: The 1991 Annual Site Environmental Report does not document LEHR-ER compliance requirements for the California NPDES stormwater discharge regulations as required by DOE 5400.1. In addition, there is no other documentation that LEHR-ER has provided to UCD about LEHR-ER's stormwater discharge, or its Resource Conservation and Recovery Act (RCRA) Part A interim status for the mixed waste storage facilities onsite, which requires reporting as per the hazardous waste treatment, storage, or disposal facility classification under the stormwater industrial discharge permit.

Discussion: Stormwater runoff from the paved areas around site buildings undergoing D&D activities, and a limited portion of the DOE trench area, is collected by a sump located near the clinic (LEHR-270) (I-SW-2). The runoff is then pumped via a lift station to a ditch along the west side of Old Davis Road, which drains into the South Fork of Putah Creek. This discharge point is not identified under the existing UCD NPDES permit. Stormwater runoff from the paved portion of the ^{60}Co field is discharged to a combined sanitary/storm sewer and treated by the UCD wastewater treatment plant (I-SW-7).

Stormwater discharge from point sources is regulated under the Clean Water Act (CWA) and NPDES (Federal Register, November 19, 1990). The 1991 Annual Site Environmental Report (LEHR-002), does not address whether stormwater activities at the site are conducted to comply with stormwater discharge regulations. LEHR-ER has a hazardous waste storage facility onsite under RCRA Part A interim status. Hazardous waste treatment, storage, or disposal facilities are one of the categories required to obtain an industrial stormwater discharge permit under the California State Water Resources Control Board sitewide general permit. As such, LEHR-ER's activities are subject to the water control board's permit notification requirements. The annual report does not explain why the facility is not subject to stormwater discharge reporting requirements based on RCRA Part A permit interim status.

In addition, there is no other documentation that LEHR-ER has provided to UCD (holder of NPDES and stormwater permits for the campus) about LEHR-ER's potential stormwater reporting requirements because of RCRA Part A permit interim status. UCD's NPDES permit covers discharges from the University's Wastewater Plant and in March 1992, UCD

submitted a Notice of Intent General Permit to Discharge Stormwater (LEHR-275). Neither permit appears to address stormwater runoff discharge from LEHR-ER facilities.

The apparent causal factor for this finding is inadequate policy implementation to properly identify and document the status of LEHR-ER regarding stormwater discharge and personnel that do not have full knowledge of stormwater permit requirements.

3.3 GROUNDWATER AND SOILS/SEDIMENT/BIOTA

3.3.1 Overview

The groundwater portion of the environmental audit evaluated the groundwater protection and monitoring programs at LEHR-ER for their compliance with DOE Orders; Federal, state, and local regulations; applicable technical guidances published by the Environmental Protection Agency (EPA); and industry best management practices, as identified in Table 3-3. This portion of the audit also extended to the evaluation of soils; sediment, and biota media investigations conducted at LEHR-ER.

Audit activities included reviews of relevant technical reports relating to the site characterization activities at LEHR-ER performed under Phase II of the site characterization study, review of aquifer characterization and groundwater chemical quality data collected as part of the Phase II study, reviews of records pertaining to well installation and destruction, interviews with DOE and EMO personnel and the LEHR-ER S&GSC responsible for groundwater characterizations and monitoring, and observation of groundwater monitoring well sampling activities which coincided with the field investigation portion of this audit.

LEHR is located in the southwestern portion of the Sacramento Valley, a topographic feature characterized by thick sections of sedimentary deposits originating from the erosion of the surrounding hills and mountains. The Sacramento Valley is defined by the Coast Ranges to the west, the Transverse Range to the south, the Cascade Range to the north, and the Sierra Nevada Mountains to the east. Eight distinct lithologies, ranging in age from Jurassic to Recent, have been identified within the Sacramento Valley.

Surface soils and subsoils beneath LEHR consist of fine sandy loam. Surface soils are sandy, grading to gravelly, loamy silt sand and clay with depth. Subsoils beneath LEHR are characterized as relatively to highly permeable with good drainage. The largest stream in the immediate area, Putah Creek, the south fork of which flows east immediately south of the LEHR site, has developed an alluvial fan, the Putah Plain, which slopes east toward the Sacramento River. The LEHR site is located on the distal portion of the Putah Plain. Sediments comprising the Putah Plain consist mainly of silts and clays intermixed with lenses and zones of coarse-grained sands, gravels, and cobbles. In the LEHR area, the Putah Plain has a nominal thickness of 180 feet.

At least three hydrostratigraphic units (HSUs) exist within the recent-aged sediments of the Putah Plain, all believed to be recharged primarily by infiltration of local precipitation, leakage from surface water bodies (including the south fork of Putah Creek), and agricultural irrigation return flows. Groundwater is encountered beneath the LEHR site at depths ranging from 45 to 130 feet below ground surface (bgs). The first (uppermost) HSU consists of fine-grained sandy silts to sandy clays. Groundwater elevations in the sediments beneath LEHR range from 45-70 feet and appear to be dependent on agricultural pumping and precipitation, undergoing dramatic seasonal fluctuations. Gradients in the first HSU are shallow, flow is approximately 1.6 feet/year to the northeast and productivity is low. No production wells are known to be completed in the first HSU. The second HSU consists of coarse sands, gravels, and cobbles. Groundwater flow in the second HSU is estimated to be generally to the east-northeast at an estimated 71 feet/year.

TABLE 3-3
LIST OF GROUNDWATER AND SOILS/SEDIMENT/BIOTA REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5400.4	Comprehensive Environmental Response, Compensation, and Liability Act Requirements	DOE
40 CFR 260-280	Hazardous Waste Regulations	EPA
OWSER Directive 9355.301	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA	EPA
OWSER Directive 9950.1	RCRA Groundwater Monitoring Technical Enforcement Guidance Document	EPA
OWSER Directive 9950.2	RCRA Groundwater Monitoring Technical Enforcement Guidance Document	EPA
OWSER Directive 9950.3	Operations and Maintenance Guide, RCRA Groundwater Monitoring Systems	EPA
23 CCR, Sections 2050-2836	California Water Regulations	State of California
22 CCR, Division 4, Chapters 15-17	California Drinking Water Quality Standards	State of California
California Health and Safety Code, Division 20, Section 25249.5 et seq.	California Safe Drinking Water and Toxic Enforcement Act of 1986 (California Proposition 65)	State of California
California Department of Water Resources Bulletin 74-90	California Well Standards, Part III	State of California
California Health and Safety Code, Division 5	California Drinking Water Act of 1989	State of California

Some privately-owned potable supply wells and agricultural wells are screened in the second HSU in the vicinity of the LEHR facility. Withdrawal wells screened in the second HSU (i.e., irrigation wells) are believed to have large areas of influence and their pumping results in large cones of depression. Groundwater in both the first and second HSUs exists at water table conditions, although the second HSU may be locally semi-confined. LEHR-ER site restoration studies have determined that the first and second HSU are strongly hydraulically connected (LEHR-011).

Alluvial fan sediments lie conformably on the Tehama Formation, a Pliocene-Pleistocene-aged (Tertiary) fluvial (and possibly lacustrine) deposit consisting of moderately compacted clays, silts, and silty sand enclosing lenses of sand, silt, gravel, and conglomerates cemented with calcium carbonate. The sediments range in thickness from 1,500 to 2,500 feet beneath the Putah Plain and comprise the principal water-bearing formation in the area, supplying the majority of water for the potable water supply of the City of Davis and all of the water for the UCD community supply. However, the City of Davis also maintains potable water wells in the third hydrostratigraphic unit of the alluvium.

Vadose zone soils, as well as the first and second HSUs have been extensively studied through a phased and ongoing site characterization study. Collectively, site characterization activities have resulted in the installation and sampling of eighteen groundwater monitoring wells (completed in both the first and second HSUs), the collection and analysis of over 272 surface and subsurface soil samples, and the collection of surface water and sediment samples from Putah Creek. Groundwater characterization studies have also been supported by lysimeter installations and cone penetrometer (CPT) studies. Organic, inorganic, and radiological contamination has been observed in both the first and second HSUs. The third HSU is believed to be hydraulically isolated from more shallow HSUs by over 90 feet of relatively impermeable clays. However, studies to determine the continuity of these clays and to confirm hydraulic isolation of the third HSU and evaluate its chemical quality have not yet occurred. Quarterly sampling of surface water and groundwater is ongoing. Beginning by the close of FY 1993, soil, sediment, and biota (e.g., vegetation) sampling will performed annually in accordance with the site's Environmental Monitoring and Surveillance Plan (LEHR-014).

Contaminants potentially related to past activities on the LEHR site have been observed in soils and sediments at elevated levels, but significant concentrations that would warrant immediate response actions (removal) have not been encountered. Concentrations above the Maximum Contaminant Levels (MCLs) of certain inorganic (e.g., chromium VI and nitrate) and organic (e.g., chloroform) contaminants have been observed in some groundwater monitoring locations in both the first and second HSU. However, the current body of evidence suggests that significant offsite migrations of contaminants has not occurred. Independent sampling of offsite downgradient potable wells have supported this conceptual model (I-GW-5). Additional groundwater monitoring is planned for downgradient onsite and offsite locations. Also, because other area activities in the LEHR vicinity have the potential to introduce contaminants similar to those of concern for the LEHR site (e.g., agricultural practices that may have been the source of nitrate contamination), additional efforts to establish background groundwater characteristics will involve the installation of additional monitoring wells in offsite upgradient locations.

Overall, the technical activities relating to groundwater characterization and monitoring (well placement, installation, and sampling, cone penetrometer studies, soil characterizations, data interpretation, aquifer modeling) are of high quality. Technical conclusions appear defensible, although confirmatory studies are warranted in some areas. Despite the extensive efforts to date to characterize groundwater and groundwater contamination, several fundamental issues still remain unanswered; the precise areal and vertical extent of contamination; the extent of the offsite contaminant migration (especially as it may jeopardize private potable water supplies); and potential contamination of lower hydrostratigraphic units. However, work plans under development are expected to address each of these unresolved issues.

Regarding liability issue, DOE has agreed to conduct characterization for the LEHR site to assist in determining future liability for site remediation. No specific assignment of DOE liability is implied by any finding in this report.

One compliance finding and three best management practices were identified. The compliance finding addresses the lack of a formal groundwater protection plan. The best management practice findings relate to necessary additional studies to justify previous technical decisions on well screen intervals, additional characterizations of the third HSU, and the application of more reliable methodologies for determination of aquifer conductivity.

3.3.2 Compliance Finding

GW/CF-1: Comprehensive Groundwater Protection Management Program and Groundwater Monitoring Plan

Performance Objective: DOE 5400.1, "General Environmental Protection Program," Chapter III, Section 4a, requires that a Groundwater Protection Management Program Plan (GPMPP) be completed by May 1990. The GPMPP shall include: (1) documentation of the groundwater regime with respect to quantity and quality; (2) design and implementation of a groundwater monitoring program to support resource management and comply with environmental laws and regulations; (3) a management program for groundwater protection and remediation, including specific Safe Drinking Water Act (SDWA), Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) actions; (4) a summary and identification of areas that may be contaminated with hazardous substances; (5) strategies for controlling sources of these contaminants; (6) a remedial action program that is part of the site CERCLA program required in DOE 5400.4; and (7) decontamination and decommissioning, and other remedial programs contained in DOE Directives.

Chapter IV, Section 9 of DOE 5400.1 requires that a Groundwater Monitoring Plan (GMP) be developed as a specific element of the groundwater protection management program by November 1991 and that the GMP address regulations and requirements applicable to groundwater protection and monitoring in development of sampling strategies and sampling and analysis plans and data management.

Finding: The GPMPP and GMP have not been formally established for the LEHR-ER project as required by DOE 5400.1.

Discussion: A number of the substantive elements required to be included in the GPMPP are addressed in the groundwater monitoring activities included in the Phase II site characterization studies. Although the characterization study was designed to satisfy the substantive and procedural requirements of the CERCLA program, it does also meet many of the requirements of DOE 5400.1 with respect to the GPMPP for the LEHR-ER project. However, these activities have not been formally incorporated into a final GPMPP. Likewise, quarterly groundwater monitoring activities that are occurring as part of the on-going site characterization study are substantively the same as required to be included in the GMP. Again, however, a GMP has not been formally adopted.

Although a number of substantive elements of groundwater protection and monitoring that should be contained in LEHR-ER's GPMPP and GMP are already addressed within ongoing and planned site characterization activities, there are additional activities and circumstances at LEHR which have the potential to impact groundwater and which, therefore, must also be addressed in the formal groundwater management/groundwater protection planning processes. Examples of other relevant GPMPP and GMP elements that are not now being formally addressed as a consequence of the ongoing site characterization study include the following:

- a strategy for controlling impacts from subsidence of shallow waste burial trenches;

- mitigating the potential impacts to groundwater that may result from D&D of the Imhoff facility and other underground structures (e.g., holding tanks, piping and sewage lines) through appropriate administrative and engineering controls;

- addressing the potential impacts from spills or leaks of radioactive sludge remaining in the tanker in the southwest corner through administrative controls and spill contingency planning;

- strategies for investigating the third HSU which prevents it from inadvertent contamination during the characterization study; and

- groundwater assessment strategies and interim control measures for offsite locations potentially impacted by contaminant migration from the LEHR-ER site.

The apparent causal factors for this finding are inadequate policy implementation in that the requirements of DOE 5400.1 related to the preparation of a GPMPP and GMP have not been implemented and inadequate procedures that failed to formalize LEHR-ER groundwater monitoring activities as required in DOE 5400.1.

3.3.3 Best Management Practice Findings

GW/BMPF-1: Characterization of the Third Hydrostratigraphic Unit

Performance Objective: Best management practice suggests that all hydrostratigraphic units (HSUs) beneath the LEHR site should be evaluated and characterized as necessary to determine if adverse impacts have occurred. Such evaluations are especially important when the HSU is utilized as a potable water supply source in an (apparent) downgradient direction from identified LEHR contamination sources.

Finding: The third HSU beneath the LEHR site has not been fully characterized for impacts from LEHR contaminant migrations.

Discussion: No sampling of the third HSU has yet occurred as part of the site characterization study. General water resource studies performed in the geographic area and well construction logs for wells completed in the third HSU indicate that the third HSU is separated from more shallow HSUs by 80 to 100 feet of relatively impermeable clays which are believed to act as an aquitard (LEHR-011). The third HSU is believed to be hydraulically isolated from the first and second HSUs, but this lack of communication is inferred from other studies and not confirmed by data or investigations conducted as part of the Phase II characterization study. Likewise, no contaminant migration pathway has been defined by which LEHR contaminants could reach the third HSU, but no studies have yet been performed that would support this. The S&GSC has recommended additional investigations of the third HSU (LEHR-011).

One exploratory boring and one groundwater monitoring well to the third HSU are planned for future studies (I-GW-1 and I-GW-8). It was further proposed that this exploratory boring would be located in the vicinity of a previously identified hot spot of second HSU contamination to maximize the opportunity of identifying a LEHR contaminant in the third HSU (I-GW-8). Although it is expected that the drilling methods employed will involve the use of casings through all contaminated zones encountered to minimize the potential for contaminant migration, it may be more appropriate to install the boring into the third HSU in an area relatively free of soil or groundwater contamination to prevent the boring from becoming an inadvertent artificial conduit of LEHR contaminants to an otherwise uncontaminated third HSU.

It is expected that a careful comparison of water chemistries in the second and third HSUs would be performed in order to determine if communication exists between the second and third HSUs (I-GW-7). In doing so, it may be safest to select naturally occurring moieties for conducting such water chemistry comparisons, rather than LEHR-related contaminants that are unique to the natural chemical profiles of the groundwaters being studied. The site restoration contractor is aware of, and sensitive to, these issues and is expected to address the exploration of the third HSU and its hydraulic connection to other HSUs in future studies.

The apparent causal factors for this finding are ineffective policy for the prompt identification of all pathways of offsite contaminant migration, and a failure to correctly identify the risk associated with contaminant migrations via pathways for which no characterization studies have been performed.

GW/BMPF-2: **Monitoring Well Screen Intervals**

Performance Objective: Best management practice suggests that when circumstantial factors require variance from standard practices, additional effort should be expended to justify technical decisions and to ensure that unconventional procedures have not introduced error or bias to the resulting data or study conclusions.

Finding: The recently completed Phase II site characterization study did not contain work elements specifically designed to justify the decision to utilize longer than normal screen intervals in groundwater monitoring wells and to determine the resulting impacts to sampling data from wells utilizing such longer screen intervals.

Discussion: The primary responsibilities of a site characterization study involve the identification of contaminant migration pathways and a determination of the presence or absence of site contaminants in those pathways. Additionally, however, in the case of migration of contaminants in saturated zones, accurate fate and transport models, as well as the ability to correctly assess and select remediation alternatives rely not only on determining the presence, but also the vertical distribution (or stratification), of contaminants. Conventional guidance suggests that screen intervals for groundwater monitoring wells be kept to a maximum length of 10 feet and that additional wells be installed as necessary to evaluate saturated zones of substantially greater thicknesses.

The monitoring wells installed in the first hydrostratigraphic unit (HSU) as part of original (Phase I) characterization study have been found to be dry (and therefore useless) during some parts of the year due to fluctuation of water levels in that HSU. Site-specific subsurface condition suggest that a similar problem could also occur in the second HSU, although to a lesser extent. In recognition of these earlier problems, the technical decision was made in the Phase II study that screens would be set a greater depths and that longer screen intervals would be used in monitoring wells installed as part of that study. Consequently, screen lengths of 15 and 25 feet, respectively, were used for the additional monitoring wells installed in the first and second HSUs (LEHR-011; I-IWS-8). (Use of the 25-foot screen interval in the second HSU monitoring wells was specifically designed to ensure that water samples represent 75 percent of the vertical cross-section of the second HSU.) While these deeper set and longer screen lengths will overcome water level fluctuation problems, their use may also introduce an unknown dilution error to sample results in those instances when the contaminants are stratified in the aquifer being sampled.

The LEHR site contaminants all have moderate to high water solubilities and other evidence suggests that they have reached the HSUs primarily through solution mechanisms rather than by mechanical transport or capillary action. It has also been established that both the first and second HSUs are subject to dramatic water level changes due to changing recharge rates and pumping influences. Consequently, it can be reasonably expected that the contaminants will be evenly distributed throughout the vertical cross-sections of the HSUs in which they are present. Nevertheless, additional studies designed to confirm the uniformity of this vertical distribution (i.e., the absence of stratification of contaminants) are warranted to fully defend the representativeness of contaminant concentration data upon which site fate and transport models are based. The S&GSC recognizes the potential for dilution errors introduced as a result of the use of

longer screen intervals when contaminant stratifications also exist and has indicated the intention to address this issue in future studies.

The apparent causal factor for this finding is inadequate policy which has not required sufficiently detailed definition of site conditions and the collection of necessary data to support overall conclusions on environmental impacts.

GW/BMPF-3: Groundwater Conductivity Studies

Performance Objective: Best management practice suggests that when circumstantial factors preempt the application of necessary and appropriate techniques for determination of critical site parameters, alternative studies should be identified and implemented that will justify the results obtained from the application of the selected technology and identify any errors that may have been introduced.

Finding: Aquifer slug testing performed during the Phase II Site Characterization study may not have resulted in sufficiently reliable determinations of hydraulic conductivities and inter-communications for the first and second hydrostratigraphic units (HSUs) and more appropriate aquifer pumping tests have not yet been pursued.

Discussion: As part of the Phase II Site Characterization study, the site restoration contractor performed rising and falling head slug tests on the first and second HSUs (LEHR-011). Tests were conducted at nine monitoring wells completed in the first HSU and in one monitoring well finished in the second HSU. It was the original intention of the Phase II work plan that slug tests would be precursors to more reliable aquifer pumping tests (both stepped-rate and long-term) that would also be conducted in order to get a more precise determination of hydraulic conductivity, transmissivity, and aquifer yield (LEHR-046; I-LEHR-10). However, concerns about the anticipated difficulty and cost of disposal of potentially contaminated groundwater that would result from such pumping tests resulted in a decision to rely only on the slug tests for determinations of HSU conductivities.

Site-specific subsurface conditions at LEHR may introduce substantial uncertainty into conductivity results determined by slug testing alone at discrete locations within any HSU. Other evidence assembled during the Phase II study suggests that the second HSU may be semi-confined on a localized basis during periods of groundwater level increases (normally September through May), further suggesting that variations in hydraulic conductivity with location may also exist. Also, it is believed that the first and second HSUs are generally in hydraulic communication but the extent and intensity of that communication is thought to vary with location. Because they measure recovery of the aquifer at a single point, slug tests may not be sufficiently sensitive to such spatial variations in aquifer parameters or to mechanisms of groundwater movement such as movement between saturated zones.

Finally, it was learned during the course of this audit that it may be technically feasible to conduct pumping test at areas contiguous to LEHR and under the control of UCD. Areas were identified which already contain agricultural pumping wells, the construction parameters and integrity of which are already documented (I-GW-5). And, because the stratigraphy throughout this portion of the Sacramento Valley is known to be generally uniform, performing the pumping tests at offsite locations and extrapolating the results to the LEHR site would appear to be a technically acceptable alternative that would not introduce unacceptable error. The site restoration contractor is expected to introduce work elements into future studies designed to produce more defensible hydraulic conductivity values.

The apparent causal factor for this finding is inadequate policy implementation that failed to require the performance of work elements necessary to produce fully defensible data

and the development and implementation of alternative strategies in response to unique circumstantial constraints.

3.4 WASTE MANAGEMENT

3.4.1 Overview

The purpose of the waste management portion of the LEHR-ER Environmental Audit was to evaluate the site's activities related to the management of solid, hazardous, radioactive, and mixed waste. Activities evaluated included the generation, storage, and offsite transportation of these wastes. The LEHR-ER waste management program was evaluated for compliance with Federal and State of California regulations and DOE Orders. In addition, the waste management evaluation considered best management practices. Table 3-4 lists the regulations and DOE Orders used in the evaluation.

The general approach to the waste management portion of the audit included: (1) inspection of storage facilities and operations; (2) interviews with staff responsible for waste management and environmental compliance; and (3) a review of documentation pertaining to waste management, including waste characterization documents, permit applications, manifests and land disposal restriction notices, training records, policies, procedures, and self-assessments.

The management of hazardous and mixed wastes is regulated by the Resource Conservation and Recovery Act (RCRA). RCRA was administered and enforced in the State of California by the United States Environmental Protection Agency (EPA), Region IX, until such time as the state received final authorization from the EPA to administer a RCRA hazardous and mixed waste program. As of August 1992, the California Department of Toxic Substances Control (DTSC) has primary administration of the program governing the regulation of hazardous and mixed wastes in California. Site municipal or non-hazardous waste is taken to the UCD landfill. Land disposal of municipal, non-hazardous wastes is governed by the regulations of the California Regional Water Quality Control Board - Central Valley Region and the California Integrated Waste Management Board.

During FY 1990, DOE, through its SF, delegated administrative responsibility for the LEHR-ER, including waste management, to EMO. In FY 1990, EMO contracted for soil and groundwater characterization (S&GSC). In FY 1991, EMO also contracted with the D&DSC to provide technical support for planning and execution of these activities. EMO has also arranged for technical support from an OSSC. In general, EMO is the project manager.

The D&DSC manages the characterization and packaging of wastes generated during the decontamination and decommissioning activities. D&DSC personnel places radioactive wastes into low specific activity (LSA) boxes (and includes non friable asbestos waste as filler) and stores them in the southern half of Geriatrics 1 building, and in the ^{60}Co building yard. D&DSC personnel place "clean" wastes in two 40-foot containers located onsite. Dry active waste from past site remediation activities is stored in the South Cargo Storage.

The S&GSC generates wastes from sampling activities, including soil borings and purge water. These wastes are packaged in 55-gallon drums and stored in the yard of the ^{60}Co building under the control of OSSC personnel.

OSSC personnel manage the hazardous and mixed waste storage facilities. Mixed wastes are currently stored in the Mixed Waste Storage Facility and two areas in the ^{60}Co building.

TABLE 3-4
LIST OF WASTE MANAGEMENT
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Titles	Authority
42 U.S.C. 6905 et seq.	Resource Conservation and Recovery Act	EPA
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5400.2A	Environmental Compliance Issues Coordination	DOE
DOE 5400.3	Hazardous and Radioactive Mixed Waste Program	DOE
DOE 5480.19	Conduct of Operations Requirements for DOE Facilities	DOE
40 CFR 260-280	Hazardous Waste Regulations	EPA
54 Federal Register 25056, June 12, 1989	Draft Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program	EPA
CH & SC, Division 20, Chapter 6.5	California Hazardous Waste Control Act	California Department of Health Services
26 CCR, Division 15	California Solid Waste Management Regulations	California Department of Toxic Substances Control
26 CCR, Division 22	California Waste Management Regulations	California Department of Toxic Substances Control
26 CCR, Division 23	California Underground Storage Tank Regulations	California Department of Toxic Substances Control

Numerous containers of chemicals, cleaners, lubricants, paints, and miscellaneous materials that were located and cataloged during an intensive room-by-room inspection encompassing all of Animal Hospitals 1 and 2 and Building H-216, and specimens stored in Formalin (formaldehyde) were previously stored in the Specimen Storage Room (Room 245 of Building 416). In April 1993, these wastes were moved to the Mixed Waste Storage Facility and the designated areas in the ^{60}Co building. Although, the Waste Management Plan (LEHR-019), the onsite support contract (LEHR-288), and the LEHR FYP Issue Statement (LEHR-290) identify these containers and specimens as an onsite waste stream, there is some dispute as to the classification of these containers and specimens as waste when they were stored in the Specimen Storage Room, in that researchers were able to retrieve usable materials or specimens through 1992 (I-WM-4). In addition, a 40-foot tank trailer containing approximately 250 gallons of radioactive sludge with potential California hazardous waste constituents is located in the southwest corner of the LEHR facility.

In February 1990, a shipment of non-radioactive, hazardous waste was shipped offsite to licensed RCRA disposal facilities under proper Uniform Hazardous Waste Manifests. No new hazardous or mixed wastes are expected to be generated at LEHR-ER as a result of research activities because active DOE research ceased in 1988. However, the ongoing D&D and site characterization activities at LEHR may generate new hazardous or mixed wastes.

Pursuant to EPA regulations, any person who owns or operates a hazardous waste facility in existence on the effective date of statutory or regulatory amendments under RCRA that render the facility subject to the requirement to have an RCRA permit shall have interim status and shall be treated as having been issued a permit to the extent he or she has complied with the notification of hazardous waste activity requirements and the requirements governing submission of the Part A permit application. On September 23, 1988, the EPA issued its clarification notice that facilities that store mixed waste be permitted under RCRA and must submit a Part A permit application to the EPA by March 23, 1989 to qualify for interim status.

On March 17, 1989, LEHR-ER submitted a Part A permit application with EPA Region IX. The application was resubmitted on September 29, 1989, to include DOE as a signator. Therefore, the application shows DOE as the owner and the Regents, University of California as the operator of the hazardous waste facility. Therefore, LEHR-ER has interim status under RCRA and holds an EPA ID Number separate from the hazardous waste operations for the rest of the UCD campus (EPA ID No. CAD982469702). Upon request, LEHR-ER supplied a copy of the Part A permit application to the DHS on December 20, 1990. No other action has been taken concerning the permit application.

On September 20, 1991, DOE directed LEHR-ER to suspend all shipments of RCRA/TSCA and State of California hazardous wastes that were originated from radioactive materials management areas until the requirements of the DOE, Office of Waste Operations' Moratorium on Hazardous Waste Shipments are met (LEHR-079). In order to resume shipments of wastes originating from radioactive materials management areas, LEHR-ER needs to comply with the requirements of the "Performance Objective for Identification and Management of Radioactive Mixed Waste" (June 21, 1991) and the "Approval Process for Procedures to Release Hazardous Wastes Potentially Contaminated with Radioactivity." Technically, the moratorium focuses only on those wastes which are to be shipped to a commercial RCRA permitted hazardous waste disposal facility as

non-radioactive. Wastes which are determined to a radioactive waste or mixed waste must be shipped to a DOE facility for disposal pursuant to DOE 5820.2A.

LEHR-ER is still in the process of developing its procedures to characterize its potentially hazardous and mixed wastes. Until these procedures are approved by DOE, LEHR-ER cannot make the determination that certain wastes may be classified as solely hazardous wastes and, therefore, can be shipped to a commercial hazardous waste disposal facility. Although LEHR-ER could currently ship radioactive wastes and possibly known mixed wastes on a case-by-case basis to Westinghouse Hanford Company, the procedures for characterizing all wastes prior to shipment are to be developed in the same document and once that program is in place all wastes will be characterized and disposed of properly.

LEHR-ER has not developed an integrated hazardous and mixed waste management program which adequately addresses all aspects of hazardous and mixed waste management as required by DOE 5400.3. The hazardous and mixed waste is being physically managed in a safe manner by the OSSC to the best of its ability given the available characterization data. However, the current Waste Management Plan (LEHR-019) does not accurately or clearly set out the responsibilities under a program for the management of hazardous and mixed waste at LEHR-ER. This has resulted in failure to comply with certain RCRA requirements. Over all, LEHR-ER is handling radioactive wastes from the decontamination and decommissioning activities in a safe and efficient manner. Through an effective waste shredding and compaction practice, the project has been able to reduce the volume of low-level waste resulting in significant cost savings to the project.

The waste management portion of the environmental audit identified six compliance findings and one best management practice finding. Three compliance findings related to the requirements governing a facility with interim status, including filing a revised Part A permit application to cover changes in operations, filing annual reports, and developing a written closure plan for the facilities. The other compliance findings addressed characterization of wastes, development of a contingency plan, and the development of a comprehensive hazardous and mixed waste management plan. The best management practice finding addressed the need to formalize the operating record, including inspection records, for the mixed waste storage facilities.

3.4.2 Compliance Findings

WM/CF-1: Hazardous and Mixed Waste Program

Performance Objective: DOE 5400.3, "Hazardous and Radioactive Mixed Waste Program," states that it is DOE policy to implement a hazardous and mixed waste program complying with laws and regulations. It also states that the head of Field Organizations shall: develop and implement a program to assure that hazardous and mixed wastes at facilities for which they are responsible are managed in accordance with Atomic Energy Act (AEA) and Resource Conservation and Recovery Act (RCRA) requirements and the requirements of the Order; complete all RCRA reporting requirements; and oversee RCRA programs and actions for which they have assigned responsibilities, requesting such funds in their budgets as they deem necessary to implement these programs and actions.

Finding: LEHR-ER has not developed an integrated hazardous and mixed waste management plan which establishes a formalized program including all aspects of hazardous waste handling, management, reporting, and compliance as required by DOE 5400.3.

Discussion: The current Waste Management Plan (LEHR-019), states that DOE, through its San Francisco Operations Office, delegated administrative responsibility for the LEHR-ER environmental restoration, including waste management, to the EMO, who, in turn, contracted with the D&DSC to provide technical support for planning and execution of these activities.

The plan states administrative responsibility for environmental restoration, including decontamination, remediation and waste management, is delegated to EMO, who in turn, contracted for technical management and oversight of all DOE-related environmental restoration activities to the D&DSC, with technical support from onsite personnel attached to the OSSC. According to the plan, the EMO Project Manager shall be informed of, and concur with any actions implemented to correct deficiencies in a waste management activity. The plan states that the D&DSC Project Manager approves actions developed by the D&DSC Waste Coordinator to correct deficiencies identified that could impact the waste management program. In addition, the D&DSC Waste Coordinator has direct programmatic responsibility for all LEHR-ER waste management activities within the purview of the D&DSC, as specified by EMO. The plan also states that the D&DSC Waste Coordinator has programmatic responsibility for waste characterization and certification in accordance with DOE, the Department of Transportation, the California Department of Health Services, Westinghouse Hanford, and State of Washington regulations and guidelines.

In reality, however, the EMO contracted with the OSSC to provide hazardous and mixed waste management technical support and the D&DSC only handles the radioactive wastes generated from D&D activities. Therefore, the plan does not adequately reflect the responsibilities for a hazardous and mixed waste management program. The plan focuses on D&D waste characterization for radioactivity and the management of radioactive waste. The section on mixed waste simply states there is a limited amount of mixed waste identified at the LEHR-ER site and provides a generalized classification of the waste stream. The plan states: "Plans will be developed for disposal of the RMW presently at LEHR-ER as disposal options are identified." For hazardous waste management, the plan

simply states: "Plans for disposal of RCRA- and TSCA-designated hazardous wastes will be developed as the need arises." The On Site Support Contract, LEHR Environmental Restoration Project, Statement of Work for Fiscal Year 1993 (LEHR-288) for the OSSC, states the OSSC shall review and provide comments on the Waste Management Plan; segregate uncharacterized waste/materials (including the Mixed Waste, Waste in Specimen Storage, ^{60}Co Building Waste and Segregated Waste in AH-1) by hazard class and designate chemical (if possible without outside lab analysis), define the radiological activities and prepare a summary report for the uncharacterized waste/materials. The OSSC shall also monitor and maintain designated waste and materials in compliance with laws and regulations including DOE Orders. The 1992 Statement of Work for the OSSC included the responsibility for characterizing the contents of the tank trailer and preparing a report clearly determining if the liquid content is a mixed waste or low-level radioactive waste. The OSSC communicates verbally with the EMO personnel and is physically managing the waste under the Statement of Work to the best of its ability, however, the onsite support contract (LEHR-288) does not provide for the administrative, characterization, and recordkeeping requirements for these mixed wastes.

Other than one sentence, the current Waste Management Plan (LEHR-019) does not acknowledge that LEHR-ER holds interim status as a Mixed Waste Storage Facility under RCRA, and now the California, regulations. It does not address the requirements of those regulations or the responsible parties for carrying out those duties. This would include updating the Part A permit application, filing annual reports, inspecting facilities and recording those inspections, characterization of the currently uncharacterized wastes, training personnel, properly labeling containers, addressing emergency response requirements in a contingency plan, developing a closure plan, conducting closure, and maintaining the integrity of the storage facilities and the containers in compliance with the California regulations.

The apparent causal factor for this finding is inadequate policy implementation for establishing hazardous waste management requirements. A secondary contributing factor for this finding is appraisals/audits/reviews by EMO and DOE, which were inadequate and did not result in correction of hazardous waste management issues.

WM/CF-2: Submission of Revised Part A Permit Application

Performance Objective: DOE 5400.3, "Hazardous and Radioactive Mixed Waste Program," requires mixed wastes be managed in accordance with the requirements of Subtitle C of RCRA and of the Atomic Energy Act (AEA). DOE 5400.2A, "Environmental Compliance Issue Coordination," requires field elements to provide EH-22 information on all environmental permits and permit applications by October 1 of each year. (Prior to 1993, these reports were to go to EH-23, DOE 5400.2A Chg 1, January 7, 1993.)

26 California Code of Regulations (CCR) § 22-66265.1(c) provides that a facility operating under interim status shall not manage hazardous wastes which are not specified in Part A permit application. 26 CCR § 22-66270.72 provides that the owner or operator of an interim status facility may store new hazardous wastes not previously identified in Part A permit application if the owner or operator submits a revised Part A permit application prior to such storage. In addition, an owner or operator may change the processes for the storage of hazardous waste or add processes to the facility if the owner or operator submits a revised Part A permit application prior to such change and the California Department of Health Services (DHS) approves the changes based on justification explaining the change was necessary to prevent a threat to human health and the environment because of an emergency situation or in order to comply with a Federal, state, or local requirement.

Finding: LEHR-ER has changed its operations since submitting its original Part A permit application and has not submitted a revised Part A permit application to the DHS, nor has SF notified DOE EH-22 of information on the Part A permit application, as required by DOE 5400.3, 26 CCR § 22-66265.1(c), and 26 CCR § 22-66270.72.

Discussion: On March 17, 1989, LEHR-ER submitted a Part A permit application with the EPA, Region IX office in San Francisco, CA. In 1990, LEHR-ER was contacted by the DHS requesting a copy of the permit application and it was submitted as requested. This permit application states the facility has a design capacity of 680 gallons in containers and 30 cubic yards in containers. The permit application indicates the material to be stored is mixed waste. The description of regulated wastes at the facility is 5 liters of flammable/radioactive mixed waste (F005), 3 cubic yards of combustible/radioactive mixed waste (D001) and 10 liters of acid/radioactive mixed waste (D002) per year. Pursuant to 40 CFR 270.13(l), the application must include a map depicting the facility and each of its hazardous waste storage facilities. The map attached to the original application designates a storage area north of the Geriatrics buildings.

Currently, the mixed waste stored at LEHR-ER is stored in a manufactured, totally enclosed metal portable storage building located next to the ^{60}Co auxiliary building. Mixed waste is also stored in the control room and a hallway in the ^{60}Co building. The mixed wastes stored in these facilities include ignitable mixed wastes (D001), corrosive mixed waste (D002), arsenic (D004) and various toxic commercial chemical products (i.e., acetone (U002), toluene (U220), and xylene (U239)).

Under 26 CCR § 22-66270.72, the owner or operator of an interim status facility may store new hazardous wastes not previously identified in Part A of the permit application if the owner or operator submits a revised Part A permit application prior to such storage. In addition, an owner or operator may change the processes for the storage of hazardous

wastes or add processes at the facility if the owner or operator submits a revised Part A permit application prior to such change and the DHS approves the changes based on justification explaining the change was necessary to prevent a threat to human health and the environment because of an emergency situation or in order to comply with a Federal, state, or local requirement.

LEHR-ER, therefore, is storing new hazardous wastes not previously identified in Part A permit application without submitting a revised Part A permit application prior to the change. LEHR-ER has also changed the processes for the storage of hazardous wastes or added processes at the facility, i.e., established new and different storage facilities onsite, without submitting a revised Part A permit application prior to such change and prior to obtaining approval of the change based on appropriate justification.

The need to submit a revised Part A permit application was identified on September 11, 1992, during a waste management walkthrough performed by the SF Waste Management Branch. This information was provided in a memorandum to the Environmental Restoration Branch, the Environmental Restoration and Waste Management Division and the Assistant Manager for Environmental Management and Support (LEHR-083). However, the information was not forwarded to EH-22 in the annual update report on hazardous waste permits as required by DOE 5400.2A, 5d(5)(b) (I-MW-13 and I-MW-14).

The apparent causal factors for this finding are inadequate policy implementation in that the waste management program does not comply with RCRA regulations and DOE 5400.3 and inadequate procedures in that the Waste Management Plan (LEHR-019) does not clearly and completely delegate waste management functions assigned to the field organization under DOE 5400.3.

WM/CF-3: **Waste Characterization**

Performance Objective: DOE 5400.3, "Hazardous and Radioactive Mixed Waste Program," requires mixed wastes be managed in accordance with the requirements of Subtitle C of Resource Conservation and Recovery Act (RCRA) and of the Atomic Energy Act (AEA).

26 California Code of Regulations (CCR) § 22-66260.200(c) provides it shall be the general responsibility of the owner or operator to determine if the waste is classified as a hazardous waste. 26 CCR § 22-66265.13(a)(1) provides before an owner or operator stores any hazardous wastes, he must obtain a detailed chemical and physical analysis of a representative sample of the wastes. In addition, under 26 CCR § 22-66265.13(b), the owner or operator must develop and follow a written waste analysis plan which describes the procedures which he will carry out to comply with the above requirement to characterize.

Finding: Although LEHR-ER filed a Part A permit application and, thereby, has interim status, LEHR-ER has not developed a written waste analysis plan nor has it characterized all the wastes it is storing onsite and in its declared hazardous and mixed waste storage facilities as required by DOE 5400.3, 26 CCR § 22-66620(c), 26 CCR § 22-66265.13(b).

Discussion: The Waste Management Plan (LEHR-019) states numerous containers of chemicals, cleaners, lubricants, paints, and miscellaneous materials were located and cataloged during an intensive room-by-room inspection encompassing all of AH-1 and all rooms in AH-2 and Building H-216. The plan also states that although the majority of these items were tentatively identified by label or physical/chemical characteristics, such as labeling for radioactivity, hazardous material, or possibly mixed waste, the items are considered to be uncharacterized. Although the Waste Management Plan acknowledges these wastes are uncharacterized, there are no waste analysis plans or procedures to characterize these wastes.

Other waste management plans for the site do not address characterization of these wastes. The Low-Level Waste Certification Plan for Laboratory for Energy-Related Health Research, University of California, Davis (LEHR-229) sets forth planned characterization activities for identified waste streams; however, does not include analysis procedures for the mixed wastes stored in the ^{60}Co Building or the mixed waste storage facilities. The plan includes proposed laboratory analysis only for the contents of the 40-foot tank trailer located at the southwest corner of the site.

The Waste Certification Plan (LEHR-226) states that a program will be developed to identify the contents and characterize, treat, and dispose of the miscellaneous containers of uncharacterized chemicals. This plan also indicates the liquid contents of the tank trailer will be characterized for chemical and radiological properties to determine whether it must be classified as mixed waste. This plan states that although numerous containers of chemicals, cleaners, lubricants, paints, and other miscellaneous materials can be tentatively identified as to their contents, they will be individually characterized prior to their disposition. A general statement that subsequent characterization for radioactive, biological, physical, and chemical properties will be performed for chemical properties using laboratory analyses. However, no specific waste analysis procedures are set forth as required by California regulations (i.e., parameters, test methods, sampling methods, etc.).

The following are examples of uncharacterized waste that is stored onsite:

- Miscellaneous Laboratory Wastes - The mixed waste storage building contains wastes that have not been characterized; although through process knowledge, the OSSC has attempted to segregate the wastes into flammable, ignitable, and toxic (poison) sections. Some ignitables are stored with toxics in Bay 2 of the building, however, the outside signage on the bay does not conform to such storage. Process knowledge is not sufficient for characterization prior to storage in a permitted storage facility, but the OSSC has used it to the best of its ability to store the wastes in as safe a manner as possible.

- Miscellaneous Laboratory Wastes - The ^{60}Co building also contains other uncharacterized wastes. Again, these have been segregated into unknowns and corrosive unknowns to the best of the OSSC's knowledge. Again, process knowledge is not sufficient if the wastes are stored in this area for more than 90 days. After 90 days, this area is a waste storage facility and would fall under LEHR-ER's Part A interim status and chemical analysis would be required.

- Tank Trailer Contents - LEHR-ER has been storing low-level radioactive sludge in a 40-foot tank trailer in the southwest corner of the site for several years over the 90-day period and has not characterized it to determine if it is a hazardous waste under California regulations. LEHR-ER acknowledges the sludge may contain oil and rainwater. Under California regulations, "oil and water" is presumed to be a hazardous waste unless it is determined that the waste is not a hazardous waste pursuant to the procedure set forth in 26 CCR § 22-66262.11 (Subdivision (b) to Appendix X to § 22-66262). In addition, "Unspecified oil-containing waste" is given California Hazardous Waste Code No. 223 (Appendix XII to 26 CCR § 22-66261). Therefore, the waste in the tank trailer should be presumed to be a California hazardous waste until it has been characterized and proven to be non-hazardous under the procedures set forth in § 22-66262.11. If characterization shows the sludge is a California regulated hazardous waste then the storage of the waste in the tank trailer for more than 90 days in California would need to comply with those requirements of 26 CCR § 22-66265.190 et seq., including integrity certification, secondary containment, inspections, labeling and possibly the protective distances for ignitable wastes. Disposal will be under the regulations of the State of Washington which does not consider waste oil a dangerous waste, therefore, it may not be a mixed waste according to Hanford Site Solid Waste Acceptance Criteria (LEHR-282).

- Septic Tank Contents - There are seven onsite septic tanks at LEHR-ER. According to Phase II Characterization Report for the LEHR Environmental Restoration (LEHR-011), these septic tanks were reported to have received all liquid wastes from the LEHR-ER facility except for strontium-90 and radium-226 project wastes. However, during backup of the radium-226 system, one septic tank west of AH-2 was reported to have received effluent from AH-2. The tanks were reported to have been filled with sand

and abandoned in place. Any sludges that remained in the tanks are not reported to have been removed prior to filling the tanks with sand.

The LEHR-ER environmental walkthrough performed by SF on April 5-8, 1993 (LEHR-078), raised the issue of the application of the Federal and state underground storage tank regulations to these tanks which are potentially contaminated with other than sanitary sewage. Under the California Health and Safety Code, Chapter 6.7, "Underground Storage of Hazardous Substances," "Underground Storage Tank" means any one or combination of tanks which are used for the storing of hazardous substances (§ 25281(x)(1)). However, under 26 CCR § 23-2621, underground storage tank does not include septic tanks or tanks containing radioactive material regulated by other Federal, state, or local agencies. Under the California Health and Safety Code, Chapter 6.7, "Underground Storage of Hazardous Substances," "storage" does not mean the storage of hazardous waste in an underground storage tank if the person operating the tank has a hazardous waste facility permit or has been granted interim status (§ 25281(r)). Therefore, these tanks are probably not underground storage tanks. Since the tanks were closed prior to the enactment of RCRA, they are probably not regulated as tanks storing hazardous wastes.

However, if the tanks are to be removed and the contents discarded, with the knowledge that the contents of the tanks may contain radioactive and/or hazardous constituents, the waste would have to be characterized under Title 26 California Code of Regulations § 22-66261. Appendix XII to § 22-66261, gives the California Waste Code No. 321 to sewage sludge. Therefore, sewage sludge may be a hazardous substance governed by California hazardous or mixed waste storage, transportation, and disposal requirements.

The problem of uncharacterized wastes was identified on September 11, 1992, during a waste management walkthrough performed by the SF Waste Management Branch. The problem was recorded in a memorandum to the Environmental Restoration Branch, the Environmental Restoration and Waste Management Division and the Assistant Manager for Environmental Management and Support (LEHR-083).

The apparent causal factor for this finding is inadequate policy implementation in that the waste management program does not comply with DOE 5400.3 and RCRA regulations.

WM/CF-4: **Closure Plans**

Performance Objective: DOE 5400.3, "Hazardous and Radioactive Mixed Waste Program," requires mixed wastes be managed in accordance with the requirements of Subtitle C of RCRA and of the Atomic Energy Act (AEA).

26 California Code of Regulations (CCR) § 22-66265.112(a) provides that within 6 months after the effective date of the rule that first subjects a facility to the provisions of interim status, the owner or operator of a hazardous waste management facility must have a written closure plan.

Finding: LEHR-ER has never developed a written closure plan for the onsite hazardous waste units as required by California regulations (26 CCR 22-66265.112(a)).

Discussion: Although LEHR-ER filed a Part A permit application and, thereby, has interim status, it has not developed a written closure plan for any of the hazardous waste storage units onsite as required by EPA regulations (40 CFR 265.112(a)) and California regulations (26 CCR § 22-66265.112(a)). A closure plan must identify steps necessary to perform partial and/or final closure of the facility at any point during its active life. Since the containers and specimens stored in Specimen Storage Room were specified as mixed wastes in the Waste Management Plan (LEHR-019) and in the On Site Support Contract LEHR Environmental Restoration Project Statement of Work for Fiscal Year 1993 (LEHR-88) and the LEHR FYP Issue Statement (LEHR-290) for the OSSC, this area appears in LEHR-ER documentation to have been a waste storage area closed without benefit of a written closure plan. The closure plan must include a description of how each hazardous waste management unit at the facility will be closed; a description of how final closure of the facility will be conducted; an estimate of the maximum inventory of hazardous wastes ever onsite over the active life of the facility (possibly including the Specimen Storage Room); a detailed description of the methods to be used during partial and final closure; a detailed description of the steps needed to remove or decontaminate all hazardous waste residues; and a schedule of closure for each hazardous waste management unit.

The apparent causal factors for this finding are inadequate policy implementation in that a RCRA closure plan was never developed for LEHR-ER and inadequate procedures to specifically close LEHR-ER mixed waste storage facilities.

WM/CF-5: **Annual Report**

Performance Objective: DOE 5400.3, "Hazardous and Radioactive Mixed Waste Program," requires mixed wastes be managed in accordance with the requirements of Subtitle C of Resource Conservation and Recovery Act (RCRA) and of the Atomic Energy Act (AEA).

26 California Code of Regulations (CCR) § 22-66265.75 requires the owner or operator shall prepare and submit an annual report to the California Department of Health Services (DHS) and to the appropriate regional water quality control board by March 1 of each year.

Finding: LEHR-ER has not filed any annual reports with the DHS or the California Regional Water Quality Control Board (RWQCB) - Central Valley Region as required by 26 CCR § 22-66265.75.

Discussion: Although LEHR-ER filed a Part A permit application and, thereby, has interim status, it has not filed any annual reports with the DHS or the RWQCB - Central Valley Region, as required by 26 CCR § 22-66265.75. The annual report should include a description and quantity of hazardous wastes received during the year, the method of storage and a description of the efforts toward waste minimization.

The apparent causal factors for this finding are inadequate policy implementation in that the requirements of DOE 5400.3 and RCRA have not been met and inadequate procedures to implement DOE Orders and Federal and state laws and regulations.

WM/CF-6: **Preparation of a Contingency Plan**

Performance Objective: DOE 5400.3, "Hazardous and Radioactive Mixed Waste Program," requires mixed wastes be managed in accordance with the requirements of Subtitle C of Resource Conservation and Recovery Act (RCRA) and of the Atomic Energy Act (AEA).

Under 26 California Code of Regulations (CCR) § 22-66265.51, each owner or operator of a hazardous waste storage facility must have a contingency plan for his facility. Under 26 CCR § 22-66265.53, a copy of the contingency plan must be submitted to all local police departments, fire departments, hospitals and state and local emergency response teams that may be called upon to provide emergency services.

Finding: LEHR-ER does not have a contingency plan, nor has a contingency plan been filed with the UCD Fire Department, the emergency responder to the site, as required by RCRA regulations.

Discussion: Although LEHR-ER filed a Part A permit application and, thereby, has interim status, LEHR-ER does not have a contingency plan and, therefore, has not filed a contingency plan with the UCD Fire Department (the emergency responder to the site), as required by RCRA regulations. The contingency plan must address the following items: (a) actions that facility personnel must take in order to properly respond to fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to the environment; (b) the arrangements with local emergency response officials including a list of the appropriate EMO, S&GSC, D&DSC, or OSSC contacts who are qualified to act as emergency coordinators; (c) a list of emergency equipment at the mixed waste storage facilities, including a description of the location of each item; and (d) an evacuation plan for LEHR-ER and the Institute of Toxicology and Environmental Health facility personnel. The emergency coordinator must be an employee who is thoroughly familiar with all aspects of the facility's contingency plan, all operations and activities at the facility, the location and characteristics of waste handled, the location of all records within the facility, and the facility layout. A Draft Contingency Plan for LEHR-ER has been prepared and is currently undergoing review.

The apparent causal factor for this finding is inadequate policy implementation in that the requirements of DOE 5400.3 and RCRA have not been implemented.

3.4.3 Best Management Practice Finding

WM/BMPF-1: Operating Records and Inspection Records

Performance Objective: Best management practice suggests that the records of hazardous wastes stored onsite should be in a form that would allow a regulator or an emergency responder to determine the location or hazard classification of the waste.
Best management practice recommends that the records of required inspections and the corresponding corrective actions be in a form that would allow a regulator to determine that all hazardous waste storage units have been regularly inspected and corrective actions have been taken upon the discovery of a deficiency.

Finding: Records of hazardous wastes stored onsite, inspection logs, and corrective action information are not maintained in an easily understandable and retrievable manner.

Discussion: Under 26 California Code of Regulations (CCR) § 22-66265.73, the owner or operator must keep a written operating record showing a description and quantity of each hazardous waste received, the location of each hazardous waste stored within the facility and the quantity at each location. Currently, the OSSC maintains a hand written list of the wastes which have been stored in the hazardous waste storage areas by bin and bay, however, the numbers on this location list must then be cross-referenced with the voluminous hazardous waste inventory to determine what is actually in the bin. In an emergency situation, only the OSSC person would be able to easily determine what wastes are stored where.

Under 26 CCR § 22-66265.15, the owner or operator must develop and follow a written schedule for inspecting all the facilities and this schedule must identify the types of problems which are to be looked for during the inspection. The owner and operator must remedy any deterioration or malfunction of equipment or structures that the inspection reveals on a schedule which ensures that the problem does not lead to an environmental or human health hazard. The owner or operator must record inspections in an inspection log or summary and, at a minimum, these records must include the date and time of the inspection, the name of the inspector, a notation of observations made, and the date and nature of any repairs or other remedial actions. The OSSC uses a form for its inspections which includes sections for the date and time of the inspection, the name of the inspector, and comments/corrective actions needed. Even though the form has a formal section for "Date Action Corrected + Initials," this section was not completed on any of the forms reviewed by the audit team. This makes it look as if the documented deficiencies are not being remedied. In addition, the form does not include all areas, e.g., the tank trailer, and what to look for during inspections there.

The apparent causal factors for this finding are inadequate training of personnel in the maintenance of data and the use of the form, and inadequate supervision to ensure the form is filled out completely and the operating record is maintained in a easily retrievable, understandable manner.

3.5 TOXIC AND CHEMICAL MATERIALS

3.5.1 Overview

The purpose of the toxic and chemical materials (TCM) portion of the LEHR-ER Environmental Audit was to evaluate facility compliance with requirements for storage, handling, and use of toxic and chemical materials, pesticides, and polychlorinated biphenyls (PCBs). TCM issues were addressed according to requirements under the Toxic Substance Control Act (TSCA); the Federal Insecticides, Fungicide, and Rodenticide Act (FIFRA); portions of the Clean Water Act (CWA) relevant to the storage of petroleum products; DOE Orders; and best management practices, which are accepted, standard procedures used by both industry and government for materials management. Table 3-5 lists the regulations, requirements, and guidelines used in this portion of the audit.

The TCM audit was conducted by reviewing pertinent LEHR-ER documents, including procedures, policies, inspection logs, inventories, and audit reports; interviewing LEHR-ER personnel; and inspecting the LEHR-ER facility.

There are minimal quantities of TCM in use or in storage at LEHR-ER. Current D&D operations are conducted "dry," and rely on physical disassembly and removal of contaminated site materials. There are no chemical strippers, solvents, or acids used during D&D. The only TCM stored at LEHR-ER consist of small quantities of gasoline (several 5-gallon cans) and 1 gallon of WD-40, which are used to maintain LEHR-ER vehicles and equipment, and 10-20 small cans of aerosol coatings. The materials are stored in a standard, flammable storage cabinet located outside of the buildings being decontaminated. The inventory of the contents of the cabinet and Material Safety Data Sheets for the stored materials are maintained by the D&DSC. TCMs are brought to the LEHR-ER site by the D&DSC. Any change in D&D operations requiring additional types or quantities of chemicals to be used at the site (beyond the equipment maintenance chemicals previously noted) would require the approval of the EMO. There have been no significant spills of TCM recorded during D&D.

LEHR-ER does not store or use any pesticide or herbicide materials. Pesticide or herbicide spraying and control is the responsibility of UCD (I-TCM-4).

All identified radioactive asbestos-containing materials at LEHR-ER were removed by D&D operations prior to the audit (I-TCM-3). Previous asbestos removal was conducted under applicable state permits. Asbestos waste disposal is addressed in the Waste Management Overview (see Section 3.4.1).

There is no PCB-containing equipment at LEHR-ER (I-TCM-6). All site transformers are owned by UCD. The site transformers have been tested and do not contain PCB oils (LEHR-270). Maintenance of site transformers is the responsibility of UCD (I-TCM-5).

Overall, the management of TCM at LEHR-ER is adequate, given the minor amounts of TCM used at the site.

There are no findings in the TCM portion of the Environmental Audit.

TABLE 3-5
LIST OF TOXIC AND CHEMICAL MATERIALS
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Titles	Authority
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5480.3	Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Waste	DOE
DOE 6430.1A	General Design Criteria	DOE
29 CFR 1910	Hazardous Materials Storage	OSHA
40 CFR 165	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), Pesticide Storage/Disposal Regulations	EPA
40 CFR 761	(TSCA) Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, Use Prohibitions	EPA
49 CFR 171, 173, 177, 178, and 397	Transportation of Hazardous Materials, Packaging, Marking, Spill Reporting, etc.	DOT
26 CCR Division 22	California Waste Management Regulations	California Department of Health Services

3.6 QUALITY ASSURANCE

3.6.1 Overview

The purpose of the quality assurance (QA) portion of the environmental audit was to evaluate the QA for LEHR-ER's environmental protection program which includes environmental monitoring, environmental restoration, and waste management activities. The environmental protection program was reviewed for compliance with DOE and regulatory agency QA requirements. The program was also reviewed against accepted best management practices. Table 3-6 lists the specific quality assurance regulations/requirements/guidelines used in this evaluation. The audit included reviews of laboratory data, purchase agreements of analytical laboratory services, QA plans, standard operating procedures, and site environmental reports.

LEHR-ER has a QA Plan that incorporates the requirements of DOE 5400.1 and DOE 5700.6C. QA activities for the LEHR-ER Project are provided in the following manner: QA support and oversight for the LEHR-ER Project is provided by the EMO QA Office. Both the D&DSC and S&GSC receive QA support and oversight from their respective corporate QA functions; and the OSSC has a designated QA officer responsible for its LEHR-ER activities. QA oversight of the EMO is the responsibility of EMO's quality assurance officer.

The EMO's QA plan for the LEHR-ER Project has been approved by SF. The subcontractors QA plans have been accepted by the EMO.

The LEHR-ER Project does not have an analytical laboratory onsite; therefore, all sample analyses are performed by offsite subcontracted laboratories. Depending on the subcontractor's area of responsibility for sampling for the LEHR-ER Project's environmental protection program, sampling is either conducted by personnel onsite or a sampling team brought onsite for that specific sampling event. Sampling and analysis for the LEHR-ER Project's environmental protection program are for both radiological and non-radiological constituents.

In general, the QA program for the LEHR-ER Project is documented, oversight responsibilities are established and implemented, audits and surveillances are being conducted, and support is being provided. Weaknesses evolve around implementing some of the fine but critical QA aspects of DOE Orders and DOE and regulatory agency guidelines.

There are three QA findings: two compliance findings and one best management practice finding. The compliance findings address the following areas: general quality assurance practices and interlaboratory performance evaluation programs. The best management practice finding addresses the QA section of the annual site environment report for Calendar Year 1991.

TABLE 3-6
LIST OF QUALITY ASSURANCE
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Titles	Authority
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5480.6	Radiological Control Manual	DOE
DOE 5700.6C	Quality Assurance	DOE
DOE Memorandum	Final Guidance for the Preparation of Annual Site Environmental Reports for Calendar Year 1991	DOE
40 CFR 136	Guidelines for Establishing Test Procedures for tne Analysis of Pollutants	EPA
40 CFR 141	National Primary Drinking Water Regulations	EPA
SW-846	Test Methods for Evaluating Solid Waste - Physical/Chemical Methods (Laboratory and Field Manuals)	EPA

3.6.2 Compliance Findings

QA/CF-1: Interlaboratory Performance Evaluation Programs

Performance Objective: DOE 5400.1, "General Environmental Protection Program," Chapter IV, Section 10, establishes the quality assurance and data verification requirements for environmental monitoring. Part C of Section 10 states "All DOE and contractor laboratories that conduct analytical work in support of DOE environmental radiological monitoring programs for radioactive materials shall participate in the DOE interlaboratory quality assurance program coordinated by the DOE Environmental Measurements Laboratory, New York, New York."

Best management practice suggests that contractor and subcontractor laboratories that conduct analytical work in support of LEHR-ER environmental monitoring programs participate in appropriate interlaboratory performance evaluation programs.

Best management practice also suggests that the analytical laboratory's performance in these interlaboratory performance evaluation programs, both radiological and non-radiological, be reviewed and assessed.

Finding: Laboratories that conduct analytical work in support of LEHR-ER's environmental monitoring programs are not required to participate in applicable interlaboratory performance evaluation programs as required by DOE 5400.1.

Discussion: Environmental monitoring is the collection and analysis of samples or direct measurements of environmental media. Environmental monitoring consists of two major activities: effluent monitoring and environmental surveillance. Currently, no effluent monitoring activities are being conducted for the LEHR-ER Project. The analytical laboratories, both radiological and non-radiological, providing technical support to the LEHR-ER environmental monitoring program are not required by contract to participate in interlaboratory performance evaluation programs.

Analytical laboratory participation in the radiological interlaboratory performance evaluation program is explicit in the DOE Order. Participation in non-radiological interlaboratory performance evaluation programs may not specifically be required at this stage of the LEHR-ER site remediation, but is a good general QA practice. Future LEHR-ER Project environmental surveillance activities may require participation in specific performance evaluation programs.

Information reported in the QA section of the LEHR-ER Environmental Monitoring and Surveillance Plan (LEHR-014) indicates that the primary subcontractor analytical laboratory participates in interlaboratory comparisons conducted by EPA and the U.S. Department of Energy Environmental Measurements Laboratory (EML). The laboratory's results in this interlaboratory performance evaluation programs were not available at the LEHR-ER Project.

Participation in interlaboratory performance evaluation programs can provide a mechanism to monitor and improve analytical laboratory performance and data quality. Once an analytical laboratory participates in an interlaboratory performance evaluation program,

review and assessment of their performance is another mechanism to monitor performance.

The apparent causal factor for this finding is inadequate policy implementation in that DOE policy on interlaboratory performance evaluation program participation in DOE 5400.1 has not been implemented.

QA/CF-2: **General Quality Assurance Practices**

Performance Objective: DOE 5400.1, "General Environmental Protection Program," states that a quality assurance program consistent with DOE 5700.6B (superseded by DOE 5700.6C) shall be established covering each element of environmental monitoring and surveillance programs commensurate with its nature and complexity. EPA guidelines included in SW-846, 40 CFR Part 136, and 40 CFR Part 141 recommend that quality assurance/quality control (QA/QC) procedures and practices resulting in technically valid environmental analysis data should be implemented

Finding: The QA/QC practices in some of the LEHR-ER Project environmental sampling and analysis activities are not sufficient to support the technical validity of the analytical data as required by DOE 5400.1.

Discussion: Deficiencies in the QA/QC practices observed in some of the LEHR-ER Project sampling and analysis activities include the following:

- The discharge point for collection of the LEHR-ER site's air effluent monitoring sample is not labelled (I-QA-1).
- The draft OSSC operating procedure used for the collection of airborne particulate samples for radiological assay does not specifically address the requirements for chain-of-custody of samples being delivered to the OSSC laboratory for screening (LEHR-292).
- Based on a review of the OSSC radioactivity counting data available from the survey of the LEHR-ER areas used for the maintenance and storage of radioactive materials, it could not be determined from the calculations on the completed survey form if the removable contamination levels are below the required limits indicated on NRC Regulation Guide 1.86 or DOE 5400.5.
- The OSSC's purchase orders for analytical laboratory services with the contracted analytical laboratories do not include requirements applicable to QA and QC (LEHR-279 and LEHR-281).
- The COC form (LEHR-285) employed by the S&GSC for groundwater samples differs from the accepted form in the Phase II Site Characterization Work Plan (LEHR-193).
- The LEHR-ER environmental dosimetry program does not require the inclusion of test exposure dosimeters (i.e., QC samples).

The items listed above are specific examples noted during the audit of practices that could cause the validity of the environmental monitoring data to be challenged.

The apparent causal factor for this finding is inadequate procedures in that procedures have not been established for these project activities.

3.6.3 Best Management Practice Finding

QA/BMPF-1: Annual Site Environmental Report

Performance Objective: DOE 5400.1, "General Environmental Protection Program," Chapter II, Section 4, requires an Annual Site Environmental Report (SER) "to present summary environmental data so as to characterize site environmental management performance, confirm compliance with environmental standards and requirements, and highlight significant programs and efforts." Attachment II-1 of the Order presents the suggested format and content of the report, which includes a section on quality assurance. The attachment states that "A quality assurance section should summarize the measures taken to ensure the quality of monitoring data. The overall program, including sampling, analysis, and data management, should be described for the radioactive and nonradioactive effluent and environmental monitoring. A summary of results from participation in interlaboratory cross-check programs should be included, listing site results and expected results." The Final Guidance for the Preparation of Site Environmental Reports for Calendar Year 1991 from EH-22 reiterates the requirements in the DOE Order.

Finding: The LEHR-ER Project Annual Site Environmental Report for Calendar Year 1991 did not include a complete summary of the measures taken to ensure the quality of data or the results from participation in interlaboratory cross-check programs for the laboratories that perform environmental radiological and nonradiological analyses for the site's environmental monitoring programs as required by DOE 5400.1.

Discussion: The Office of Environmental Compliance (EH-22) issued "Final Guidance for the Preparation of Site Environmental Reports for Calendar Year 1991" on February 13, 1992. The guidance was provided to clarify key reporting requirements and facilitate DOE review and approval for release of the SERs to the public in a timely fashion. The guidance for the 1991 reports addressed the need to include non-radiological monitoring and regulatory compliance data, and to ensure consistency among the various reports with regard to data presentation and the use of models and assumptions. To help accomplish this, EH-22 reviewed the draft Compliance Summary chapters for incorporation of these review comments in the reports. The Program Offices were also requested to provide comments on the draft Compliance Summaries to EH-22. EH-22 also recommended that the field offices coordinate technical review of the entire draft SERs with the Program Offices prior to forwarding the reports to EH-1 for approval to release.

The suggested content and format for the QA section of annual SERs includes the recommendation that the section address the measures taken to ensure the quality of the monitoring data and the results from participation in interlaboratory cross-check programs be incorporated in the report. The LEHR-ER Project Site Environmental Report for Calendar Year 1991 (LEHR-002) includes comments on some of the field QA samples but does not address the measures used by the analytical laboratories to ensure monitoring data quality. Incorporation of a summary of field and laboratory QA/QC measures along with interlaboratory cross-check program results for the laboratories supplying radiological and nonradiological analytical data would provide additional credibility to the environmental monitoring program's sample analysis data.

The apparent causal factor for this finding is that formal procedures have not been developed to implement current DOE Order guidelines which recommend that interlaboratory cross-check program results be incorporated into the SER.

3.7 RADIATION

3.7.1 Overview

The purpose of the radiation portion of the environmental audit was to evaluate environmental radiation protection programs at LEHR-ER to determine the status of the these programs and compliance with Federal, state, and local regulations, DOE Orders, and best management practices. Radiological environmental programs and activities were evaluated against the regulations and guidelines in Table 3-7.

The approach to the radiation portion of the environmental audit included inspections of facilities; interviews with EMO, subcontractors (D&DSC, S&GSC, and OSSC), and SF personnel; and review of site documents, procedures, and data. As part of the environmental radiation assessment, reviews were coordinated with other team members to ensure that all potential environmental radiation issues were identified and evaluated. Reviews were coordinated with the groundwater and surface water audit team specialists to evaluate sources of potential contamination from liquid releases; the quality assurance audit team specialist to assess QA in radiological monitoring programs; the air audit team specialist to assess air monitoring; and the waste management audit team specialist to assess adequacy of radioactive waste storage.

The environmental radiation protection and monitoring activities at LEHR-ER include environmental dosimetry with thermoluminescent dosimeters (TLDs); surface water and groundwater sampling; and stack sampling to determine the airborne releases from the D&D operations of the LEHR-ER facilities. D&D activities are currently underway at one building at LEHR-ER. Typically, the decontamination involves cutting and removing concrete to access and remove contaminated subsurface piping, scabbeling of the concrete surfaces, cutting and removing contaminated dog cages, and conducting radiation surveys to determine releasability of removable equipment. The contamination was the result of years of use of radioactive material (primarily Ra-226 and Sr-90) in beagle ingestion/clearance studies. Surveillance, maintenance, and decommissioning of contaminated facilities is documented in specific decontamination and decommissioning plans.

During D&D, the building air is filtered twice by high efficiency particulate air HEPA units before it leaves the building and in-stack air sampling is performed. To date, no significant releases have been noted. CAP-88 calculations are performed to ensure compliance with DOE and National Emission Standard for Hazardous Air Pollutants (NESHAPs) requirements (see also Section 3.1, Air). Confirmatory air monitoring is performed outside the stack, every 2 weeks, while D&D activities are underway.

Low-level waste is generated by the environmental restoration project and is stored in barrels, metal containers, and boxes (awaiting shipment to Hanford) at the ^{60}Co storage facility (building and yard), the South Cargo Container, and the Waste Staging Facility.

Daily radiation surveys are conducted in the D&D work areas and health physics technicians continuously monitor contamination levels. The radiation contamination control program is effectively implemented in D&D and waste storage areas.

TABLE 3-7
LIST OF RADIATION
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Titles	Authority
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5400.3	Hazardous and Radioactive Mixed Waste Program	DOE
DOE 5400.5	Radiation Protection of the Public and the Environment	DOE
DOE 5480.4	Environmental Protection, Safety, and Health Protection Standards	DOE
DOE 5480.6	Radiological Control Manual	DOE
DOE 5480.19	Conduct of Operations Requirements for DOE Facilities	DOE
DOE 5484.1	Environmental Protection, Safety, and Health Information Reporting Requirements	DOE
DOE 5700.6B	Quality Assurance	DOE
DOE 5820.2A	Radioactive Waste Management	DOE
40 CFR 61	National Emission Standards for Hazardous Air Pollutants	EPA
DOE/EH-0229	Performance Objectives and Criteria for Conducting DOE Environmental Audits	DOE
DOE/IG-0308	Packaging, Transporting and burying Low-Level Waste	DOE
Interim Guide March 8, 1991	DOE Guidance on the Procedures in Applying the ALARA Process for Compliance with DOE 5400.5	DOE
NRC	Proposed Rulemaking to Establish Radiological Control for Decommissioning	NRC
NRC	Radiological Criteria for Decommissioning of NRC-1 Licensed Facilities; Workshops	NRC
NRC	Regulatory Guide 1.86, Termination of Operating License for Nuclear Reactors	NRC

Direct radiation monitoring is performed using TLDs. The OSSC monitors the site perimeter, waste storage areas, areas awaiting D&D, and areas adjacent to buildings undergoing D&D.

Surface water is sampled quarterly. Beginning at the close of FY 1993, soil, sediment, and biota (e.g., vegetation) sampling will be performed annually in accordance with the site Environmental Monitoring and Surveillance Plan. An ambient air sampling program is not conducted at this time. Future characterization and restoration activities that have the potential to distribute contaminants into environmental media will require additional supporting radiological monitoring.

The current radiological environmental programs adequately address radiation issues present at the site. The contamination control program is well developed and effectively implemented. An air stack emissions sampling program has been developed. However, deficiencies in sample collection make the data less defensible (see also Section 3.1, Air).

No findings were identified in the radiation portion of the audit.

3.8 INACTIVE WASTE SITES

3.8.1 Overview

The inactive waste sites portion of the environmental audit evaluated the ongoing site assessment and characterization activity at LEHR-ER for its overall technical and programmatic quality and sufficiency with regard to the following: the statutory and regulatory provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA), including the Emergency Planning and Community Right-To-Know Act (EPCRA or SARA Title III); the National Contingency Plan (NCP), the Resource Conservation and Recovery Act (RCRA), and the Hazardous and Solid Waste Amendments (HSWA); the regulatory requirements of appropriate Federal, state, and local agencies; and the provisions of DOE Orders and Executive Order 12580 (Superfund Implementation) (see Table 3-8).

Since 1984, numerous site assessment and environmental characterization studies have been completed for LEHR-ER. Major studies, listed in chronological order, include: Initial Assessment Survey of the DOE LEHR Site of University of California, Davis (LEHR-066); Environmental Survey Final Report (LEHR-208); Groundwater and Soils Investigation, U.C. Davis LEHR Facility, Davis, CA (LEHR-062); Final SWAT Report, Old UCD Landfill, University of California, Davis (LEHR-065); and Phase II Site Characterization Report of the LEHR Environmental Restoration, University of California at Davis, Volume I (LEHR-011). In addition, a number of special focus studies have been undertaken to address such topics as aquifer characteristics, contaminant distributions, and potential migration pathways.

The Environmental Protection Agency (EPA) directed its contractor to perform a preliminary assessment of the LEHR site in 1989 (LEHR-074) for the purpose of scoring the site in accordance with CERCLA Hazard Ranking System (HRS) methodologies. Results of the EPA study were communicated to DOE and UCD in 1990 (LEHR-074). Both UCD and DOE commented to EPA in an attempt to resolve the technical and factual errors contained in the EPA contractor's report (LEHR-119 and LEHR-118, respectively). However, EPA has not acknowledged those proposed corrections and has not yet completed its HRS scoring of the LEHR site.

In February 1993, EPA listed the LEHR facility on the Federal Facility Hazardous Waste Compliance Docket (the Docket) (see 58FR7298) (LEHR-249). Section 120(c) of CERCLA requires EPA to compile and maintain the Docket, including all Federal facilities that had submitted information or reports to EPA regarding their hazardous waste activities as required by Sections 3005, 3010, and 3016 of RCRA, or that had filed notice of a CERCLA hazardous substance release as required by Section 103(c) of CERCLA. Specifically, the LEHR-ER site was included as a result of reports submitted to EPA under RCRA 3016, which provided an inventory of hazardous waste management sites at LEHR. Inclusion on the Docket requires a Federal facility to complete a CERCLA Preliminary Assessment (PA) and, if warranted, a Site Inspection (SI) within 18 months of listing. Inclusion on the Docket carries with it no implication regarding future NPL listing. Rather, the Docket was created as a means of compiling relevant information on Federal facilities and making this information readily available to the public.

TABLE 3-8
LIST OF INACTIVE WASTE SITES
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
Executive Order 125801	Superfund Implementation	U.S. President
CERCLA/SARA Public Laws 96-510 and 99-499	Section 103-Notices, Penalties	EPA
CERCLA/SARA Public Laws 96-510 and 99-499	Section 120-Federal Facilities	EPA
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5400.4	Comprehensive Environmental Response, Compensation, and Liability Act Requirements	DOE
DOE 5400.5	Radiation Protection of the Public and the Environment	DOE
DOE 5480.19	Conduct of Operations	DOE
DOE 5484.1	Environmental Protection, Safety, and Health Protection Information Reporting Requirements	DOE
DOE 5500.2A	Emergency Notification, Reporting and Response Levels	DOE
29 CFR 1910	Part 1910.120 Occupational Safety and Health Standards, Port 1910.134 Respiratory Protection	OSHA
40 CFR 300	National Oil and Hazardous Substances Contingency Plan (NCP)	EPA
40 CFR 302	Designation, Reportable Quantities, and Notification	EPA
40 CFR 355	Emergency Planning and Notification	EPA
40 CFR 370	Hazardous Chemical Reporting: Community Right-To-Know Act	EPA
40 CFR 372	Toxic Chemical Release Reporting	EPA

TABLE 3-8
LIST OF INACTIVE WASTE SITES
REGULATIONS/REQUIREMENTS/GUIDELINES

Regulations/ Requirements/ Guidelines	Sections/Title	Authority
OSWER Directive 9230.0-3B	Community Relations in Superfund: A Handbook Interim Version	EPA
OSWER Directive 9345.0-01	Preliminary Assessment Guidance FY 1988	EPA
OSWER Directive 9345.0-01A	Guidance for Performing Preliminary Assessments Under CERCLA (September 1991)	EPA
OSWER Directive 9355.3-01	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA	EPA
California Health and Safety Code, Chapter 6.95 Division 19	Hazardous Materials Release Response Plans and Inventory (Hazardous Materials Business Plan)	California Office of Emergency Services
Title 22 California Code of Regulations	Hazardous Waste Management Regulations	California Department of Health Services, Toxic Substances Control Program
California Health and Safety Code, Chapter 6.8, Division 20	Section 25319.51 Interim Guidance For Preparation of a Preliminary Endangerment Assessment Report (June 1990)	California Department of Health Services
Title 8, California Code of Regulations	California Health and Safety Regulations	California Department of Health Services

Continuing site characterization studies are being performed by the soils and groundwater subcontractor (S&GSC) under the direction of the EMO. Under the terms of a Memorandum of Agreement (MOA) (LEHR-060, LEHR-061, and LEHR-076), UCD provides health and safety oversight support to the S&GSC and is provided review opportunities on all technical workplans and reports. Under an independent initiative, UCD performs sampling and analysis of offsite groundwater domestic supply wells and irrigation wells and provides analytical results to the S&GSC. In addition, SF has entered into an Agreement in Principal (AIP) with the California Department of Health Services (DHS) (LEHR-077). Under the terms of that AIP, DOE provides the results of quarterly groundwater monitoring of the site to the DHS for incorporation into a state-wide groundwater data base and provides DHS with technical review opportunities on technical documents and reports related to the site characterization studies.

Over the history of the LEHR project, related activities have also taken place at four non-contiguous facilities, all owned by UCD. Cursory studies have been completed for these satellite locations and radiological surveys have been performed by UCD to ensure no immediate public safety problems exist (LEHR-250). SF recognizes DOE's responsibilities for these satellite facilities, but has assigned them a low priority with respect to formal CERCLA investigations (I-IWS-1). However, soil samples have been taken at one of the facilities, the Old Atomic Energy Commission (AEC) site, during the course of the Phase II site characterization and additional studies to investigate the septic tank still remaining on the Old AEC site are planned for the future, in conjunction with RI/FS studies at the main LEHR-ER site.

The Phase II Site Characterization Report completed in February 1993 (LEHR-011) provided the most comprehensive delineation of contaminant distributions in soils and groundwater beneath the site to date. That report also included a compilation and evaluation of all data collected in previous studies and evaluated all previous assessments and characterizations for their sufficiency in satisfying CERCLA technical and procedural requirements. The Phase II Site Characterization Report also provided a comprehensive evaluation of the site's present condition and overall environmental impact, utilizing only that data meeting applicable CERCLA data quality objectives and has proposed a strategy and schedule for removing identified CERCLA deficiencies and data gaps.

Major findings and conclusions contained in the Phase II Site Characterization Report included the following:

- Identified sources of contaminants include: one landfill comprised of three units, operated by UCD (only two units of which may have received DOE wastes); numerous shallow radiological waste disposal trenches (some of which received only UCD wastes, some of which received only DOE wastes, and others which may have received both UCD and DOE wastes); two former outdoor chemical dispensing areas; the Imhoff Strontium 90-containing wastewater treatment facility leach field; dry wells and associated septic tanks utilized for management of Radium 226-containing wastewaters; and dog pens.

- Organic, inorganic, and radiological contaminants are present in subsurface soils.

- Contamination has been observed in each of the first two hydrostratigraphic units (HSUs) existing beneath the site at depths ranging from approximately 45 to 130 feet below ground surface (bgs).

- Contaminant concentrations observed in groundwater monitoring wells are generally low, but some contaminants (e.g., nitrate, chromium VI, chloroform, 1,1-dichloroethane, and 1,2-dichloroethane) have been detected at levels exceeding their respective Maximum Concentration Levels (MCLs) as established under the Safe Drinking Water Act (SDWA).

- Topography, engineered barriers, and stormwater controls combine to virtually eliminate potential impacts to surface waters resulting from LEHR-ER contaminants.

Finally, although groundwater contamination levels above MCLs have been observed on the site, the current body of evidence does not suggest significant offsite contaminant migrations or adverse impacts to nearby privately-owned potable water supplies. However, additional sampling and aquifer characterizations are required before reliable groundwater and contaminant fate and transport models can be developed to predict offsite impacts with precision.

The technical quality of the latest site sampling and characterization work is very good and most technical conclusions are defensible. However, additional characterizations and refinements are necessary before comprehensive site evaluations can be developed. Although earlier DOE-sponsored studies had failed to satisfy their respective CERCLA standards, the S&GSC has developed an acceptable strategy for addressing all identified shortcomings in future characterization studies.

Given the relatively close proximity of all contaminant sources and the natural lability of the groundwater, it may be difficult to identify for remediation the discrete contaminant plumes emanating from each source. Under the MOA with UCD, SF has agreed to perform additional studies in a manner sufficient to identify impacts to soils and groundwater from all identified sources. The ultimate distribution of responsibility between UCD and DOE for remediation of contamination is expected to be based on the results of this sitewide characterization. The S&GSC is expected to provide a workplan for the next phase of the study, the Remedial Investigation/Feasibility Study (RI/FS), for review in June 1993.

DOE has anticipated the possibility that the LEHR site may eventually be listed on the National Priority List (NPL). However, exercising its discretionary authority under DOE 5400.4, SF has chosen to not pursue an Inter-Agency Agreement (IAG) at this time for RI/FS studies planned for the site. (If EPA does ultimately place the site on the NPL, DOE's discretionary authority will be preempted and an IAG will be required for RI/FS studies by Section 120(e) of CERCLA.)

It is also important to note that safety and health issues relating to LEHR-ER site characterization studies are particularly unique because of occupancy of certain areas of the site by UCD researchers not directly connected with or involved in site characterization activities. Under the MOA, UCD's Office of Environmental Health and Safety (EH&S) personnel provide the necessary liaison to other site occupants. Once site characterization activities are scheduled, the UCD EH&S personnel notify other UCD researchers on the

LEHR site, identifying the particular hazards and dangers associated with the planned activity and providing directions on how unnecessary exposures can be avoided. Importantly, the effort to identify and avoid hazards also extends to consideration of the research animals also on the LEHR site. The EH&S personnel also erect physical barriers when necessary and oversee the activity for health and safety issues. This important health and safety activity is very well coordinated and comprehensive in scope.

Finally, because DOE-sponsored research has ceased at LEHR, there are a very limited amounts of hazardous materials present at the site. The amounts of hazardous materials present are not sufficient to trigger reporting or emergency planning requirements under SARA Title III regulations (40 CFR 302 and 40 CFR 371).

Overall, the program for meeting CERCLA responsibilities is acceptable. The quality of the recent technical work is excellent and generally defensible. Earlier DOE-sponsored site characterization studies were insufficient in scope and data quality objectives to meet CERCLA requirements. However, it is expected that these shortcoming will be adequately addressed in future studies and that DOE will be able to fully satisfy its CERCLA responsibilities. Future programmatic issues (possible NPL listing) may affect the schedule of future studies, and may require DOE to expand its technical scope of work (e.g., expanded investigations of offsite impacts) and introduce additional program elements (e.g., Community Relations Plan and Record of Decision).

Two compliance findings and one best management finding were identified. The compliance findings relate to inadequacies of scope and methodologies of DOE-sponsored site characterization studies relative to applicable CERCLA requirements, and inadequate Health & Safety plans. The best management practice finding relates to establishing consistent data quality objectives for all sampling activities relating to the LEHR-ER site.

3.8.2 Compliance Findings

IWS/CF-1: Scope and Methodologies Employed in Preliminary Assessment/Site Inspection Studies

Performance Objective: DOE 5400.4, "Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] Requirements," states that DOE shall respond to releases or potential releases of CERCLA hazardous substances from facilities under its jurisdiction in accordance with requirements of CERCLA, as well as those of the National Contingency Plan (NCP) and Executive Order 12580. NCP regulations 40 CFR 300.410 and 40 CFR 300.420 require that lead agencies conduct Preliminary Assessments (PAs) and Site Inspections (SIs) as appropriate to develop an inventory of all actual or potential releases of CERCLA hazardous substances, develop a comprehensive history of waste handling activities on the facility, and develop a comprehensive evaluation of site conditions and environmental impacts. The Environmental Protection Agency (EPA) has published guidances for performance of PAs and SIs.

Finding: DOE-sponsored site assessment and characterization studies at LEHR-ER are not of sufficient scope and detail to fully satisfy requirements of DOE 5400.4, 40 CFR 300.410, 40 CFR 300.420, and EPA PA and SI Guidances.

Discussion: As part of the most recent characterization study completed in February 1993 (LEHR-011), the S&GSC has identified most of the inconsistencies and data gaps from previous studies and developed a strategy for addressing these inconsistencies in future studies. However, the scope of work for the Phase II work, just completed, was not comprehensive in its identification and evaluation of all possible pathways of contaminant migrations. Two examples are provided below.

A potable water supply well once existed within the footprint of the LEHR shop building. This well was used as the domestic supply well by previous site occupants (prior to 1959) and by LEHR in the early years of site occupancy by the LEHR project. Rates and volumes of water withdrawals from this well have never been cataloged. The well has been properly destroyed in accordance with applicable standards (LEHR-215, LEHR-219, and LEHR-220). Although the record shows that UCD also evaluated the chemical quality of the groundwater in this well prior to destruction (LEHR-213), the analytical results have never been made available to the S&GSC (I-IWS-11). Because the well was operational during the period of active use of one of the UCD landfill units and, at that time, represented the closest pumping well to the UCD landfill, and because the direction of groundwater flow in the second hydrostratigraphic unit (HSU) in which this well is screened is believed to be influenced by water withdrawals, it is important that the S&GSC collects all available information on the past water withdrawals from this well and considers the potential past impacts of this well on the direction and shape of contaminant plumes emanating from the UCD landfill unit (and from any other waste disposal and management areas also existing during this well's operational period). Failure to do so may result in inaccurate interpretation of contaminant spatial distribution data. Personnel from the S&GSC share these concerns and have indicated that further investigations of the destroyed well will be incorporated into future studies (I-IWS-10 and I-IWS-11).

A second example involves the failure to consider buried utility lines on the site as artificial conduits of subsurface contaminant migration. Various utility lines traverse the site,

including: potable water, wastewater/stormwater sewer, gas, electric, and communication. Many of these lines are expected to be located within underlying clays and some are proximate to identified probable sources of contamination (e.g., the Imhoff leach field and radium dry wells) at the same approximate depth below ground surface as the anticipated point of contaminant release. Because the native clays that underlie the site are relatively impermeable, the presence of a utility line within this stratigraphic unit, the excavation for which is probably backfilled with permeable materials for engineering stability, represents an artificial conduit for contaminant migration. Contaminants will follow the direction of the engineered utility line rather than the natural flow patterns of the vadose zone and HSUs. Although there is no evidence that migration of contaminants along utility lines has occurred to any significant extent, neither the studies completed to date nor the planned future studies include investigations of such possible migration pathways. Failure to do so may result in inaccurate interpretation of contaminant spatial distribution data and development of incorrect or incomplete contaminant fate and transport models for the site. More importantly, failure to recognize this contaminant migration pathway may result in offsite migrations going undetected and, consequently, unremediated (if necessary). The S&GSC acknowledges this as a legitimate concern and has indicated that the scope of work for future work will be expanded to include utility line investigations (I-IWS-10 and I-IWS-11).

The apparent causal factors for this finding are ineffective policy to ensure that ongoing and future site assessment and characterization studies are conducted in a manner consistent with guidances and DOE Orders and address all relevant technical issues and ineffective supervision at the time the scope of work for the Phase II study was under development.

IWS/CF-2: **Health and Safety Plans for Site Characterization Studies**

Performance Objective: DOE 5400.4, "Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] Requirements," states that DOE shall investigate releases and potential releases of CERCLA hazardous substances from facilities under its jurisdiction in accordance with the requirements of CERCLA, the National Contingency Plan (NCP), and Executive Order 12580. Regulations applicable to health and safety aspects of CERCLA site characterization activities have been promulgated by the Occupational Safety and Health Administration (OSHA) in 29 CFR 1910.120, including requirements to prepare and follow a site-specific health and safety plan. Title 8 of the California Code of Regulations (CCR) adopts the substantive provisions of 29 CFR 1910.120.

Finding: The Health and Safety Plan developed in support of the Phase II Site Characterization Study (LEHR-046) was not sufficiently site-specific for field sampling activities (soil borings) on the Old Atomic Energy Commission (AEC) site, as required by DOE 5400.4 and 29 CFR 1910.120.

Discussion: Chapter 3.0, "Facility Background/Work Plan," of the Health and Safety Plan for the recently completed Phase II Site Characterization Study (LEHR-046) acknowledges the fact that, while the field activities would take place primarily on the main site, soil sampling at the Old AEC site would also be part of the field investigations. Beyond this notice, however, the remaining chapters of the Health and Safety Plan are silent with respect to the Old AEC site. Phase II activities at the Old AEC site were minimal (consisting of the collection of 20 soil samples) and there is no evidence that the noted Health and Safety Plan deficiencies have resulted in adverse impacts to field personnel or the general public as a result of the conduct of field investigations at the Old AEC site.

Federal and state regulations require that site-specific considerations be part of Health & Safety Plans, including such items as hospital evacuation routes, the identification of hazards indigenous to each discrete location at which field activities will take place, and the development of specific engineering controls (including the identification of necessary personnel protective equipment) and directives sufficient to prevent adverse impacts to field personnel and the public from those identified hazards.

Future site characterizations are expected to involve additional field sampling activities at the Old AEC site. In addition, those future studies are also expected to involve monitoring well installation and sampling on lands contiguous to the main LEHR property for the purpose of better defining "background" groundwater conditions. The UCD is currently conducting agricultural research on these adjacent land parcels that is unrelated to LEHR. As a result, there may be unique, and perhaps not readily apparent, hazards (e.g., pesticides) associated with those research activities that would also deserve consideration in site-specific Health & Safety Plans developed to support field activities in those locations.

The apparent causal factors for this finding are inadequate policy implementation in the review of work plans to ensure adequacy and completeness and ineffective procedures for review of Health & Safety Plans.

3.8.3 Best Management Practice Finding

IWS/BMPF-1: Environmental Data Quality Objectives and Sampling and Analysis Plans

Performance Objective: Best management practice suggests that agreements be in place between parties engaged in the collection of environmental data which may be relevant to characterizing the environmental impacts from the LEHR-ER site to ensure that samples are collected and analyzed in a consistent manner to maximize the usability of such data. The term "consistent manner" can be defined by such criteria as: established data quality objectives, sampling and sample preservation protocols, quality assurance/quality control procedures (QA/QC) (including chain of custody considerations), specified analyses and methods, and analytical laboratory accreditation requirements.

Finding: DOE has not pursued a formal agreement with UCD that ensures that UCD's collection of data potentially relevant to defining the LEHR-ER site's environmental impacts meets the DOE data requirements.

Discussion: Currently, UCD is sampling privately-owned wells in the vicinity of the LEHR-site. The results are provided to DOE. Some of these potable wells may be screened in the second hydrostratigraphic unit and in a direction generally downgradient of contaminants observed in that groundwater unit beneath the LEHR site. Thus those wells may be potentially affected by LEHR contaminants (I-IWS-8). This activity is a UCD initiative, not formally a part of the DOE-sponsored LEHR-ER characterization study, but rather an activity undertaken by UCD to provide potentially affected individuals with information regarding the chemical quality of their drinking water in a timely manner (I-IWS-8). Nevertheless, the results from the sampling of these wells may have relevance to the LEHR-ER site study. Although UCD provides the S&GSC with the sampling results (I-IWS-8), the data cannot be fully integrated into the environmental data base developed in the site characterization study until the equivalency of data quality can be confirmed. The UCD sampling and analysis program for private wells is designed to meet the UCD-established program objectives. However, evaluation of the compatibility of the UCD program's data quality objectives with those of the LEHR-ER site characterization study has not occurred.

The site restoration contractor has indicated that future studies will undoubtedly include offsite sampling of groundwater both upgradient and downgradient of the site (I-IWS-3 and I-IWS-10). No determination of exact locations for these offsite sampling activities has been selected, however, and it is not clear whether existing offsite potable wells could be incorporated into those offsite investigations.

It is further important to note that the LEHR site is currently being considered by EPA for inclusion on the National Priorities List (NPL) (I-IWS-9; LEHR-074). If NPL listing occurs, DOE may be asked to demonstrate the nature and extent of offsite impacts of the LEHR site. While currently available environmental data collected in the characterization study can provide some projections with respect to offsite impacts, analytical data from potentially affected environmental media at offsite locations may be required to provide a more reliable demonstration. In that instance, the UCD offsite domestic well sampling results may become particularly important to DOE in meeting its CERCLA responsibilities and in developing a data base for determining necessary interim controls for offsite areas

(including provision of alternate water supplies). Finally, because well construction details for most of these private wells are unknown and the integrity of each well has not been documented, sampling results have limited value in support of groundwater modeling activities for the LEHR site, but nevertheless provide the necessary evaluation of the chemical quality of the formation water.

The apparent causal factor for this finding is a lack of policy addressing agreements to ensure that environmental data will be consistently gathered and exchanged to ensure its maximum benefit to all programs.

3.9 ENVIRONMENTAL MANAGEMENT

3.9.1 Overview

The environmental management portion of the environmental audit evaluated the status and effectiveness of the EM, SF, and LEHR-ER Project management as it related to ensuring environmental regulatory compliance and implementing DOE environmental protection policies and directives. The appraisal entailed an assessment of the LEHR-ER Project's onsite contractors' and subcontractors' management of the site's environmental protection programs and the LEHR-ER Project contractor's interfaces with SF and the ER program. The specific performance criteria against which the LEHR-ER Project management was assessed included, in part, the Environmental Management Performance Objectives and Criteria from the Performance Objectives and Criteria for Conducting DOE Environmental Audits (DOE/EH-0029). Table 3-9 lists the specific DOE Orders and guidelines used in this assessment to define the basis for functional relationships within and between DOE organizations and the LEHR-ER Project, and the environmental program organization within the LEHR-ER Project.

The environmental management appraisal portion of the environmental audit was accomplished through interviews and discussions with LEHR-ER Project onsite staff, Headquarters LEHR-ER Program staff, and SF staff; review of documents, policies, internal reports, and correspondence; and consultations with all environmental audit team specialists. The LEHR-ER Project's site facilities are owned by DOE and the land is owned by the UCD Regents and leased to DOE. DOE began cleanup and assessment activities at the LEHR-ER site in 1988. The initial work on the environmental restoration (ER) project was managed by UCD as part of their M&O contract. In early 1990, the current LEHR-ER Project onsite contractor was selected by SF to manage and oversee the LEHR-ER Project. The onsite contractor is charged with ensuring that the environmental protection program is implemented and policies and procedures are in place for the project and responsible for all related reporting to SF. The onsite contractor's project manager is also responsible for ensuring that the OSSCs and their subtier support contractors conduct operations according to established policies and procedures. The OSSCs include an OSSC tasked with providing project support in the areas of coordination and planning, technical, community relations, regulatory interface, QA and environmental monitoring, health and safety, oversight support for D&D and site characterization, data information and document control, waste management, and general services; a D&DSC tasked with conducting the onsite D&D activities for the site buildings; and a S&GSC tasked with conducting the site characterization of the soil and groundwater for the LEHR-ER.

In addition, SF and UCD have a Memorandum of Agreement (MOA) covering the environmental restoration and decontamination activities at the LEHR-ER site and the LEHR-ER Project activities (LEHR-076). The MOA establishes a steering committee responsible for the oversight of the environmental restoration at the site and for providing direction and objectives for the LEHR-ER Project. A technical advisory committee is also established through the MOA. The technical advisory committee reports to the steering committee and is charged with the routine planning and coordination of all environmental restoration and cleanup activities including review of technical plans, monitoring of project milestones, and producing monthly reports for review by the steering committee. EM-43 has contracted an independent verification contractor to validate the accuracy and completeness of field measurements or remedial radioactivity before, during, and after site

TABLE 3-9 LIST OF ENVIRONMENTAL MANAGEMENT REGULATIONS/REQUIREMENTS/GUIDELINES		
Regulations/ Requirements/ Guidelines	**Sections/Title**	**Authority**
DOE 5400.1	General Environmental Protection Program	DOE
DOE 5400.3	Hazardous and Radioactive Mixed Waste Program	DOE
DOE 5480.1B	Environment, Safety, and Health Program for Department of Energy Operations	DOE
DOE 5480.19	Conduct of Operation Requirements for DOE Facilities	DOE
DOE 5482.1B	Environment, Safety, and Health Appraisal Program	DOE
DOE 5700.6C	Quality Assurance	DOE

cleanup. The independent verification contractor will also review the procedures used during the cleanup operations.

The DOE and the State of California have entered into an Agreement in Principle (AIP) (LEHR-077) that reflects the understanding and commitments between the parties regarding DOE's provision to the State of California of additional technical and financial support, for state activities in environmental oversight, monitoring access, facility emergency preparedness, and initiatives to ensure compliance with Federal, state, and local laws. The LEHR-ER site is covered in the AIP.

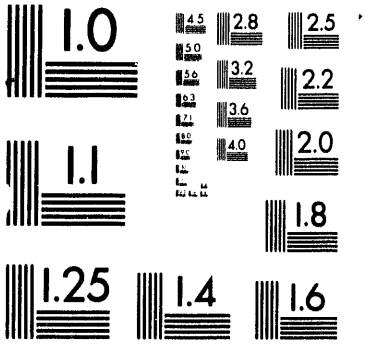
The SF Environmental Restoration and Waste Management Program Office is responsible for all compliance of contractors with all environmental regulations and DOE Orders. The Assistant Manager for Environment Management and Support (AMEMS) has responsibility for external oversight and technical support. The LEHR-ER Project Manager is integrally involved in project activities. Both the SF LEHR-ER Project Manager and AMEMS meet with the EMO to discuss and resolve environmental issues and problems. DOE-HQ support is provided by the LEHR-ER Program Manager.

The EMO to the LEHR Project has been managing the LEHR-ER Project for slightly more that 3 years under the EMO contract and has developed a reputation for making progress in effectively managing the site's environmental restoration and environmental monitoring activities. The success of the D&D and site characterization activities can be attributed to the dedicated and professional manner in which the OSSC, D&DSC, and S&GSC have performed their tasks. The OSSC has also played an important role in providing general support to the project's onsite activities.

The LEHR-ER Program Office, SF, EMO, OSSC, D&DSC, S&GSC, and UCD EH&S Office staffs were genuinely interested in the audit process producing constructive results. All of the onsite subcontractors were responsive to the audit team's requests and provided much insight into the management of the LEHR-ER Project. The progress of the LEHR-ER Project can best be summarized in the statement made by UCD, SF, and EMO personnel that the public and the University are pleased with DOE and the LEHR-ER Project because "they [DOE] are doing something to clean it up."

Overall, LEHR-ER Project management has been progressive but the LEHR-ER Project has not fully addressed the development and implementation of DOE guidance related to conduct of operations and the self-assessment programs. Another area identified as needing improvement is formal communications for the project. Internal communication can be improved; internal and external communication should be formalized. The followup of corrective actions for the SF environmental appraisal program was also identified as an area that is not being coordinated effectively.

The environmental management component of the audit identified three compliance findings and one best management practice finding. The compliance finding addresses the areas of environmental appraisal program, formality of environmental programs, and self-assessment program. The best management practice finding addresses internal and external communications.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3.9.2 Compliance Finding

EM/CF-1: Self-Assessment Program

Performance Objective: The DOE Office of Environmental Restoration and Waste Management (EM) has established the EM Self Assessment Management Plan, which incorporates the essential self-assessment program elements and organizational requirements established in the July 1990 guidance issued by the Secretary of Energy. The EM Self Assessment Management Plan applies to all programs, activities, operations, and facilities under the sponsorship or direction of EM and requires the development and implementation of a site-specific self-assessment program.

Finding: The LEHR-ER Project has not implemented a self-assessment program, as required by the EM Self-Assessment Management Plans.

Discussion: A formal self-assessment program implementation plan for the LEHR-ER Project, the EMO, and subcontractors involved in the project has been drafted and transmitted to SF (LEHR-278). Although the formal self-assessment program has not been implemented and to date a self-assessment has not been conducted, it should be noted that portions of some elements of a self-assessment program exist within the LEHR-ER Project such as audits and surveillances, and a formalized system for carrying out corrective actions.

An institutionalized program of self-assessment will assist the organization in identifying its own deficiencies and move it a mode which parallels DOE policy.

The apparent causal factor for this finding is inadequate policy implementation in that self-assessment guidance has not been implemented.

EM/CF-2: **Formality of Environmental Programs**

Performance Objective: DOE 5480.19, "Conduct of Operations Requirements for DOE Facilities," Chapter 1, Section A, states that effective implementation and control of operating activities is primarily achieved by established written standards in operations, periodically monitoring and assessing performance, and holding personnel accountable for their performance. Section B states that a high level of performance is accomplished by establishing operating standards, communicating these standards to the working level, and by providing sufficient resources to the operating departments.

DOE 5700.6C, "Quality Assurance," states that work shall be performed to established technical standards and administrative controls. This work shall be performed under controlled conditions using approved instructions procedures, or other appropriate means.

Finding: The LEHR-ER Project has not developed and implemented a formal conduct of operations program as required by DOE 5480.19 or fully implemented standards and controls required by DOE 5700.6C.

Discussion: The provisions of DOE 5480.19 apply to all contractors performing work for DOE. Conformance with the requirements of the Order are to be documented. The Order establishes that (1) each DOE contractor is to use the Order and its associated guidelines in the review and development of existing and proposed directives, plans, or procedures relating to the conduct of operations at DOE facilities; and (2) a graded approach is to be used in the application of the guidelines to ensure that the depth of detail required and the magnitude of resources expended for operations are commensurate with the facility's programmatic importance and potential environmental, safety, and health impact. However, it is not necessary to develop a separate manual or plan. As a minimum, a document (e.g., a matrix) is to be prepared in coordination with the Head of the Field Element and the cognizant Program Secretarial Officer. The document is to (1) indicate whether a specific guideline applies to the facility; (2) indicate where and how each of the guidelines are applied with the contractors existing policies and procedures; and (3) identify any deviations or exemptions from the guidelines. The document, as a minimum, is to be approved by the Head of the Field Element. The EMO has not developed and implemented a conduct of operations document for the LEHR-ER Project, but it has developed a conduct of operations index of the applicability of the conduct of operations Order to the LEHR-ER Project. This index has been transmitted to SF (I-EM-10).

In addition, a DOE Conduct of Operations Assessment of the LEHR-ER Project was conducted between November 16-19, 1992. A response to the assessment was transmitted to SF on January 27, 1993 (LEHR-012). As a result of the Conduct of Operations assessment performed at LEHR-ER, EM-25 has determined that implementation of conduct of operations requirements at D&D facilities needs major revisions. The current DOE Order and its guidelines do not differentiate between nuclear reactor operations and D&D sites. On April 6-7, 1993, EH-25 formed a working group to develop a guidance manual for facilities undergoing D&D. The working group identified major revisions in 9 of 19 chapters addressed in DOE 5480.19 and minor revisions in the remaining chapters. In addition to the DOE Order requirement to develop and implement a conduct of operations program, the formality is also prescribed in the DOE Order on quality assurance. A number of areas were identified during the audit as examples of operations where more formality is generally expected.

While a certain degree of formality is imposed on the LEHR-ER Project as a result of the QA requirements in DOE 5700.6C, discussions with many of the LEHR-ER Project staff (I-EM-9 and I-EM-10) indicate that since the project is relatively small, a high degree of formality is not necessary. To that end, a fair degree of informality permeates the project's operations. Examples include the data review of the environmental dosimetry program and the environmental air sampling program.

Environmental sampling data at LEHR-ER Project site are collected in order to be able to assess the impact upon the environment from DOE-related activities. These data satisfy two requirements, the scientific description of the impact and the requirement placed on DOE from upper management and outside regulatory agencies. As a consequence, data collection, timely analysis, and review are important to determine appropriate actions by EMO.

The data from the environmental dosimetry program are received by the responsible OSSC person. Although the data are usually sent to the EMO, the transmittal process is informal and the responsibility for review of the data is not formally defined.

The environmental air sampling program is also conducted by the OSSC. OSSC personnel perform the air sampling, analyze the samples, perform the calculations, and prepare a report. However, review of the report was not formally documented.

The apparent causal factors for this finding are inadequate policy implementation in that DOE policy on conduct of operations has not been implemented and procedures in that procedures have not been developed.

EM/CF-3: **Environmental Appraisal Program**

Performance Objective: DOE 5482.1B, "Environmental, Safety, and Health Appraisal Program," establishes the Environmental, Safety, and Health (ES&H) Appraisal Program for the Department of Energy. The Order requires line management to be responsible for effective ES&H performance in their programs. The ES&H appraisal program should provide management with an objective, timely, and reliable information on ES&H performance including timely notification of findings with an effective followup system.

Finding: SF has not implemented effective followup systems for environmental appraisal program findings as required in DOE 5482.1B.

Discussion: SF has conducted a number of onsite reviews and formal periodic appraisals of the LEHR-ER Project's environmental protection program (LEHR-129). SF has conducted several formal appraisals including a comprehensive Appraisal of the Environmental Monitoring Program in April 1992 (LEHR-129), and a Quality Assurance System Appraisal in September 1992 (LEHR-295). The environmental appraisal report provides recommendations for improvement of environmental program performance. The formal transmittal letter requests that an Action Plan to address the appraisal findings be submitted to SF within 30 days. The LEHR-ER Project responded but in several of the responses there is not a schedule for completion of the corrective action. In addition, the LEHR-ER Project records on this appraisal do not contain a formal response from SF on the acceptance of the project's planned actions to address the findings.

In addition to the formal appraisals, SF has conducted "walkthrough" and "waste management surveillances" at the LEHR-ER site. A waste management walkthrough was conducted in September 1992 and an environmental walkthrough was conducted in April 1993 (LEHR-078 and LEHR-083). The waste management surveillances are conducted on a more routine basis, at least bimonthly, and a formal checklist in completed and distributed to the EMO, the SF Program Manager, and other staff within the SF Environmental Restoration and Waste Management Division (LEHR-296). These oversight activities identify deficiencies a formal reports are transmitted to the project but discussions with SF indicate that formal corrective actions and plans are not required from the project and that the deficiencies and followup are not formally tracked (I-EM-3). In as much as these "informal" oversight activities are designed to improve the performance of SF's sites' environmental protection programs and associated activities, recommendations are included in the formal reports to the site (LEHR-078 and LEHR-296). The lack of formal followup by SF that includes oversight of the corrective action, a schedule for completion of the activities, and a scheme to review the progress of the corrective action activities will most likely result in inaction.

The apparent causal factor for this finding is the lack of policy implementation, in that DOE policy has not been fully implemented by SF for the environmental appraisal program, and other "informal" oversight activities.

3.9.3 Best Management Practice Finding

EM/BMPF-1: Internal and External Communications

Performance Objective: Best management practice suggests that formal communication mechanisms be in place to facilitate both the internal and external transmission of project information. Formal systems may be supplemented by informal systems of communication, especially when the project organization is small. Both formal and informal communication systems should facilitate the exchange of project information.

Finding: The internal and external communication systems do not always facilitate the transmission of LEHR-ER Project information. Many internal and external communications of LEHR-ER Project information by project staff and SF are informal.

Discussion: Both internal and external communications to the LEHR-ER Project are transmitted by numerous modes including memos, reports, letters, FAX, and telephone. While many of these modes of communication are formal, communications onsite are generally less formal, and some important external communications have been less formal than expected. This approach is accepted onsite as the normal mode of operation because "the project is small" (I-EM-10) but this approach does not ensure that all of the contractor and subcontractor managers receive project information in a timely fashion. Examples where existing communication arrangements do not satisfy the performance objective are as follows:

- Minutes of the LEHR Radiation Control Committee are distributed to the meeting attendees but not formally transmitted to all LEHR-ER Project onsite contractor and subcontractor managers (LEHR-251, I-EM-10, I-EM-11).

- The Waste Management Plan requires that the EMO Project Manager be informed of, and concurred with, any actions implemented to correct deficiencies in a waste management activity (LEHR-019). There is no formal procedure for OSSC Waste Coordinator to inform the EMO Project Manager of deficiencies identified in weekly inspections of hazardous waste management nor is there a formal process established for concurrence.

- EPA listed LEHR on the Federal Facility Hazardous Waste Compliance Docket in February 1993 (LEHR-249). This listing has resulted in explicit compliance requirements and schedules for DOE with respect to preliminary assessment and site inspection. Subsequent to the Docket listing, personnel from SF had a telephone conversation with EPA wherein EPA reportedly indicated that all reports previously sent to EPA regarding the LEHR site satisfied all of the explicit DOE responsibilities resulting from Docket listing (I-IWS-9). However, this telephone conversation has never been formalized by written confirmatory communication to EPA or by memoranda to the file.

The apparent causal factor for this finding is procedures, in that personnel have not been trained to effectively implement formal communication procedures.

APPENDICES

APPENDIX A

BIOGRAPHICAL SKETCHES OF THE ENVIRONMENTAL AUDIT TEAM

APPENDIX A:

BIOGRAPHICAL SKETCHES OF THE ENVIRONMENTAL AUDIT TEAM

NAME: Atam P. (Al) Sikri, Ph.D., P.E.

AREA OF RESP: Team Leader

ASSOCIATION: U.S. Department of Energy, Office of Environmental Audit

EXPERIENCE: 26 Years

- U.S. Department of Energy, Washington, DC
  - Team Leader, Office of Environmental Audit. Provides guidance, direction, and assistance to a multi-disciplined group of professionals performing Environmental Audits and Assessments at DOE facilities. Team Leader for the Uranium Mill Tailings Remedial Action Project Environmental Management Audit and the West Valley Demonstration Project Environmental Audit. Participated as the Environmental Subteam Leader for the Ames Laboratory, Naval Petroleum and Oil Shale Reserves, and Stanford Linear Accelerator Center Tiger Team Assessments; Assistant Subteam Leader for the Sandia National Laboratories Tiger Team Assessment; and a member of the Progress Assessment Team for the Savannah River Site.
  - Assessment and Validation Engineer, Office of Program/Project Management and Control. Provided independent appraisal of projects involving design/construction, environmental aspects, planning/scheduling, and cost estimating. Also, NEPA Compliance Officer for the Office of Procurement.
  - Program Manager/Assistant Director, Office of Fossil Energy. Responsible for directing and managing synthetic fuel research, development, and demonstration of technologies. Processes developed in full compliance with environmental regulations.
  - General Engineer. Office of Defense Programs. Worked with uranium enrichment technology, project management, and classification determination capability.
- Other Experience
  - Petroleum Engineer, U.S. Corps of Engineers. Work involved process design, project engineering, and cost studies.
  - Senior Process Design/Development Engineer. Worked with DuPont Company, Cities Service Company (now part of Occidental Petroleum Corporation), Johnson & Johnson, and Hoffmann-LaRoche, Incorporated.

EDUCATION:
Ph.D., Chemical Engineering, University of Pennsylvania
M.S.E., Chemical Engineering, University of Michigan
B.S.E., Metallurgical Engineering, University of Michigan
B.S.E., Chemical Engineering, University of Michigan

OTHER: Registered Professional Engineer

NAME: Ching-San Huang, Ph.D., P.E.

AREA OF RESP: Deputy Team Leader

ASSOCIATION: U.S. Department of Energy, Office of Environmental Audit

EXPERIENCE: 23 Years

- U.S. Department of Energy
  - Deputy Team Leader. Responsible for providing guidance, direction, and assistance to a multi-disciplined group of professionals performing environmental audits and Tiger Team Assessments at DOE facilities.

- U.S. Department of Defense
  - U.S. Army Environmental Hygiene Agency. Served as Sub-Program Manager in the area of hazardous waste minimization (HAZMIN), and multi-disciplined team leader for environmental audits; also conducted special studies, medical waste management, hazardous waste sampling, and personnel training.

  - U.S. Army HQ V Corps. As Environmental Branch Chief, supervised engineers engaged in engineering and consultation services with responsibility to plan, program, coordinate, and administer the environmental and sanitary missions in water, wastewater, solid/hazardous wastes, air pollution, and groundwater pollution.

  - U.S. Air Force. Worked as Project Manager in preparing statement of work, program plan, budgets, contractor proposal evaluation, and contract selection. Oversaw other engineers and scientists and contractors in conducting environmental impact statements (EISs), studies, design, troubleshooting, and analyses.

- Clinton Bogert Associates
  - As a Senior Staff Engineer in supervising water/wastewater and solid waste treatment process design, detailed design, pilot plant studies, cost-effective analyses, cost estimate, specifications preparation, solid waste management plans, and 201 Facility Plans.

- Metcalf & Eddy, Inc.
  - Work covered water/wastewater and solid waste treatment process design/detailed design and research, including reaction kinetics derivation, process parameter and process selection, pilot plant studies, treatment unit design and hardware selection, plant layouts, and technical report writing.

EDUCATION:
Ph.D., Environmental Engineering, State University of New York at Buffalo, NY
M.S., Civil Engineering, Cheng Kung University, Taiwan
B.S., Civil Engineering, Cheng Kung University, Taiwan

NAME: Susan Barisas

AREA OF RESP: Technical Coordinator

ASSOCIATION: Argonne National Laboratory

EXPERIENCE: 17 Years

- Argonne National Laboratory
  - Participant in the Tiger Team Assessments of Savannah River Site and Lawrence Berkeley Laboratory and Environmental Audits at the Environmental Measurements Laboratory, Southwestern Area Power Administration, Uranium Tailings Remedial Action Project, Alaska Power Administration, and the Component Development and Integration Facility sites. Provided technical assistance to the DOE in the development and execution of environmental survey and audit programs. Principal responsibilities include conducting environmental surveys at eight major DOE operating facilities, evaluating audit and appraisal procedures used by the DOE and private industry, and developing guidance manuals to be used by DOE facilities and field organizations.
  - Worked on various projects related to hazardous waste materials management. Responsibilities included developing hazardous waste and materials management plans, evaluating applicability of treatment and disposal options for synthetic fuels facilities, evaluating technologies for the treatment and disposal of PCB waste, and assessing the environmental impacts of alternative energy scenarios.
- Iowa Natural Resources Council
  - Developed task force reports on Water for Energy Production, Water for Commercial and Recreational Navigation, and Water quality for a State Comprehensive Water Plan. Aided in the development of a public participation program.

EDUCATION: M.S., Water Resources/Agricultural Engineering, Iowa State University
B.A., Biology, Grinnell College

NAME: David A. Dolak

AREA OF RESP: Air, Surface Water/Drinking Water, and Toxic and Chemical Materials

ASSOCIATION: Argonne National Laboratory

EXPERIENCE: 11 Years

- Argonne National Laboratory
  - Staff Scientist. Participated in the Tiger Team Assessment of Lawrence Berkeley Laboratory and environmental audits at the Southwestern Area Power Administration, Uranium Mill Tailings Remedial Action Project, the Component Development and Integration Facility, the Environmental Measurements Laboratory and Alaska Power Administration sites. Participated in numerous environmental audits of Air Force Bases under the USAF, Environmental Assessment and Compliance Management Protocol program.
- Versar, Inc.
  - Prepared remedial investigation/feasibility studies for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA) sites, and prepared environmental permits to comply with the Clean Water Act, Clean Air Act, and RCRA regulations.
  - Performed environmental insurance audits at industrial facilities to assess the sites' potential for financial liability due to chemical contamination, CERCLA responsibility, noncompliance with RCRA, or violation of Superfund Amendments and Reauthorization Act (SARA) Title III reporting requirements. Assisted various clients in preparing documents for hazardous materials reporting under SARA Section 311, 312, and 313, including data base development for Form R submissions.
  - Lead investigator in the allocation of liability costs to 30 individual parties responsible for toxic contamination at a Superfund site. Project Manager for the assessment and removal of hazardous materials at a large abandoned industrial site near Cleveland, Ohio.
- United States Steel Corporation; Seaway Laboratories
  - Analytical Chemist. Diverse background in wet chemical methods and instrument analysis of environmental media.

EDUCATION: M.S., Environmental Science, Water Chemistry, Indiana University
B.S., Environmental Science, St. Joseph's College

NAME: Rebecca A. Haffenden

AREA OF RESP: Waste Management

ASSOCIATION: Argonne National Laboratory

EXPERIENCE: 14 Years

- Argonne National Laboratory
  - Energy and Environmental Programs Attorney, Environmental Assessment and Information Sciences Division.
  - Performs environmental compliance audits for the U.S. Air Force under AF Regulations 19-16, Environmental Compliance Assessment and Management Programs. Responsible for reviewing documentation and examining hazardous waste or wastewater facilities to determine compliance with Air Force regulations and federal and state statutes and regulations.
  - Identifies potential applicable, relevant, and appropriate regulations (ARARs) for use in CERCLA documents such as Remedial Investigation/Feasibility Studies Workplans and potential regulatory limits for preliminary workplans to comply with Corrective Action Schedules of Compliance.
  - Drafted the Regulatory Compliance chapters in DOE Environmental Impact Statements for Western Power Administration, the Superconducting Supercollider and the New Production Reactor, including research and application of federal and state environmental statutes and regulations to the alternative actions proposed under each environmental impact statement.

EDUCATION: J.D., Suffolk University Law School
B.S., Psychology, University of Illinois

NAME: Ron Kolpa

AREA OF RESP: Groundwater, Inactive Waste Sites

ASSOCIATION: Argonne National Laboratory

EXPERIENCE: 20 Years

- Argonne National Laboratory

  - Staff Scientist, Regulatory Compliance Group Leader, Environmental Research Division. Principal responsibilities include CERCLA preliminary assessments and site investigations for the DOE, Department of Defense, Department of Commerce, and Army National Guard. Mr. Kolpa has also served as the project manager for property assessments required on Army properties as a result of the Base Closure and Realignment Act, and as Team Leader for site characterizations of Army National Guard properties throughout the United States. Mr. Kolpa has participated in the Tiger Team Assessment of Lawrence Berkeley Laboratory, environmental audits of the Southwestern Area Power Administration, Uranium Mill Tailings Remedial Action Project (UMTRA), the Component Development and Integration Facility, the Environmental Measurements Laboratory, and Alaska Power Administration, and an environmental management audit of the UMTRA project, Mr. Kolpa also has participated in Environmental Compliance and Management Plan (Audits) at Department of the Air Force facilities under the control of Air Force Space Command and Air Force Materiel Command. He has participated in DOE's development and evaluation of mixed waste management protocols for DOE installations. In addition, Mr. Kolpa serves on the Environmental Research Division's Environment, Safety, and Health Committee and previously served as the Environmental Compliance Representative for the Environmental Research Division. Mr. Kolpa is responsible for regulatory assessments for the Division's field investigation efforts.

- Iowa Department of Natural Resources

  - Prior environmental experience includes over 14 years as technical program specialist and Environmental Program Supervisor for regulatory programs in air, solid waste, and hazardous waste for the State of Iowa. Included during this period was a 2-year detail to the U. S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC, where his responsibilities included the development of Federal and state implementation strategies for hazardous waste programs developed under CERCLA and RCRA authorities.

EDUCATION: M.S., Inorganic Chemistry, Iowa State University
B.S., Chemistry, St. Procopius College

NAME: Peter C. Lindahl

AREA OF RESP: Quality Assurance, Environmental Management

ASSOCIATION: Argonne National Laboratory

EXPERIENCE: 21 Years

- Argonne National Laboratory

  - Group Leader. Principal responsibilities include supervision of environmental analysis group. Currently is a detailee to DOE's Office of Environmental Restoration and Waste Management in the Technology Development's Laboratory Management Division. Served as analytical laboratory project manager for the DOE Environmental Survey Program and as task manager for the development of gas analysis methods and associated quality assurance requirements for the DOE Waste Isolation Pilot Plant Pretest Waste Characterization Program. Also, participated in the DOE Tiger Team Assessments of Savannah River Site and Lawrence Berkeley Laboratory; environmental audits of the Southwestern Area Power Administration, Uranium Mill Tailings Remedial Action Project, Component Development and Integration Facility, Environmental Measurements Laboratory, and Alaska Power Administration; the DOE Operational Readiness Review of the Defense Waste Processing Facility at the Savannah River Site; and the DOE Environmental Management Audit of the Uranium Mill Tailings Remediation Action Project.

- Exxon Production Research Company

  - Senior Research Specialist. Responsible for supervision of inorganic analytical chemistry laboratory in support of coal, oil shale, and hydrothermal research projects.

- Perkin-Elmer Corporation

  - Senior Product Specialist. Responsible for atomic absorption spectrophotometry and analytical technical support.

- Illinois State Geological Survey

  - Associate Chemist. Responsible for the development of analysis methods for the determination of trace elements in coal.

EDUCATION: Ph.D., Analytical Chemistry, Southern Illinois University
M.A., Inorganic Chemistry, Southern Illinois University
B.A., Chemistry, Lake Forest College

NAME: Richard B. Lynch

AREA OF RESP: Technical Editor

ASSOCIATION: META

EXPERIENCE: 5 Years

- META, Inc.
  - Technical Editor. Provided technical writing and editing support for DOE on 13 Tiger Team Assessments, 6 ES&H Progress Assessments, and 2 Environmental Audits. Also, oversees the preparation of the final camera-ready copy of assessment and audit reports.
  - Writer/Editor. Provided technical writing and editing support to DOE's Office of New Production Reactors (NPR), including writing NPR's Correspondence Manual and a variety of technical articles for publication.
- Advanced Sciences, Inc.
  - Writer/Editor. Researched, wrote, and edited fact sheets and information briefs on energy conservation and renewable energy topics for a DOE-funded energy information service.
  - Response Analyst/Media Liaison. Analyzed and researched inquiries on energy topics from the general public, U.S. Congress, and trade associations. Also, wrote information briefs, monthly news releases, and conducted media outreach activities.

EDUCATION: B.A., Liberal Arts, Louisiana State University

APPENDIX B

ENVIRONMENTAL AUDIT PLAN

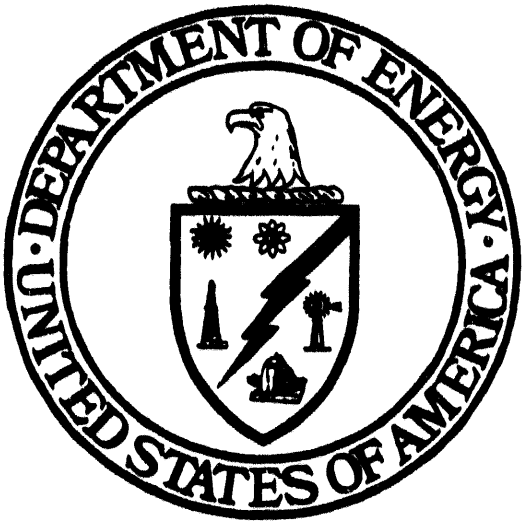
Plan for the

DOE Environmental Audit

of the

Laboratory for Energy-Related Health Research (LEHR-ER)

Davis, California



U.S. Department of Energy

Office of Environmental Audit

May 1993

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PLAN FOR THE DOE ENVIRONMENTAL AUDIT

OF THE

LABORATORY FOR ENERGY-RELATED HEALTH RESEARCH (LEHR-ER)

DAVIS, CALIFORNIA

MAY 1993

1.0 INTRODUCTION

The Office of Environmental Audit (EH-24) within the Office of Environment, Safety and Health (EH) performs independent audits and assessments as part of DOE's Environmental Audit Program.

This Environmental Audit Program, created in 1985, provides a continuing program of internal, independent oversight of line management's environmental performance to support DOE's broader goal of achieving full compliance and excellence in the environmental area. The Program's objectives include:

- Performing comprehensive, baseline environmental audits at facilities not addressed in Tiger Team Assessments;
- Performing audits on line program environmental management functions, including adequacy of self-assessment programs;
- Continuing technical reaudits at DOE facilities;
- Conducting focused, special issue audits for high priority issues at specific sites or across site and program lines; and
- Updating and automating audit protocols, training, and other mechanisms of transferring the special auditing expertise of EH-24 to the field in support of line management self-assessment programs.

An environmental baseline audit of the Laboratory for Energy-Related Health Research-Environmental Restoration (LEHR-ER) will be performed from May 10 through May 24, 1993. The purpose of the environmental audit is to provide the Secretary with information on the current environmental regulatory compliance status and associated vulnerabilities, root causes for noncompliance, adequacy of environmental management programs, and response actions to address the identified problem areas. The "DOE Environmental Audit Program Guidance" (January 1992) and "Performance Objectives and Criteria for Conducting DOE Environmental Audits" (DOE/EH-0229, February 1992) will be used to perform this audit.

The scope of the LEHR-ER Environmental Audit is comprehensive, covering all environmental media, DOE Orders, and Federal, state, and local regulations, requirements, and best management practices. The environmental disciplines to be addressed in this

audit include air, soil, surface water, hydrogeology, waste management, toxic and chemical materials, radiation, quality assurance, and inactive waste sites. The audit also addresses the performance of self-assessment and environmental management functions.

2.0 ENVIRONMENTAL AUDIT IMPLEMENTATION

The environmental audit of LEHR-ER will be conducted by a Team managed by a Team Leader and a Deputy Team Leader from the DOE's Office of Environmental Audit and technical specialists from Argonne National Laboratory. The administrative and technical editing support will be provided by Maria Elena Toraño Associates, Inc. (META). The names and responsibilities are listed below:

Al Sikri	DOE	Team Leader
Ching-San Huang	DOE	Deputy Team Leader
Susan Barisas	ANL	Technical Coordinator
Ron Kolpa	ANL	Inactive Waste Sites, Groundwater
Dave Dolak	ANL	Surface Water, Soils/Sediments/Biota, Toxic Materials, Air
Peter Lindahl	ANL	Environmental Management, Quality Assurance
Becca Haffenden	ANL	Waste Management
Chuck Salsbury	ANL	Radiation, Air
Helen Walters	META	Administrator
Richard Lynch	META	Technical Editor

2.1 PRE-AUDIT ACTIVITIES

Pre-audit activities for the LEHR-ER Environmental Audit included the issuance of an introduction and information request memorandum, a pre-audit site visit, and initial review of documentation which was sent to the Environmental Team by LEHR-ER as a result of the information request memorandum.

A pre-audit site visit was conducted on March 23-24, 1993, by the Team Leader and Deputy Team Leader, and the ANL technical coordinator and inactive waste sites/groundwater specialist. The purpose of the pre-audit visit was to become familiar with the site, to review information being supplied and request additional information, and to coordinate plans for the upcoming audit with DOE and contractor personnel.

This environmental audit plan is based upon the information received by the Environmental Team as of April 16, 1993.

2.2 ONSITE ACTIVITIES AND REPORTS

The onsite activities for the environmental audit will take place from May 10 through 24, 1993. Onsite activities will include field inspections, file/record reviews, and interviews with site personnel. The preliminary schedule for the audit is shown in the attached agenda. The agenda will be modified as needed during the early part of the onsite audit. Any and all modifications to the agenda will be coordinated with the principle contacts from LEHR-ER and DOE. LEHR-ER is requested to identify, as soon as possible, any facility activities such as sampling, spill response, or inspections which may occur during the audit so that Team members may observe the operations.

A daily debriefing with site/facility personnel will be held each afternoon at 4:30 pm at which time team specialists will describe their activities and identify issues that may develop into findings.

A closeout briefing will be conducted at the conclusion of the onsite activities on May 24, 1993. Findings and strengths from the environmental audit will be presented during that briefing. A draft report containing the results of the audit will be provided to LEHR-ER, the San Francisco Operations Office, and the Office of the Assistant Secretary for Environmental Restoration and Waste Management for their review and comment.

2.3 POST-SITE ACTIVITIES

Following the onsite activities, LEHR-ER will have the opportunity to submit final comments on the draft audit report. After reviewing these comments, EH-24 will issue a final report. LEHR-ER will be responsible for preparing a corrective action plan which will be reviewed by EH-24. The following is a tentative schedule for completion of these post-site activities.

June 8, 1993	Site comments on draft audit report due
June 22, 1993	Final audit report issued by EH-24
July 7, 1993	Draft corrective action plan due (six weeks after closeout)
July 21, 1993	EH-24 comments on draft action plan
August 4, 1993	Final action plan due

3.0 AIR

3.1 ISSUE IDENTIFICATION

The air portion of the environmental audit involves an assessment of facility-wide air emissions, emission control and emission monitoring procedures and equipment, and acquisition and processing of ambient air quality data, where appropriate. Areas of interest are the process emissions of particulates, organic vapors, inorganic compounds and air toxics. Operational and procedural practices associated with emission control equipment will be evaluated. Compliance with the local air authority's regulations, State of California regulations, National Emission Standards for Hazardous Air Pollutants (NESHAPs) requirements, and DOE Order requirements will also be assessed. The audit at LEHR-ER will assess emissions and emission control procedures for radionuclides and particulates, including asbestos, from the site during decontamination and decommissioning activities.

The general approach to the audit will involve a review of operating procedures, operating records and other relevant documents which identify sources of air emissions and demonstrate LEHR-ER's compliance status with respect to requirements. Following document review, a physical inspection of processes or operations, and emissions control and monitoring equipment will be accomplished along with interviews of site staff and managers.

3.2 RECORDS REQUIRED

Documents and files to be reviewed during the audit include, but will not be limited to, the following:

- Source and source emission inventories;
- Environmental monitoring reports;
- Reports on accidental releases of airborne substances;
- Operating and testing/maintenance procedures for control equipment;
- Air related correspondence with regulatory agencies including waivers or interpretations of air regulation applicability; and
- Monitoring/sampling program documentation.

4.0 SURFACE WATER

4.1 ISSUE IDENTIFICATION

The focus of the surface water/drinking water portion of the environmental audit will be on the release of contaminated or polluted wastewaters to the sanitary sewers, storm sewers, surface waters, and groundwater aquifers underlying the site. The audit will review the potential for contamination of wastewaters by metals, organics and radionuclides and review the present system for wastewater collection and discharge. Liquid waste treatment, collection and discharge equipment will be examined and records of operation will be reviewed. The audit will review current discharge permits or agreements with the University of California, Davis. A review of State of California agreements regarding surface water runoff or discharge control measures will be undertaken.

The audit will include identification of discharges (e.g., overland stormwater runoff) to surface waters, or to the sanitary sewer system, which may not be addressed in operating permits or other documents. A walk-through of LEHR-ER facilities will be made to observe normal practices. Spill prevention provisions for fuels and hazardous material storage areas will be reviewed, along with LEHR-ER's procedures for reporting spills.

The audit will also review drinking water distribution systems at LEHR-ER to determine compliance with regulations under the Safe Drinking Water Act for delivery of safe drinking water to employees.

4.2 RECORDS REQUIRED

Specific documents and files to be reviewed as part of the assessment include, but will not be limited to, the following:

- Sampling and analytical plans and/or data;
- Correspondence with state or local regulatory agencies regarding wastewater, drinking water or stormwater runoff controls and requirements;
- SOPs for wastewater or stormwater collection, holding and discharge;
- Drawings of sanitary, storm sewer and septic systems;
- Plans or diagrams showing where building floor drains discharge;
- Procedures for collecting samples of wastewater, surface water, and stormwater;
- Maintenance and inspection records for the drinking water system, including water tanks and cross connection/backflow prevention procedures;
- Spill prevention plans and records inspection;
- Internal memos or correspondence relating to surface water/drinking water problems;

- POTW and University of California, Davis discharge requirements for the LEHR-ER; and

- Other records as determined onsite.

5.0 GROUNDWATER

5.1 ISSUE IDENTIFICATION

The groundwater section of the environmental audit will involve the evaluation of both the programmatic and technical status of groundwater protection and monitoring activities as they are relate to regulations, DOE Orders, and best management practices. Regulations include California regulations pertaining to water resources and regulations and guidance developed as part of both the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) programs of the U.S. Environmental Protection Agency.

An evaluation of previous studies of the site hydrogeology, determination of the status of ongoing studies and investigations will be included in the audit. The adequacy of existing groundwater monitoring and characterization efforts will be determined by comparison to existing regulations, DOE Orders and best management practices. In addition to a document review, visits will be made to areas of interest to observe field conditions, monitoring well construction and location, well purging and sampling techniques, and field QA/QC procedures. Discussions will be held with site personnel and contractors who have responsibilities for groundwater protection, remedial action, and monitoring well sampling. Procedures and permits for well abandonment will be reviewed against applicable California regulations and best management practices.

5.2 RECORDS REQUIRED

Documents and records to be reviewed as part of the audit include the following:

- Data/maps concerning subsurface geology and hydrology;
- Groundwater Protection Management Plan documents or guidance;
- Groundwater Monitoring Plan including sampling procedures and analytical protocols;
- Recent (1990-1992) chemical analytical data for soil and groundwater samples;
- Well construction as-built diagrams and well/boring locations;
- Well abandonment procedures and permits;
- Current or historic groundwater discharge or well construction permits; and
- Any additional hydrogeologic or geologic investigation reports.

6.0 WASTE MANAGEMENT

6.1 ISSUE IDENTIFICATION

The waste management section of the environmental audit will address the generation and management of solid, hazardous, mixed and radioactive wastes, including accumulation, labeling, characterization, storage, transportation and disposal, with regards to DOE Orders, state and Federal regulations, and good management practices. In addition, this portion of the audit will evaluate LEHR-ER's compliance with applicable underground storage tank regulations.

Management of all waste streams will be reviewed. Specific issues that will be investigated include, but are not limited to:

- Status of waste generated and characterization of wastes disposed with respect to the Land Disposal Restrictions, DOE's mixed waste extension application, and toxicity characteristic leaching procedure requirements;
- Characterization of site investigation and decontamination and decommissioning wastes;
- Storage of waste sludge in the tank trailer;
- Status of onsite waste generation points (e.g., location, waste type, quantities);
- Manifesting and tracking of wastes;
- Status of hazardous, mixed, and radioactive waste storage areas;
- Permit status for storage of hazardous and mixed wastes;
- Solid waste accumulation, collection, treatment, transportation, and disposal;
- Training for waste generators and waste facility employees; and
- Underground storage tanks (USTs).

6.2 RECORDS REQUIRED

Specific documents and files to be reviewed as part of the audit include, but will not be limited to, the following:

- Written policies and procedures relating to waste management activities including waste management plans, waste minimization plans, internal procedures and other guidance documents;
- Waste generation and characterization documentation;

- Waste storage, treatment, and disposal records;
- Regulatory permits, permit applications, exclusions, or waivers related to waste management activities;
- Emergency spill response and cleanup procedures;
- Underground storage tank notification and associated records;
- Any inspection reports or notices of violation from the state or EPA with regard to hazardous waste management activities;
- Any internal audits or assessments of LEHR-ER's solid and hazardous waste management program;
- Environmental training records;
- Last 3 years of manifests; and
- Any liability audits that have been conducted for hazardous waste disposal or transportation contractors.

7.0 TOXIC AND CHEMICAL MATERIALS

7.1 ISSUE IDENTIFICATION

The toxic and chemical materials portion of the environmental audit will address the management and use of raw materials and chemical materials with reference to their handling, storage, and disposal. Any substances regulated by the Toxic Substances Control Act (TSCA) (for example, polychlorinated biphenyls (PCBs) and chlorofluorocarbons (CFCs), and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) will be evaluated. Any storage tanks used for chemicals and fuels, drum storage and dispensing facilities, and storage cabinets will also be included in the assessment. Information obtained will be evaluated to assess whether the management and control of toxic and hazardous substances are in compliance with Federal, state, and local regulations pertinent DOE Orders, and best management practices.

Toxic and hazardous materials (including oil) purchase and usage records will be reviewed along with procedures for safe storage, handling, and use of any hazardous materials. Areas where these materials are stored and used will be visited. The MSDS inventory will be reviewed to verify chemicals used at the site.

7.2 RECORDS REQUIRED

Specific documents and files to be reviewed as part of the audit include, but will not be limited to, the following:

- Toxic substances labeling and tracking system;
- Procedures for procurement, handling, storage, control, use, and management of toxic substances;
- Pesticide purchasing, training, handling, storage, disposal records, and environmental monitoring;
- Special procedures involving handling, storage, use, and disposal of chlorofluoroalkanes (freons) and chloro-organic solvents;
- Spill control and emergency preparedness plans for aboveground storage tanks;
- Audits or inspection reports pertaining to the toxic substances program; and
- Material Safety Data Sheets.

8.0 QUALITY ASSURANCE

8.1 ISSUE IDENTIFICATION

The quality assurance (QA) portion of the environmental audit will evaluate current environmental sampling and analysis procedures performed at LEHR-ER by contractors or subcontractors as to their compliance with Federal, state, and local regulations; DOE Orders; and current industry practices. Oversight of laboratories conducting analyses on LEHR-ER environmental samples will be evaluated to ensure that they are generating scientifically valid and defensible data. In addition to QA for environmental monitoring, the QA programs for all environmental functions will be reviewed.

Specific issues that will be addressed include sampling and analysis procedures for environmental samples; contractor and subcontractor laboratory procedures; oversight of contractor and subcontractor laboratories; personnel training; and chain of custody procedures. In addition, the QA programs for environmental programs will be evaluated including documentation of past audits or assessments performed by LEHR-ER; follow-up activities; a determination of the effectiveness of the QA program; and a review of the extent of interaction between LEHR-ER, San Francisco Operations Office, and DOE Headquarters.

8.2 RECORDS REQUIRED

Part of the audit will consist of a review of pertinent documents and files. This will include documents not previously reviewed or received, individual files, and documents which have not been identified at this time. Some specific documents and files to be reviewed include, but will not be limited to, the following:

- QA plans for any supporting analytical laboratories;
- Environmental sampling, analysis, and sample disposal procedures used by contractor(s);
- QA audits by DOE contractor(s) and subcontractor(s) conducting environmental sampling and analysis;
- QA plans, manuals and implementing procedures for any environmental surveillance programs;
- Summaries of results of QA sample analysis (conducted by LEHR-ER or subcontractors) of external performance evaluation sample;
- Procedures and QA requirements for acceptance of offsite sampling and analysis contractor(s) and subcontractor(s); and
- Data validation procedures used for the LEHR-ER project.

9.0 RADIATION

9.1 ISSUE IDENTIFICATION

The radiological portion of the environmental audit will involve the review and observation of site-wide radioactive emissions and effluents, emission and effluent control and monitoring, and the associated impact on the public and the environment. This review and observation will include direct radiation exposure issues, dose assessment methodologies and quality assurance programs for radiation-related environmental monitoring. The assessment will be performed to determine conformance with radiological standards and requirements in Federal, state, and local regulations and DOE Orders, as well as with best and accepted industry practices.

The assessment will be based on observations of processes, operations, emission control and monitoring and waste handling at LEHR-ER. Procedures and/or documentation associated with these activities will be reviewed and discussions will be held with operational and supervising personnel. Records, reports and other data associated with continuous, intermittent, and accidental releases, if any, will also be reviewed. Areas of special interest include: cleanup levels and associated documentation; sampling and analysis of environmental radiological samples; and adequacy of site radiological environmental protection program to implement established standards and requirements.

9.2 RECORDS REQUIRED

- Annual Environmental Monitoring Reports;
- Radioactivity data for all sampled media;
- Inventories of environmental releases and quantities;
- Unscheduled or unplanned release reports;
- Dose assessment methods and modeling;
- Radioactive waste work practices, procedures, and write ups;
- Decontamination and decommissioning information, plans, and data;
- Agreements, and statements of understanding between LEHR-ER, State of California, University of California-Davis, and DOE;
- Radiological Control Manual Implementation Plan.

10.0 INACTIVE WASTE SITES

10.1 ISSUE IDENTIFICATION

The inactive waste sites portion of the environmental audit will assess the compliance status of the facilities relative to the identification and characterization of past disposal sites and locations of spills/releases of hazardous materials or wastes. This portion of the audit will also evaluate the facility's compliance with respect to hazardous material inventory, reporting, and emergency planning responsibilities that may exist. The compliance evaluation will be made based against requirements specified in: the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA); the National Contingency Plan (NCP) and its implementing regulations contained in 40 CFR 300 et seq; the corrective action provisions of the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984; the Emergency Planning and Community Right-to-Know Act (EPCRA) under Title III of SARA; applicable DOE Orders and Executive Orders, including DOE 5400.4 (CERCLA Compliance) and Executive Order 12580 (Superfund Implementation) and applicable State of California regulations. The definition of a release under CERCLA includes any spilling, leaking, discharging, injecting, escaping, leaching, dumping, or dispensing into the environment (including the abandonment or discarding of barrels, containers or other closed receptacles) of any CERCLA hazardous substance as defined in 40 CFR 302.

The general approach to the inactive waste site portion of the audit will include a review of all relevant documents relating to the facility's efforts at discovery, identification, and characterization of past releases of CERCLA substances to the environment, a review of documents or plans for additional characterization or remediation of identified releases, observations of existing field conditions, observations of CERCLA-related field activities that will occur during the period of the audit (e.g., groundwater monitoring well sampling) and interviews with site personnel and technical support contractors involved in CERCLA related activities. Past and planned activities will be evaluated for the consistency of their technical approach with applicable EPA regulations and guidances and their sufficiency with respect to DOE Orders. The inactive waste sites portion of the audit will also investigate any existing agreements between LEHR-ER and the land owner, the University of California at Davis, which impact or otherwise support on-going CERCLA-required investigations and remediations.

10.2 RECORDS REQUIRED

The types of records to be reviewed will include, but are not limited to the following:

- Any permits or compliance agreements addressing past practices that may have resulted from releases of contaminants to the environment;
- Previous environmental audit or inspection reports from outside agencies or internal efforts;
- Preliminary Assessment (PA) and/or Site Inspection (SI) reports;
- Historical site maps and aerial photos;

- Work plans or sampling plans for on-going or planned investigative activities (including all necessary supporting documents such as QA/QC Plans, Health and Safety Plans, etc.).

- Environmental Protection Implementation Plans;

- Notifications or emergency response planning documents submitted to local public authorities;

- Memoranda of Agreement with the University of California-Davis with respect to site characterization and remediation activities;

- All compliance agreements or related correspondence between the facility and state or Federal environmental regulatory authorities regarding site characterization and/or remediation activities.

11.0 ENVIRONMENTAL MANAGEMENT

11.1 ISSUE IDENTIFICATION

The Environmental Management portion of the LEHR-ER environmental audit will include an assessment of the overall policies and procedures implemented to ensure conformance with Federal, state, and local statutes and regulations; DOE Orders; and commonly accepted best industry practices for general environmental protection and waste management programs. The principal focus will be to assess if there is a sufficient management understanding and oversight of environmental protection programs, and an effective communication of these programs to managers and staff. Oversight of the environmental compliance process is a critical element of environmental management and will also be evaluated as part of this audit.

The general approach to the audit will include reviews of LEHR-ER's environmental protection program, policies, and procedures documentation and interviews with personnel, at DOE-HQ, San Francisco Operations Office, and LEHR-ER, who are responsible for implementation of environmental protection programs. The management audit will concentrate on the organizational and procedural arrangements by which all regulations, DOE Orders, and best management practices are implemented. Of particular interest will be determining if formal arrangements are in place to comply with the above and if these formal arrangements are part of the informal routine of the operation. Also of interest will be the interagency relationships that determine, oversee, or facilitate compliance.

Also of interest will be the effectiveness of management: (1) in meeting the intent of DOE environmental policies; (2) in translating the DOE policies into a useable implementation program; (3) in communicating the environmental protection program to the staff; and (4) in establishing a reasonable oversight program to ensure the staff, DOE consultants, and contractors are satisfying the program objectives.

11.2 RECORDS REQUIRED

- Environmental Protection Implementation Programs;
- LEHR-ER Environmental Policies and internal documents;
- Environmental compliance audit reports;
- Internal documents relative to Audit findings;
- Long Range Environmental Plan;
- Self-Appraisal Reports, internal appraisals and corrective action plans;
- Charters of technical advisory committees or groups;
- Contracts or agreements for LEHR-ER management and contracted/subcontracted support;

- Documents on LEHR-ER Project interaction with Federal, state, and local regulatory agencies;
- Standards for the preparation, review, approval, maintenance and control of environmental compliance procedures and documents;
- Position descriptions;
- Environmental compliance program training; and
- Other records as determined onsite.

APPENDIX C

ENVIRONMENTAL AUDIT TEAM SCHEDULE OF ONSITE ACTIVITIES

APPENDIX C:

ENVIRONMENTAL AUDIT TEAM
SCHEDULE OF ONSITE ACTIVITIES

Week 1	Mon. 6/10/93	Tues. 6/11/93	Wed. 6/12/93	Thurs. 6/13/93	Fri. 6/14/93	Sat. 6/15/93
D. Dolak am Air Surface Water/Drinking Water Toxic and Chemical Materials	• Orientation • Site Tour	• Interviews - G. Atchinson LEHR Site Superintendent	• Interviews - A. Tackett OSSC Project Manager - J. Sarge H&S supervisor	• Interviews - C. Judal Assistant Technologist	• Write Findings and Overview	
pm	• Interviews - D. Mitchell EMO Assistant Project Manager - R. Moren Project Geologist/Project Coordinator - S. Black Environmental Engineer - A. Rose Supervisor	• Interviews - D. Mitchell EMO Assistant Project Manager	• Interviews - S. Black DOE Environmental Engineer, telephone interview	• Write Findings and Overview - G.Atchinson LEHR Site Supervisor	• Interviews - T. Chapman Project Manager	

ENVIRONMENTAL AUDIT TEAM
SCHEDULE OF ONSITE ACTIVITIES (continued)

Week 1	Mon. 5/10/93	Tues. 5/11/93	Wed. 5/12/93	Thurs. 5/13/93	Fri. 5/14/93	Sat. 5/15/93
Ron Kolpa am Groundwater and Soils/Sediment/Biota Inactive Waste Sites	• Orientation • Site Tour	• Interviews - R. Moren LEHR Rerstoration Project Coordinator	• Interviews - R. Ollikkala Occupational Health and Safety Manager - A. Tackett, LEHR Project Manager	• Interviews - J. Niland Associate Group Manager - J. Bold Soil Scientist - W. Short Senior Engineer	• Interviews - R. Liddle Chief, Environmental Technical Restoration Branch - S. Attiga EMO Senior Project Manager	• Write Findings and Overview
pm	• Interviews - E. Ballard Chief, Environmental and Technical Branch - J. Montella LEHR Project Manager	• Interviews - H. Joma Geologist, Waste Management Branch - E. Kilduff Hydrogeolist - S. Attiga EMO Senior Project Manager	• Interviews - T. Ha SF Technical Advisor on CERCLA and UST program issues	• Write Findings and Review Documents	• Interviews - E. Ballard Chief, Environmental Technical Restoration Branch • Write Findings and Overview	

ENVIRONMENTAL AUDIT TEAM
SCHEDULE OF ONSITE ACTIVITIES (continued)

Week 1	Mon. 5/10/93	Tues. 5/11/93	Wed. 5/12/93	Thurs. 5/13/93	Fri. 5/14/93	Sat. 5/15/93
Becca Haffenden am Waste Management	• Orientation • Site Tour	• Interviews - D. Mitchell EMO Assistant Project Manager - A. Tackett OSSC Manager - G. Atchinson D&D Site Superintendent	• Interview - C. Forman UCD Industrial Hygienist (telephone)	• Interviews - J. Warren OSS Group Leader Integrated Hazardous Waste Program - R. Moren ST&G Project Geologist/Project Coordinator	• Followup Interviews	• Write Findings and Overview
pm	• Interviews - W. Kao DOE Waste Management Division Environmental Engineer - R. Roberts DOE Environmental Restoration and Waste Management Waste Engineer - E. Ballard DOE Chief, Environmental and Technical Branch	• Interviews - J. Aborn OSS Waste Coordinator - R. Keen D&D Waste Coordinator	• Review Documents	• Review Documents	• Interviews - K. Jester UCD Incident Commander	

ENVIRONMENTAL AUDIT TEAM
SCHEDULE OF ONSITE ACTIVITIES (continued)

Week 1	Mon. 5/10/93	Tues. 5/11/93	Wed. 5/12/93	Thurs. 5/13/93	Fri. 5/14/93	Sat. 5/15/93
Peter Lindahl am Quality Assurance Environmental Management	• Orientation • Site Tour - A. Dong Director, Environmental Restoration and Waste Management Division - E. Ballard Chief, Environmental and Technical Branch	• Interviews - A. Tackett OSSC Project Manager - B. Shanks UCD Director, Office of ES&H - R. Moren LEHR Restoration Project Coordinator	• Interviews - C. Taylor Senior Quality Engineer - A. Tackett LEHR Project Manager - G. Atchinson Site Superintendent	• Interviews - C. Judal Assistant Technologist - C. Taylor Senior Quality Engineer - J. Montella LEHR Program Manager	• Interviews - J. Davis Assistant Manager for Environmental Management and Support - R. Liddle Chief, Environmental Technical Restoration Branch	• Write Findings and Overview
pm	• Interviews - J. Montella LEHR Program Manager - R. Roberts Environmental Restoration and Waste Management Waste Engineer	• Interviews - S. Attiga Senior Program Manager - D. Mitchell Assistant Project Manager	• Interviews - M. Spector Acting QA Officer - G. Grissett Project QA Supervisor	• Interviews - D. Mitchell Assistant Project Manager	• Followup Interviews - D. Mitchell Assistant Project Manager - E. Ballard Chief, Environmental Technical Restoration Branch	

ENVIRONMENTAL AUDIT TEAM
SCHEDULE OF ONSITE ACTIVITIES (continued)

Week 1	Mon. 5/10/93	Tues. 5/11/93	Wed. 5/12/93	Thurs. 5/13/93	Fri. 5/14/93	Sat. 5/15/93
Chuck Salsbury am Radiation	• Orientation • Site Tour	• Interviews - T. Chapman Project Manager - D. Mitchell Assistant Project Manager	• Interviews - G. Atchinson Site Superintendent - S. Attiga Senior Program Manager - D. Mitchell Assistant Project Manager - J. Aborn Waste Coordinator	• Interviews - C. Judal Assistant Technologist - R. Moren Project Geologist/Project Coordinator	• Interviews - M. Spector Acting QA Officer - M. Kirksen Health Physicist	• Write Findings and Overview
pm	• Interviews - S. Lasell Nuclear Engineer	• Interviews - C. Judal Assistant Technologist - P. Rogers Health & Safety Officer	• Interviews - J. Sarge H&S supervisor - A. Ulrich Instrumentation Specialist	• Followup Interviews	• Write Findings and Overview - D. Mitchell Assistant Project Manager - A. Tackett, LEHR Project Manager	

ENVIRONMENTAL AUDIT TEAM
SCHEDULE OF ONSITE ACTIVITIES (continued)

Week 2	Mon. 5/17/93	Tues. 5/18/93	Weds. 5/19/93	Thurs. 5/20/93	Fri. 5/21/93
Dave Dolak a.m. Air Surface Water/Drinking Water Toxic and Chemical Materials	• Interviews - G. Atchinson Site Superintendent	• Draft Findings to Site - Toxic and Chemical Material - Surface Water - Air - A. Tackett OSSC Project Manager	• Factual Accuracy Review - Air		
p.m.		• Factual Accuracy Reviews (FARs) - Toxic and Chemical Material - Surface Water	• Revisions as required		

ENVIRONMENTAL AUDIT TEAM
SCHEDULE OF ONSITE ACTIVITIES (continued)

Week 2	Mon. 5/17/93	Tues. 5/18/93	Wed. 5/19/93	Thurs. 5/20/93	Fri. 5/21/93
Ron Kolpa a.m. Groundwater and Soils/Sediment/Biota Inactive Waste Sites	• Interview - D. Mitchell EMO Assistant Project Manager • Write Findings	• Write Findings and Overview	• Factual Accuracy Review (FAR) - Inactive Waste Sites • Draft Findings to Site - Groundwater	• Factual Accuracy Review (FAR) - Groundwater	
p.m.	• Observe groundwater sampling • Interview - D. Zuber Field Geologist - G. Fernald Sampling Technician • Write Findings and Overview	• Draft Findings to Site - Inactive Waste Sites	• Revisions as required	• Revisions as required	

ENVIRONMENTAL AUDIT TEAM
SCHEDULE OF ONSITE ACTIVITIES (continued)

Week 2	Mon. 5/17/93	Tues. 5/18/93	Weds. 5/19/93	Thurs. 5/20/93	Fri. 5/21/93
Becca Haffenden a.m. Waste Management	• Write Findings and Overview • Interviews - W. Kao DOE Waste Management Division Environmental Engineer (telephone) - E. Ballard DOE Chief, Environmental and Technical Resources Branch (telephone)	• Draft Finding to Site - Waste Management	• Revisions as required		
p.m.		• Factual Accuracy Review - Waste Management			

ENVIRONMENTAL AUDIT TEAM
SCHEDULE OF ONSITE ACTIVITIES (continued)

Week 2		Mon. 5/17/93	Tues. 5/18/93	Wed. 5/19/93	Thurs. 5/20/93	Fri. 5/21/93
Peter Lindahl Quality Assurance Environmental Management	a.m.	• Observe groundwater sampling - G. Fernald Sampling Technician - R. Zuber Field Geologist	• Write Findings and Overview	• Draft Findings to Site - Quality Assurance	• Draft Findings to Site - Environmental Management • Factual Accuracy Review - Quality Assurance - Environmental Management	
	p.m.	• Write Findings and Overview	• Write Findings and Overview	• Factual Accuracy Reviews - Quality Assurance - Environmental Management	• Revisions as required	

ENVIRONMENTAL AUDIT TEAM
SCHEDULE OF ONSITE ACTIVITIES (continued)

Week 2		Mon. 5/17/93	Tues. 5/18/93	Weds. 5/19/93	Thurs. 5/20/93	Fri. 5/21/93
Chuck Salsbury Radiation	a.m.	• Review Documents	• Write Findings and Overview	• Draft Finding to Site - Radiation - D. Mitchell Assistant Project Manager		
	p.m.	• Write Findings and Overview	• Write Findings and Overview	• Factual Accuracy Review - Radiation • Revisions as required		

APPENDIX D

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM

APPENDIX D:

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-001	Site Specific Plan for Environmental Restoration and Waste Management at the Laboratory for Energy-Related Health Research Fiscal Year 1992	UCD	UCD	DOE	1992
LEHR-002	Annual Site Environmental Report for the Laboratory for Energy-Related Health Research University of California, Davis for Calendar Year 1991	SF	DOE	DOE	4/30/92
LEHR-003	Annual Site Environmental Report for the Laboratory for Energy-Related Health Research University of California, Davis for Calendar Year 1990	SF	DOE	DOE	1990
LEHR-004	Laboratory for Energy-Related Health Research Site Environmental Monitoring Report for Calendar Year 1989	S. Eckberg	UCD	DOE	1989
LEHR-005	Laboratory for Energy-Related Health Research ER Project Personnel	Not indicated	UCD	DOE	Not indicated
LEHR-006	Laboratory for Energy-Related Health Research Site Map	Not indicated	LEHR	DOE	Not indicated
LEHR-007	LEHR Project Organization Chart	Not indicated	LEHR	DOE	8/11/92
LEHR-008	Audits/Surveillance/Inspections	Not indicated	LEHR	DOE	Not indicated
LEHR-009	Quarterly Groundwater and Surface Water Monitoring Results Spring Quarter 1992	Battelle	Battelle	SF	2/3/93
LEHR-010	Intentionally Omitted (Duplicate LEHR-009)	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-011	Phase II Site Characterization Report LEHR Environmental Restoration University of California at Davis, Volume I	Not indicated	SF	DOE	2/93
LEHR-012	Letter to J. Montella re: Response to DOE 5480.19, "Conduct of Operations Assessment" findings, LEHR	S. Attiga	Battelle	DOE	1/27/93

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-013	Emergency Response Plan, Revision I	Not indicated	BEI	DOE	12/17/92
LEHR-014	Environmental Monitoring and Surveillance Plan for the Laboratory for Energy-Related Health Research Environmental Restoration Project	Battelle	Battelle	SF	9/23/92
LEHR-015	Letter to E. Ballard re: Air Emissions Annual Report	S. Attiga	Battelle	SF	6/3/92
LEHR-016	Reconstruction of Dose Equivalents to the Public on University of California, Davis, Property from the ^{60}Co Irradiator Facility	T. Chapman	Battelle	SF	5/91
LEHR-017	Reconstruction of Dose Equivalents to the Public from the ^{60}Co Irradiator Facility at the Laboratory for Energy-Related Health Research	T. Chapman, R. Scherpelz	Battelle	SF	3/91
LEHR-018	Occurrence Report	Not indicated	LEHR	DOE	9/25/92
LEHR-019	Revised Waste Management Plan for the Laboratory for Energy-Related Health Research University of California, Davis	Not indicated	BEI	Battelle	12/91
LEHR-020	Letter to S. Attiga re: Work Plan, Characterization and Disposal of Soil Cuttings Contained in Roll-Off Containers Utilized During DOE Phase II Site Characterization Activities, LEHR Environmental Restoration, University of California, Davis	S. Eckberg	LEHR ER	Battelle	4/10/91
LEHR-021	Waste Characterization Stored Wastes LEHR Environmental Restoration Davis, CA	Not indicated	D&M	LEHR	10/92
LEHR-022	Intentionally Omitted (Duplicate of LEHR-020)	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-023	Letter to D. Hartline re: Discharge of LEHR Deep Monitoring Well Development Water to the UC Davis Sanitary Sewer System	C. Owen	UCD	UCD Physical Plant	1991
LEHR-024	Compilation Hazardous Waste Manifests	Various	Various	LEHR	Various
LEHR-025	Letter to E. Ballard re: Submittal of the LEHR Federal Agency Pollution Abatement Plan, Circular No. A-106	S. Attiga	Battelle	SF	6/12/92

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-026	Revised Waste Management Plan for Laboratory for Energy-Related Health Research, University of California, Davis	Not indicated	BEI	Battelle	3/12/92
LEHR-027	Certificate of Registration for Asbestos-Related Work and Operating Manual	Asbestos Operations Division	IDM Corp.	LEHR	12/8/92
LEHR-028	Draft Contingency Plan and Emergency Procedures for the Mixed Waste Storage Facility at the Laboratory for Energy-Related Health Research	Not indicated	UCD	LEHR	11/20/92
LEHR-029	Flammable Liquid Storage Cabinet Inventory	Not indicated	LEHR	DOE	Not indicated
LEHR-030	Compilation of Waste Inventories	Not indicated	Various	DOE	Various
LEHR-031	Revised Waste Discharge Requirements for UCD Main Wastewater Treatment Plant Yolo County	Not indicated	CA Regional Water Quality Control Board Central Valley Region	UCD	Not indicated
LEHR-032	Environmental Assessment for the Decommissioning and Decontamination of Contaminated Facilities at the LEHR	Not indicated	SF	DOE	10/92
LEHR-033	Letter to S. Cimperman re: RCRA Permit for the Laboratory for Energy-Related Health Research	S. Eckberg	UCD	DHS/TSCP	12/20/90
LEHR-034	Memorandum to G. Butner re: LEHR Site Visit to Review Sludge Processing Activities - March 24, 1992	P. McLay	CA	LEHR	3/31/92
LEHR-035	Environmental Management Branch Department of Energy/Agreement in Principle Quality Assurance/Quality Control Technical Review	EM	DOE	LEHR	2/13/91
LEHR-036	DOE-SF Waste Management Surveillance Monitoring Checklist for EM-30 Facilities at LEHR	W. Kao	SF	D. Mitchell, J. Aborn	2/22/93
LEHR-037	Quality Assurance Plan CEP-QA-1 Revision 11	Not indicated	CEP	LEHR	2/3/92
LEHR-038	DOE-SF Waste Management Surveillance Monitoring Checklist for EM-3C Facilities at LEHR	W. Kao	SF	D. Mitchell	11/12/92
LEHR-039	Intentionally Omitted (Per Site)	Not indicated	Not indicated	Not indicated	Not indicated

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-040	Compilation Quality Assurance Manual EMO-QA-001 and Quality Assurance Programs and Procedures	Battelle	Battelle	DOE	Various
LEHR-041	Quality Assurance Project Plan	Not indicated	BEI	Battelle	2/92
LEHR-042	Project Work Element Health and Safety Plan Environmental Restoration Project for the Laboratory for Energy-Related Health Research University of California, Davis	Office of Environmental Health and Safety	UCD	Battelle	1/92
LEHR-043	Work Element Quality Assurance Plan	Not indicated	UCD	Battelle	5/92
LEHR-044	Dames & Moore Quality Assurance Program Plan	Not indicated	D&M	Battelle	6/90
LEHR-045	Letter to H. Joma re: Assessment of LEHR Imhoff and Radium 226 Septic Tank Waste and Recommendations for Disposal	S. Eckberg	UCD	SF	12/15/89
LEHR-046	Work Plan, Phase II Site Characterization LEHR Environmental Restoration University of California, Davis	Not indicated	D&M	SF	9/90
LEHR-047	The Removal of Strontium ^{90} From Organic Waste	M. Goldman, R.P. Anderson, E. Edgerley, Jr, A.D. Rey	*Health Physics*, Vol 9, pp. 847-855	Not indicated	1963
LEHR-048	Waste Shipment	Not indicated	BEI	Battelle	Various
LEHR-049	LEHR ER Project Characterization Plan for the Animal Hospital Buildings	Not indicated	BEI	Battelle	7/8/91
LEHR-050	Compilation of Audits and Appraisals	Not indicated	Various	Various	Various
LEHR-051	Compilation of Audits, Surveillances, and Appraisals	Not indicated	Various	Various	Various
LEHR-052	Operations and Training Procedures	Not indicated	BEI	Battelle	Various
LEHR-053	Cobalt 60 Source Removal, Packaging, and Transportation Plan	Not indicated	BEI	Battelle	12/24/92
LEHR-054	LEHR ER Project ARC Health and Safety Procedures	Not indicated	ARC	LEHR ER Project	10/92

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-055	Health and Safety Plan for the DOE Environmental Restoration Project at the Laboratory for Energy-Related Health Research University of California, Davis, Revision 4	Not indicated	LEHR ER Project	DOE	9/22/92
LEHR-056	Site Health and Safety Plan for Phase I of the Imhoff and Radium Septic Tank Liquid and Sludge Removal Project at the LEHR	Not indicated	Chem-Nuclear Environmental Services, Inc.	LEHR	5/15/91
LEHR-057	Site Health and Safety Plan for the Environmental Restoration Project at LEHR	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-058	Site Health and Safety Plan for Phase II of the Imhoff and Radium Septic Tank Liquid and Sludge Removal Project at LEHR	Not indicated	Chem-Nuclear Environmental Services, Inc.	LEHR	10/4/91
LEHR-059	Compilation of Audits, Surveillances, and Appraisals	Not indicated	Various	Various	Various
LEHR-060	Memorandum of Agreement between the U.S. Department of Energy and the Regents of the University of California	Not indicated	Not indicated	Not indicated	8/88
LEHR-061	Amendment No. 2 Memorandum of Agreement between the U.S. Department of Energy and the Regents of the University of California	Not indicated	Not indicated	Not indicated	2/17/93
LEHR-062	Groundwater and Soils Investigation, U.C. Davis LEHR Facility, Davis, CA., Volumes I and II	Not indicated	Wahler Associates	EH&S	5/89
LEHR-063	Evaluation of On-Site Wells, UCD Facility, Davis, CA., Final Report	Not indicated	D&M	EH&S	2/90
LEHR-064	Contaminant Pathway Analysis For the UC Davis Campus From the LEHR Study Site, University of California Davis	Not indicated	D&M	UCD Board of Regents	7/90
LEHR-065	Final SWAT Report, Old UCD Landfill, University of California, Davis	Not indicated	D&M	EH&S, UCD	7/90
LEHR-066	Initial Assessment Survey of the DOE LEHR Site of University of California - Davis	Not indicated	Rockwell International	DOE	10/84
LEHR-067	Groundwater and Soils Investigation, U.C. Davis Research Facility, Davis, California	Not indicated	Wahler Associates	EH&S, UCD	12/88

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-068	Evaluation of Potential Nitrate and Hexavalent Chromium Sources In The Vicinity of The UCD LEHR Facility for University of California, Davis	Not indicated	D&M	EH&S, UCD	11/90
LEHR-069	Solano County Department of Environmental Management, Well Permit No. D-90-04	Not indicated	Not indicated	Not indicated	2/7/90
LEHR-070	Solano County Department of Environmental Management, Well Permit No. M-90-04	Not indicated	Not indicated	Not indicated	3/5/90
LEHR-071	Draft Charter Technical Advisory Committee for the DOE and UC Davis Environmental Restoration Project at LEHR, Revision 1	Not indicated	DOE/LEHR	LEHR	4/7/93
LEHR-072	Draft Charter Radiological Control Committee for the Environmental Restoration Projects at LEHR	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-073	California AIP Program, Environmental Management Branch, Site Visit Report Cobalt-60 Removal, LEHR Facility Davis, California	Not indicated	Not indicated	Not indicated	1/27/93
LEHR-074	Preliminary Assessment Report, Old Campus Landfill	Not indicated	Ecology and Environment, Inc.	Not indicated	12/18/89
LEHR-075	California AIP Program, Department of Health Services, Site Visit Report, Decontamination and Decommission of Animal Hospital Buildings at the LEHR Facility	Not indicated	Not indicated	Not indicated	4/14/93
LEHR-076	Memorandum of Agreement between the U.S. Department of Energy and the Regents of the University of California for Environmental Restoration and Decontamination	Not indicated	Not indicated	Not indicated	3/13/90
LEHR-077	Agreement in Principle between the State of California and the United States Department of Energy	D. Pearson	SF	K. Kizer	9/6/90
LEHR-078	Letter: LEHR Environmental Walk-Through Writeup	J. Juetten	SF	S. Attiga	5/6/93
LEHR-079	DOE Moratorium on Hazardous Waste Shipments from Radioactive Materials Management Areas	Not indicated	SF	S. Attiga	9/20/91
LEHR-080	Disposal of Drill Cuttings LEHR ER	S. Attiga	Battelle	R. Liddle	6/4/91

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-081	Qualification of UC Davis LEHR Facility Waste for Disposal at the Hanford Site	S. Hodges	Chem-Nuclear Environmental Services, Inc.	G. Triner	9/12/91
LEHR-082	Letter: Characterization and Disposal of Low-Level Radioactive Sludge Generated at DOE's Laboratory for Energy-Related Health Research (LEHR) at the University of California-Davis	J. Zelikson	USEPA	J. Jutten	2/23/90
LEHR-083	Memorandum: Waste Management Walk Through at LEHR	R. Corey	SF	J. Cullen	10/1/92
LEHR-084	Chain of Custody Records - Dog Cages	Not indicated	Not indicated	Not indicated	Various
LEHR-085	Intentionally Omitted (Per Site)	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-086	EMO Quality Assurance Department Source Surveillance Report	W. Taylor	UCD	Distribution	8/29/90
LEHR-087	Letter: Subcontract No. 099430 - Surveillance of Waste Counting Activities for the LEHR Project	D. Gale	Battelle	D. Mitchell	8/31/90
LEHR-088	LEHR Environmental Restoration - U.C. Davis Phase II Site Characterization - Surveillance Activities - External	D. Gale	Battelle	J. Niland	12/21/90
LEHR-089	Memorandum: Ron Schalla Site Surveillance Report	S. Eckberg	UCD	S. Attiga	12/20/90
LEHR-090	Two Surveillance Reports - LEHR UCD Well #UCD-10 and #UCD-22	J. Bold	D&M	S. Attiga	11/12/90
LEHR-091	Field Memorandum: Schedule of Activities	D. Zuber	D&M	Not indicated	11/7/90
LEHR-092	Compilation of QA Audits - 1991-1993	Various	BEI	Various	Various
LEHR-093	Blank Audit Checklist	Not indicated	BEI	Not indicated	Not indicated
LEHR-094	Compilation of QA Surveillance/Inspections - 1992-1993	Not indicated	BEI	Not indicated	Not indicated
LEHR-095	LEHR-ER Project - Job No. 21429 Quality Assurance Communications LEHR-804	W. Borden	BEI	S. Attiga	3/16/93

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-096	Closure for Bechtel QA Audit of Forensic, Inc. December 1992, Audit No. 92-03 LEHR-ER, Davis - Job No. 21429 LEHR-812	W. Borden	BEI	M. Pappe	3/17/93
LEHR-097	LEHR ER Project - Bechtel Job No. 21429 QA Audit No. 93-01, CARs 93-01, 93-02, 93-03, and 93-04 and Close-Out of the Forensic Laboratory BEI File No. LEHR-815	W. Borden	BEI	S. Attiga	3/18/93
LEHR-098	LEHR ER Project - Job No. 21429 Bechtel QA Management Audit of the LEHR-ER Project LEHR-525	E. Walker	BEI	S. Attiga	10/7/92
LEHR-099	QADP 1.6 and QADP 1.7 Changes	S. Attiga	Battelle	E. Walker	5/1/92
LEHR-100	QA Audit of Bechtel Environmental March 31-April 3, 1992 - LEHR Project, Task Order #137455	D. Gale	Battelle	T. Demmitt	4/27/92
LEHR-101	Master Agreement 071913-A-D6, Quality Assurance Program Plan Audit	D. Gale	Battelle	T. Demmitt	3/6/92
LEHR-102	Bechtel Response to QA Audit of Bechtel Environmental March 31-April 3, 1992 - LEHR Project, Task Order #137455	D. Gale	Battelle	T. Demmitt	4/4/92
LEHR-103	Audit Finding No. 004, There was no evidence available to demonstrate calibration of Measuring and Test Equipment (M&TE) that was used to perform measurements in the field.	C. Taylor	BEI	Not indicated	Not indicated
LEHR-104	Evaluation of Bechtel's Environmental Audit Response	D. Mitchell	Battelle	J. Work	7/23/92
LEHR-105	Compilation of Responses to Findings	E. Walker	BEI	D. Gale	Various
LEHR-106	LEHR ER Project - Bechtel Job No. 21429 Documentation for Project Audits, Surveillances, and Inspections BEI File No. LEHR-818	W. Borden	BEI	S. Attiga	3/19/93
LEHR-107	Compilation of Health and Safety Audits	Various	BEI	Various	Various
LEHR-108	EMO Quality Assurance Department Source Surveillance Report	C.Taylor	Not indicated	Not indicated	1/16/91

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-109	LEHR Environmental Restoration Quality Assurance Plan No. 011, Revision 1	C. Taylor	Battelle	Various	5/6/93
LEHR-110	UC Davis Corrective Action Request Log	Not indicated	Not indicated	Not indicated	Various
LEHR-111	QA Audit of Dames & Moore, Sacramento Office, May 22-24, 1991	J. Niland	D&M	D. Gale	6/28/91
LEHR-112	QA Audit of Dames & Moore, Sacramento Office,, May 22-24, 1991	D. Gale	Battelle	J. Niland	6/6/91
LEHR-113	LEHR Environmental - UC Davis Phase II Site Characterization Quality Assurance Documentation	R. Moren	D&M	D. Mitchell	3/22/93
LEHR-114	LEHR Project QA Program Audit of Dames & Moore, Sacramento, California; August 26-27, 1992	K. Harrison	Battelle	Distribution	9/29/92
LEHR-115	Master Agreement 07191-A-D8, Quality Assurance Program Plan Audit	D. Gale	Battelle	J. Niland	8/10/92
LEHR-116	QA Audit of Dames & Moore, Sacramento Office, August 26-27, 1992	D. Gale	Battelle	J. Niland	9/14/92
LEHR-117	Compilation of LEHR Environmental Restoration - U.C. Davis Phase II Site Characterization - External Audits August 26-27,1992	Various	D&M	Various	Various
LEHR-118	CERCLA Preliminary Assessment Report Regarding the Old Campus Landfill Facility, UC Davis, EPA ID# CAD 982401423	H. Joma	SF	P. LaCourreye	2/28/90
LEHR-119	CERCLA Preliminary Assessment Old Campus Landfill, Davis, California EPA ID# CAD982401432	C. Owen	UCD	P. LaCourreye	11/9/90
LEHR-120	Compilation of LEHR Environmental Restoration - U.C. Davis - Phase II Site Characterization - Internal Audits January 22-23, 1993	Various	D&M	Various	Various
LEHR-121	Project QA Audit Report No. 91-01 of LEHR-ER Project No. 21429	J. Gilbert	BEI	E. Walker	9/17/91
LEHR-122	LEHR-ER Project Audit Checklist BEI No. LEHR-042	J. Gilbert	BEI	C. Taylor	9/18/91
LEHR-123	Deficiency Response - LEHR Project Records	C. Taylor	Battelle	S. Attiga	9/13/91

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-124	Health & Safety Audit	P. Rodgers	Battelle	S. Eckberg	10/28/91
LEHR-125	EMO Quality Assurance Department Source Surveillance Report No. SR-92-004	C. Taylor	Battelle	Not indicated	10/31/91
LEHR-126	Compilations of Notes from Jim Mohatt (EMO) Audit of the Chem Nuclear Operation	P. Rodgers S. Attiga S. Hodges	Battelle	S. Eckberg S. Hodges S. Attiga	10/28/91 11/20/91 11/22/91
LEHR-127	Close-out of Corrective Action Request No. 1, LEHR-075	J. Chapin	BEI	S. Attiga	11/19/91
LEHR-128	Multi-Discipline Safety appraisal of LEHR	R. Corey	SF	S. Attiga	2/13/92
LEHR-129	Comprehensive Environmental Appraisal for ESS	J. Juetten	DOE/ESS	R. Liddle	4/7/92
LEHR-130	February 1992 Appraisal by the ESS Division of the Environmental Monitoring Program at LEHR	S. Attiga	Battelle	J. Juetten	6/2/92
LEHR-131	Quality Assurance/Quality Control Technical Review	Not indicated	DOE	Not indicated	2/13/91
LEHR-132	Response to Environmental Management Branch Department of Energy/Agreement in Principle Quality Assurance/Quality Control Technical Review	P. McLay	Department of Health Services	D. Mitchell	3/20/92
LEHR-133	LEHR Compliance Review, OSHA's Lockout/Tagout Regulations	S. Attiga	Battelle	J. Juetten	5/29/92
LEHR-134	LEHR Compliance Review, OSHA's Lockout/Tagout Regulation	J. Juetten	DOE Environment and Safety	R. Corey	5/4/92
LEHR-135	Fiscal Year 1993 Low-Level Waste Management Assessment with University of California at Davis	R. Roberts	Westinghouse Hanford Company	J. Hennig	3/12/93
LEHR-136	LEHR Site Visit to Review Sludge Processing Activities - March 24, 1992	P. McLay	State of California	G. Butner	3/31/92
LEHR-137	Fiscal Year 1991 Waste Management Audit Announcement for the Laboratory for Energy Related Health Research, University of California at Davis	R. Roberts	Westinghouse Hanford Company	S. Attiga	10/29/90
LEHR-138	Fiscal Year 1992 Waste Management Audit Report	N. Willis	Not indicated	Various	4/7-8/92

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-139	Phase II Site Characterization - UC Davis LEHR Facility Project CEP Audit, April 9-10, 1992	P. Leapley	D&M	S. Attiga	8/20/92
LEHR-140	Intentionally Omitted (Duplicate of LEHR-083)	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-141	Quality Assurance System Appraisal of the *Laboratory for Energy Related Research*	R. Claverie	SF	Not indicated	4/93
LEHR-142	Contract Number 099430-A-D9, Quality Assurance Program Plan Audit	D. Gale	Battelle	C. Foreman	8/10/92
LEHR-143	QA Audit of University of California, Davis LEHR Project, August 24-25, 1992	C. Foreman	UCD	D. Gale	10/23/92
LEHR-144	Compilation of Sprinkler System Maintenance Check Records	Various	UCD Fire Department	Various	Various
LEHR-145	Operations Assessment Laboratory for Energy-Related Health Research (LEHR)	Not indicated	UCD/SF	LEHR	11/16-19/92
LEHR-146	Response to DOE 5480.19 "Conduct of Operations Assessment" findings, LEHR	S. Attiga	Battelle	J. Montella	1/27/93
LEHR-147	Bechtel QA Audit of Scientech, Inc. December 1992, Audit No. 92-02 LEHR-ER, Davis - Job No. 21429 LEHR-706	E. Walker	BEI	M. Rusk	1/11/93
LEHR-148	LEHR D&D Safety and Health Plan Review	F. Foster	DOE	R. Liddle	8/23/92
LEHR-149	California AIP Program Environmental Management Branch - Site Visit Report - Cobalt 60 Source Removal, LEHR Facility, Davis, California	P. McLay	State of California	Not indicated	2/4/93
LEHR-150	EMO Health and Safety Audit Report for the D&D Activities	S. Attiga	Battelle	W. Borden	4/29/93
LEHR-151	California AIP Program Department of Health, Site Visit Report, Decontamination & Decommissioning of Animal Hospital Buildings at the LEHR Facility	P. McLay	State of California	Not indicated	4/14/93
LEHR-152	Memorandum: Comprehensive Environmental Baseline Audit of the Laboratory for Energy-Related Health Research (LEHR)	A. Sikri	DOE	J. Davis	2/24/93

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-153	Intentionally Omitted (Duplicated of LEHR-011)	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-154	Phase II Site Characterization Report of the LEHR Environmental Restoration University of California at Davis, Volume II, Appendices A-E	Not indicated	D&M	SF	2/93
LEHR-155	Phase II Site Characterization Report of the LEHR Environmental Restoration University of California at Davis, Volume II, Appendices F-L	Not indicated	D&M	SF	2/93
LEHR-156	Yolo-Solano Air Pollution Control District Rules and Regulations 3/90 Edition	Not indicated	Yolo-Solano Air Pollution Control District	Not indicated	3/90
LEHR-157	LEHR 1992 NESHAPS Report	S. Attiga	Battelle	E. Ballard	4/30/93
LEHR-158	LEHR ER Project, Project Control Manual, University of California, Davis at the Laboratory for Energy-Related Health Research, Airborne Particulate Sampling OPS ENV-1.02, Revision A	Not indicated	UCD	LEHR	2/93
LEHR-159	University Fire Department, Fire Prevention Bureau, hazardous Conditions Permit, Conduct Abatement of Asbestos Work Plan	L. Larson	UCD Fire Department	LEHR	11/30/92
LEHR-160	Certificate of Registration for Asbestos-related Work, Operating Manual	R. Cope	Fidelity Environmental Insurance Company	International Dismantling & Machinery Corp.	12/9/91
LEHR-161	Transmittal letter to U.S. Fish and Wildlife - Putah Creek Sediment and Water Sampling Report	D. Mitchell	UCD	Ms. Terry	6/26/91
LEHR-162	Letter regarding Certificate No. 350 issued by the Hazardous Waste Testing Laboratory Certification Program	W. Ray	State of California	R. Moren	6/15/92
LEHR-163	Finding of No Significant Impact for Decontamination and Decommissioning of Contaminated Facilities at the Laboratory for Energy-Related Health Research	P. Ziemer	DOE	LEHR	9/18/92
LEHR-164	Waste Characterization Plan Stored Wastes, LEHR Environmental Restoration	Not indicated	D&M	LEHR	5/92

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-165	Characterization Report for the Animal Hospital Buildings (AH-1 and AH-2) at the Laboratory for Energy-Related Health Research, Volume I	Not indicated	BEI	Battelle	11/91
LEHR-166	Decontamination and Decommissioning Work Plan for the Animal Hospital Buildings (AH-1 and AH-2) at the Laboratory for Energy-Related Health Research	Not indicated	BEI	Battelle	7/28/92
LEHR-167	Characterization Report for the Animal Hospital Buildings (AH-1 and AH-2) at the Laboratory for Energy-Related Health Research, Volume II - Appendixes A through E	Not indicated	BEI	Battelle	11/91
LEHR-168	Characterization Report for the Animal Hospital Buildings (AH-1 and AH-2) at the Laboratory for Energy-Related Health Research, Volume III - Appendix F	Not indicated	BEI	Battelle	11/91
LEHR-169	Characterization Report for the Animal Hospital Buildings (AH-1 and AH-2) at the Laboratory for Energy-Related Health Research, Volume IV - Appendix F (Continued)	Not indicated	BEI	Battelle	11/91
LEHR-170	U.C. Davis Campus Landfill, Yolo County (Case No. 3114)	W. Marshall	State of California	B. Shanks	5/15/91
LEHR-171	Characterization Plan for the Animal Hospital Buildings (AH-1 and AH-2) and the Specimen Storage and Feed Mixing Building at the Laboratory for Energy-Related Health Research	Not indicated	BEI	Battelle	7/91
LEHR-172	LEHR Environmental Restoration Project - Emergency Response Plan, Revision 1, Job No. 21429	Not indicated	BEI	LEHR	12/17/92
LEHR-173	Laboratory for Energy-Related Health Research Radiological Control Manual Implementation Plan	Not indicated	DOE/LEHR	LEHR	4/8/93
LEHR-174	Radiological Survey of Facilities at the LEHR - Appendices	D. Layton K. Wond J. Brunk Y. Ricker	LLNL	LEHR	4/3/89

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-175	Memorandum to file: Removal of Low-Level Radioactive Sludge from the Laboratory for Energy-Related Health Research at the University of California at Davis Compliance with the National Environmental Policy Act	L.Duffy	DOE	LEHR	5/16/91
LEHR-176	Storage/Disposal Approval Record for Animal Carcasses and Remains	R. Roberts	Westinghouse Hanford	R. Gerton	9/10/90
LEHR-177	Review Comments on the Environmental Assessments for the Decommissioning and Decontamination of Contaminated Facilities at the Laboratory for Energy-Related Health Research (LEHR) University of California, Davis	J. Adams	State Waste Resources Control Board	G.Butner	8/10/92
LEHR-178	Work Plan Radiological Assessment of the Laboratory for Energy-Related Health Research	D.Layton V. Noshkin	LLNL	LEHR	5/88
LEHR-179	Draft Laboratory for Energy Health Related Research Environmental Restoration Project Environmental Protection Implementation Plan April 1993 to April 1994	Not indicated	Not indicated	SF	4/93
LEHR-180	SSI Summary Memo	J. Kaps	Ecology and Environment, Inc.	J. Quint	9/23/91
LEHR-181	Memorandum: Action Description Memorandum for the Laboratory for Energy-Related Health Research (LEHR) Decontamination and Decommissioning (D&D) Project at UC Davis	J. Ricks	DOE	R. Thomas	6/1/89
LEHR-182	Project Work Element Health and Safety Plan Environmental Restoration Project for the Laboratory for Energy-Related Health Research, University of California, Davis, Revision 1	Not indicated	UCD	Battelle	1/92
LEHR-183	Draft Site Health & Safety Plan for the Environmental Restoration Project at LEHR UCD Davis, Revision 0	Not indicated	Chem-Nuclear Environmental Services, Inc.	LEHR	3/19/91

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-184	Applied Radiological Control, Inc. Health and Safety Procedures for the Laboratory for Energy-Related Health Research, University of California, Davis, Environmental Remediation Project, Revision 1	R. Grant	ARC	LEHR	1/4/93
LEHR-185	LEHR Environmental Restoration Project - Health and Safety Procedures, Job No. 21429	E. Walker	BEI	S. Attiga	2/27/92
LEHR-186	Health and Safety Plan for the DOE Environmental Restoration Project at the Laboratory for Energy-Related Health Research at University of California, Davis, Revision 4	Not indicated	BEI	LEHR	9/22/92
LEHR-187	Laboratory for Energy-Related Health Research, University of California, Davis, Environmental Restoration Project, Project Plan	J. Hartley S. Attiga	Battelle	SF	7/91
LEHR-188	Environmental Assessment for the Decommissioning and Decontamination of Contaminated Facilities at LEHR, University of California, Davis, SCH #92074021	D. Womeldorf	State of California	D. Williams	8/27/92
LEHR-189	Information for Applying for a License of an Owner or Operator of a Facility that Treats, Stores or Disposes of Mixed Waste	M. Knapp	State of California	Not indicated	1/23/89
LEHR-190	Final Report for the Liquid and Sludge Removal Project at the LEHR Facility at UC Davis, Revision 0	Not indicated	Chemical Waste Management, Inc.	LEHR	7/92
LEHR-191	Intentionally Omitted (Duplicate of LEHR-071)	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-192	Occupancy Agreement between University of California and U.S. Atomic Energy Commission for Property on Davis Campus	Not indicated	SF/UCD	LEHR	6/29/65
LEHR-193	Work Plan Phase II Site Characterization LEHR Environmental Restoration University of California, Davis	J. Niland	D&M	S. Attiga	8/31/90
LEHR-194	Draft Water Monitoring Plan LEHR Environmental Restoration University of California at Davis	Not indicated	D&M	SF	4/93

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-195	Quality Assurance Project Plan for the DOE Environmental Restoration Project at the Laboratory for Energy-Related Health Research, University of California, Davis, Revision 1	Not indicated	BEI	Battelle	2/92
LEHR-196	Dames & Moore Quality Assurance Program Plan for Environmental Management Operations	C. Rotan	D&M	D&M - Battelle EMO	6/90
LEHR-197	Work Element Quality Assurance Plan for the Laboratory for Energy-Related Health Research, University of California, Davis, Revision 2	Not indicated	UCD	Battelle	5/92
LEHR-198	Environmental Management Operations - Quality Assurance Program	Not indicated	Not indicated	Battelle	5/5/92
LEHR-199	Initial Assessment Survey of the DOE LEHR Site of University of California - Davis	Not indicated	Rockwell International	AL	10/31/84
LEHR-200	Final Report Evaluation of On-Site Wells UCD LEHR Facility Davis, California	A. Kearns	D&M	UCD	2/90
LEHR-201	Groundwater and Soils Investigation U.C. Davis Research Facility, Davis, California	Not indicated	Wahler Associates	UCD	12/88
LEHR-202	Well Permit Application for University of Davis, California, LEHR Facility, Old Davis Road, Permit No. M90-04	K. Williams	Solano County Department Of Environmental Management	UCD	3/5/90
LEHR-203	Well Permit Application for University of Davis, California, LEHR Facility, Abandoned Dump Sites Davis Road, Permit No. D90-04	Not indicated	Solano County Department Of Environmental Management	UCD	2/7/90
LEHR-204	Quarterly Groundwater and Surface Water Monitoring Results - Fall Quarter 1991, DOE Phase II Characterization LEHR Facility, Davis, California	R. Moren	D&M	Battelle	3/92
LEHR-205	Intentionally Omitted (Duplicate of LEHR-009)	R. Moren	D&M	Battelle	2/93

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-206	Quarterly Groundwater and Surface Water Monitoring Results Winter Quarter 1992, DOE Phase II Characterization LEHR Facility Davis, California	R. Moren	D&M	Battelle	2/93
LEHR-207	Final Report Evaluation of On-Site Wells UCD LEHR Facility Davis, California	A. Keerns	D&M	UCD	2/90
LEHR-208	Environmental Survey Final Report, Laboratory for Energy-Related Health Research, Davis, California	P. Ziemer	DOE	Distribution	10/26/91
LEHR-209	Intentionally Omitted (Duplicate of LEHR-270)	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-210	Environmental Survey Team Ranking Data	Not indicated	Not indicated	Not indicated	12/8/88
LEHR-211	Work Plan for Characterization of the Lateral and Vertical Extent of Radionuclides in the Soil and Ground Water at U.C. Davis - LEHR Davis, California	C. Wittman	Wahler Associates	DOE/UCD	6/87
LEHR-212	Intentionally Omitted (Per Site)	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-213	Letter: Re: Final Report on Evaluation of UCD LEHR On-site Monitoring Wells	A. Tackett	UCD	J. Maughan	8/27/90
LEHR-214	Quarterly Groundwater and Surface Water Monitoring Results Summer Quarter 1992, DOE Phase II Characterization LEHR Facility Davis, California	R. Moren	D&M	Battelle	5/93
LEHR-215	Letter: Abandonment of a Domestic Water Well located on UCD Property	A. Sjoberg	UCD	J. Maughan	1/13/89
LEHR-216	Letter: Telephone Conversation on April 17, 1991 Regarding the Location of the LEHR Site and Wells UCD 15, 16, and 17	S. Eckberg	UCD	K. Blevins	4/17/91
LEHR-217	Letter: Authorization of Abandon UCD-2	R. Liddle	SF	S. Eckberg	2/6/90
LEHR-218	Letter: Change Order to Existing Shop Well Destruction Contract	S. Eckberg	UCD	J. Hartman	1/31/90
LEHR-219	Letter: Well Abandonment	A. Tackett	UCD	R. Scheufler	12/20/89

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-220	Water Well Drillers Report	P. Bartlett	Valley Pump & Motor Works, Inc.	UCD	2/5/90
LEHR-221	Intentionally Omitted (Per Site)	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-222	Intentionally Omitted (Per Site)	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-223	Letter: Waste Storage/Disposal Request, UCD LEHR	S. Attiga	Battelle	D. Nakahara	11/20/91
LEHR-224	Intentionally Omitted (Per Site)	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-225	Waste Management Plan for Laboratory for Energy-Related Health Research, University of California, Davis	Not indicated	The Earth Technology Corporation	Battelle	1/91
LEHR-226	Waste Characterization Plan for the Laboratory for Energy-Related Health Research, University of California, Davis, Revision 0	Not indicated	BEI	Battelle	2/27/92
LEHR-227	Waste Management Plan for Laboratory for Energy-Related Health Research, University of California, Davis	Not indicated	BEI	Battelle	1/6/91
LEHR-228	Intentionally Omitted (Duplicate of LEHR-026)	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-229	Low-Level Waste Certification Plan for Laboratory for Energy-Related Health Research, University of California, Davis	Not indicated	BEI	The Earth Technology Corporation	1/91
LEHR-230	Site Work Plan for Phase II of the Imhoff and Radium Septic Tank Liquid and Sludge Removal Project at the Laboratory for Energy-Related Health Research, University of California, Davis, Revision 1	S. Hodges	Chem-Nuclear Environmental Services, Inc.	LEHR	9/10/91
LEHR-231	Work Instruction for the Final Characterization and Radiological Survey of the Imhoff and Radium Septic Tanks, University of California at Davis Laboratory for Energy-Related Health Research, Revision 0	S. Hodges	Chem-Nuclear Environmental Services, Inc.	LEHR	2/6/92
LEHR-232	Site Work Plan for Phase I of the Imhoff and Radium Septic Tank Liquid and Sludge Removal Project at the Laboratory for Energy-Related Health Research, University of California, Davis, Revision 0	S. Hodges	Chem-Nuclear Environmental Services, Inc.	LEHR	5/15/91

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-233	U.D. Davis Shipment 01: (C) LLWSDR; (C) B of L; (C) Prior Notification; (C) Driver Instruction; (C) Inventory Sheet; (C) Truck Survey; (C) Emergency Action, Control No.	S. Attiga	Battelle	Westinghouse Hanford	1/27/92
LEHR-234	U.D. Davis Shipment 02: (C) LLWSDR; (C) B of L; (C) Prior Notification; (C) Driver Instruction; (C) Inventory Sheet; (C) Truck Survey; (C) Emergency Action	S. Attiga	Battelle	Westinghouse Hanford	1/28/92
LEHR-235	U.D. Davis Shipment 03: (C) LLWSDR; (C) B of L; (C) Prior Notification; (C) Driver Instruction; (C) Inventory Sheet; (C) Truck Survey; (C) Emergency Action	S. Attiga	Battelle	Westinghouse Hanford	1/29/92
LEHR-236	Summary Report Biowaste Inventory Packaging and Shipment Activities	Not indicated	UCD, Environmental Health and Safety at LEHR	Battelle	2/91
LEHR-237	U.D. Davis Shipment 04: (C) LLWSDR; (C) B of L; (C) Prior Notification; (C) Driver Instruction; (C) Inventory Sheet; (C) Truck Survey; (C) Emergency Action	S. Attiga	Battelle	Westinghouse Hanford	1/30/92
LEHR-238	U.D. Davis Shipment 05: (C) LLWSDR; (C) B of L; (C) Prior Notification; (C) Driver Instruction; (C) Inventory Sheet; (C) Truck Survey; (C) Emergency Action	S. Attiga	Battelle	Westinghouse Hanford	2/3/92
LEHR-239	U.D. Davis Shipment 06: LLWSDR; B of L; Prior Notification; Driver Instruction; Inventory Sheet; Truck Survey; Emergency Action; LSA Hazard Sheet; Vehicle Inspection; License	S. Attiga	Battelle	Westinghouse Hanford	2/4/92
LEHR-240	U.D. Davis Shipment 07: LLWSDR; B of L; Prior Notification; Driver Instruction; Inventory Sheet; Truck Survey; Emergency Action; LSA Hazard Sheet; Vehicle Inspection	S. Attiga	Battelle	Westinghouse Hanford	2/10/92
LEHR-241	U.D. Davis Shipment 08: LLWSDR; B of L; Prior Notification; Driver Instruction; Inventory Sheet; Truck Survey; Emergency Action; LSA Hazard Sheet; Vehicle Inspection	S. Attiga	Battelle	Westinghouse Hanford	2/11/92

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-242	U.D. Davis Shipment 09: LLWSDR; B of L; Prior Notification; Driver Instruction; Inventory Sheet; Truck Survey; Emergency Action; LSA Hazard Sheet; Vehicle Inspection	S. Attiga	Battelle	Westinghouse Hanford	3/2/92
LEHR-243	U.D. Davis Shipment 10: LLWSDR; B of L; Prior Notification; Driver Instruction; Inventory Sheet; Truck Survey; Emergency Action; LSA Hazard Sheet; Vehicle Inspection	S. Attiga	Battelle	Westinghouse Hanford	3/3/92
LEHR-244	U.D. Davis Shipment 11: LLWSDR; B of L; Prior Notification; Driver Instruction; Inventory Sheet; Truck Survey; Emergency Action; LSA Hazard Sheet; Vehicle Inspection	S. Attiga	Battelle	Westinghouse Hanford	3/19/92
LEHR-245	U.D. Davis Shipment 12: LLWSDR; B of L; Prior Notification; Driver Instruction; Inventory Sheet; Truck Survey; Emergency Action; LSA Hazard Sheet; Vehicle Inspection	S. Attiga	Battelle	Westinghouse Hanford	3/24/92
LEHR-246	U.D. Davis Shipment 13: LLWSDR; B of L; Prior Notification; Driver Instruction; Inventory Sheet; Truck Survey; Emergency Action; LSA Hazard Sheet; Vehicle Inspection, Control No. 512900	S. Attiga	Battelle	Westinghouse Hanford	3/25/93
LEHR-247	U.D. Davis Shipment 14: LLWSDR; B of L; Prior Notification; Driver Instruction; Inventory Sheet; Truck Survey; Emergency Action; LSA Hazard Sheet; Vehicle Inspection, Control No. 512901	S. Attiga	Battelle	Westinghouse Hanford	3/25/92
LEHR-248	Compilation of Steering Committee Minutes	Not indicated	LEHR	Various	Various
LEHR-249	Memorandum: CERCLA Federal Agency Hazardous Waste Compliance Docket Update #7	K. Taimi	DOE	Distribution	2/18/93
LEHR-250	Compilation of Information on Other DOE/LEHR Sites	Various	Various	Various	Various
LEHR-251	Compilation of LEHR Radiological Control Committee	Various	Various	Various	Various
LEHR-252	LEHR Environmental Restoration Project Emergency Response, Revision 1	Not indicated	BEI	LEHR	12/17/92

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-253	Record of Telephone Conversation, Job No. 10805-720-044	R. Moren	D&M	R. Scheufler	4/26/93
LEHR-254	Intentionally Omitted (Duplicate of LEHR-083)	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-255	Intentionally Omitted (Duplicate of LEHR-083)	Not indicated	Not indicated	Not indicated	4/14/93
LEHR-256	Letter: SDAR 331J-5A-0 (July 3, 1990) Change	S. Attiga	Battelle	J. Anderson	9/5/90
LEHR-257	Partial List of Sewerage Disposal Daily Release Values (Appendix 1)	Not indicated	Not indicated	Not indicated	10/89
LEHR-258	Intentionally Omitted (Duplicate of LEHR-028)	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-259	Letter: Disposal of Collected Rainwater to the UCD Sanitary Sewer	S. Attiga	Battelle	R. Liddle	6/12/92
LEHR-260	Letter: Animal Carcass Disposal	R. Stanley	State of California	R. Freeburg	8/14/89
LEHR-261	Letter: Registration of University of California, Davis Radioactive material License No. 1334-57.	G. Westcott	UCD	C. MacDonald	1/22/93
LEHR-262	Asbestech Quality Assurance Manual for Bulk Asbestos Analysis	T. Conlon	Asbestech	Not indicated	8/1/88
LEHR-263	Waste Analysis/Characterization Records and Analytical Results	Not indicated	Not indicated	Not indicated	Various
LEHR-264	Quality Education System for the Individual	Not indicated	Philip Crosby Associates, Inc.	Not indicated	1988
LEHR-265	Letter: Uncontrolled Copy of Revision No. 11 of Radiation Detection Company's Quality Assurance Manual	B. Paustenbach	Radiation Detection Company	M. Spector	7/24/92
LEHR-266	QA Report for University of California at Davis	Not indicated	Controls for Environmental Pollution, Inc.	Not indicated	Various
LEHR-267	Quality Assurance/Quality Control Manual	Not indicated	Anlab Analytical Laboratory	Not indicated	Not indicated
LEHR-268	Dallas, TX Laboratory, Quality Assurance Manual, Revision No. 92-2	Not indicated	Scientech, Inc.	Not indicated	10/6/92

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-269	LEHR Environmental Restoration Project, Data Management Plan, Revision 1	Not indicated	BEI	LEHR	11/12/92
LEHR-270	DOE Environmental Survey Preliminary Report Laboratory for Energy-Related Health Research Davis, California	Not indicated	DOE EH-24	Not indicated	3/88
LEHR-271	Amended General Industrial Storm Water Permit	Water Resources Control Board	State of California	Not indicated	10/15/92
LEHR-272	Certificate of Regulations for Asbestos Work	Not indicated	State of California	IDM Corporation	12/9/91
LEHR-273	LEHR Environmental Survey Preliminary Report March 1988	Not indicated	DOE	Not indicated	3/88
LEHR-274	Telephone Memorandum - Air Pollution Permits for Construction Equipment	G. Atchinson	BEI	P. Huff	5/7/93
LEHR-275	Notice of Intent - General Permit to Discharge Storm Water	Not indicated	UCD	California Resources State Water Control Board	3/26/92
LEHR-276	Compilation of Hazardous Waste Management (WHM) Weekly Inspection Log for Storage Areas	J. Aborn	UCD	Not indicated	8/7/92 through 4/30/93
LEHR-277	Compilation of LEHR Technical Advisory Committee Meeting Minutes	Not indicated	LEHR	Various	3/12/93 11/2/92
LEHR-278	Draft Environmental Restoration and Waste Management Self-Assessment Program Implementation Plan, Laboratory for Energy-Related Health Research Environmental Management Operations	Not indicated	EMO	SF	4/93
LEHR-279	University of California, Davis Change Order D-300920C5 to Purchase Order D-300920	M. Whiteside	UCD	Control for Environmental Pollution, Inc.	10/20/92
LEHR-280	University of California, Davis Change Order D-384211C4 to Purchase Order D-384211	J. Finney	UCD	Asbestech	10/21/92
LEHR-281	University of California, Davis Purchase Order D-307440	R. Marti	UCD	Anlab	10/11/90

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-282	Hanford Site Solid Waste Acceptance Criteria	Not indicated	Westinghouse Hanford Company	DOE/EM	9/91
LEHR-283	Compilation of Building Survey Results, December 1992, January 1993, and February 1993	P. Rodgers	UCD	C. Foreman	12/92, 1/93, 2/93
LEHR-284	Memorandum: Final Guidance for the Preparation of Site Environmental Reports for Calendar Year 1991	K. Taimi	DOE	Distribution	3/12/92
LEHR-285	Chain of Custody Form	Not indicated	D&M	Various	Not indicated
LEHR-286	QA Test of Radiation Detection Corporation	Not indicated	Not indicated	Not indicated	3/91, 8/91, 4/92
LEHR-287	Letter: DOE Review of LEHR D&D Health and Safety Plan Documents	S. Attiga	Battelle	R. Liddle	11/2/92
LEHR-288	Letter: Environmental Management Operations Master Agreement No 071913-A-D6; Quality Assurance Program Plan	J. Slater	Battelle	B. Kown	3/28/90
LEHR-289	Memorandum: Issues Analysis Document for LEHR	K. King	Battelle	S. Attiga	5/28/92
LEHR-290	Compilation of LEHR FYP Issue Statements 1995-1999	Not indicated	Not indicated	Not indicated	1995-1999
LEHR-291	UCD South Campus Stormwater Runoff Survey (Handwritten Map)	B. Markel P. Storey	UCD Physical Plant	Not indicated	12/11/92
LEHR-292	Draft LEHR ER Project Control Manual, University of California, Davis at the Laboratory for Energy-Related Health Research - Operating Procedure - Airborne Particulate Sampling, No. OPS ENV-1.02, Revision A	Not indicated	UCD/LEHR	Not indicated	2/93
LEHR-293	Transmittal Letter: LEHR Self-Assessment Program Implementation Plan	S. Attiga	EMO	A. Dong	4/11/93

LIST OF SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Doc. No.	Title/Description	Author	Organization	Recipient	Doc. Date
LEHR-294	Index of Applicable DOE 5480.19 to LEHR	Not indicated	Not indicated	Not indicated	Not indicated
LEHR-295	Quality Assurance System Appraisal of the Laboratory for Energy-Related Health Research, September 23-24, 1992	F. Claverie	SF	LEHR	4/93
LEHR-296	Compilation of DOE-SF Waste Management Surveillance Monitoring Checklist for EM-30 Facilities for LEHR	W. Kao	SF	D. Mitchell	11/2/92, 1/27/93, 2/22/93, 4/14/93

APPENDIX E

LIST OF CONTACTS AND INTERVIEWS CONDUCTED BY THE ENVIRONMENTAL AUDIT TEAM

APPENDIX E:

LIST OF CONTACTS AND INTERVIEWS CONDUCTED BY THE ENVIRONMENTAL AUDIT TEAM

Ref. No.	Date	Auditor	Organization	Position	Topic
Air (A)					
I-A-1	5/11/93	D. Dolak	BEI	Site Superintendent	Chemical use, asbestos removal, D&D procedures, mobile generator
I-A-2	5/12/93	D. Dolak	ARC	H&S Supervisor	Airborne emissions monitoring
I-A-3	5/13/92	D. Dolak	UCD	Assistant Technologist	Air monitoring program
I-A-4	5/14/93	D. Dolak	PNL	Project Manager	Air monitoring program
I-A-5	5/17/93	D. Dolak	BEI	Site Superintendent	In-stack air sample data
Surface Water/Drinking Water (SW)					
I-SW-1	5/10/93	D. Dolak	EMO	Assistant Project Manager	Surface water runoff
I-SW-2	5/10/93	D. Dolak	D&M	Project Coordinator	Surface water and stormwater discharge and surface waste sampling
I-SW-3	5/10/93	D. Dolak	SF	Environmental Engineer	Stormwater discharge
I-SW-4	5/11/93	D. Dolak	EMO	Assistant Project Manager	Stormwater and toxic chemical storage
I-SW-5	5/12/93	D. Dolak	UCD	LEHR Project Manager	Stormwater, drinking water, NPDES
I-SW-6	5/12/93	D. Dolak	SF	Environmental Engineer	Telephone interview: stormwater permits for state
I-SW-7	5/18/93	D. Dolak	UCD	LEHR Project Manager	Stormwater drainage

LIST OF CONTACTS AND INTERVIEWS CONDUCTED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Ref. No.	Date	Auditor	Organization	Position	Topic
Groundwater and Soils/Sediment/Biota (GW)					
I-GW-1	5/11/93	R. Kolpa	D&M	LEHR Restoration Project Manager	Groundwater monitoring strategy, groundwater monitoring well locations and construction, site geology/hydrogeology, RI/FS workplan, offsite groundwater monitoring, establishing background groundwater values, aquifer characterizations
I-GW-2	5/11/93	C-S. Huang R. Kolpa	SF	Geologist Waste Management Branch	Phase II characterization study conclusions, aquifer characterizations, offsite groundwater monitoring activities, future groundwater characterization activities, conclusions of DOE's, environmental walkthrough (April 1993)
I-GW-3	5/11/93	C-S. Huang R. Kolpa	Uribe Associates	Hydrogeologist (Support contractor to DOE)	Phase II characterization study conclusions, aquifer characterizations, offsite impacts to groundwater, conclusions of DOE's, environmental walkthrough (April 1993)
I-GW-4	5/11/93	R. Kolpa A. P. Sikri	Battelle	LEHR Senior Project Manager	Characterization of impacts to groundwater from UCD landfills, future groundwater characterization activities, DOE/UCD agreement with respect to groundwater characterizations, draft Groundwater Protection Management Program

LIST OF CONTACTS AND INTERVIEWS CONDUCTED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Ref. No.	Date	Auditor	Organization	Position	Topic
I-GW-5	5/12/93	R. Kolpa	UCD	LEHR Project Manager	Site hydrogeology, UCD-controlled irrigation wells in nearby areas, offsite domestic well sampling program methodologies, data sharing with DOE, early site characterization activities
I-GW-6	5/13/93	R. Kolpa	D&M	Senior Geologist	Phase II Characterization conclusions, groundwater characterization studies (transmissivity pump tests), data sharing and normalization of procedures for DOE and UCD sampling/monitoring activities, water chemistry studies
I-GW-7	5/13/93	R. Kolpa	D&M	Soil Scientist	Site soil chemistries, fate and transport modeling, additional site characterizations in RI/FS, soil gas studies during RI/FS phase
I-GW-8	5/13/93	R. Kolpa	D&M	Associate Group Manager	Characterization activities for all UCD landfills, data sharing with UCD, impacts to third HSU, hydropunch sampling methodologies
I-GW-9	5/17/93	C-S. Huang R. Kolpa P. Lindahl C. Salsbury A. P. Sikri	D&M	Field Geologist	Groundwater monitoring well sampling protocols
I-GW-10	5/17/93	C-S. Huang R. Kolpa P. Lindahl C. Salsbury A. P. Sikri	D&M	Sampling Technician	Groundwater monitoring well sampling procedures, QA/QC issues associated with well sampling

LIST OF CONTACTS AND INTERVIEWS CONDUCTED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Ref. No.	Date	Auditor	Organization	Position	Topic
Waste Management (WM)					
I-WM-1	5/10/93	R. Haffenden	SF	Environmental Engineer, Waste Management Division, Waste Management Operations	Waste management
I-WM-2	5/10/93	R. Haffenden	SF	Waste Engineer, Waste Management Division, Waste Management Operations	Waste management
I-WM-3	5/10/93	R. Haffenden	SF	Chief, Environmental and Technical Resources Branch	Waste overview
I-WM-4	5/11/93	R. Haffenden	Battelle	Assistant Project Manager	Waste management
I-WM-5	5/11/93	R. Haffenden	UCD	EHS LEHR Project Manager	Waste overview
I-WM-6	5/11/93	R. Haffenden	BEI	Site Manager	D&D waste management
I-WM-7	5/11/93	R. Haffenden	UCD	Waste Coordinator, EHS	Waste management
I-WM-8	5/11/93	R. Haffenden	BEI	Waste Coordinator	D&D waste management
I-WM-9	5/12/93	R. Haffenden	UCD	Industrial Hygienist, EHS	Part A application and pest shipments, annual reports
I-WM-10	5/13/93	R. Haffenden	UCD	Group Leader Integrated Hazardous Waste Program, EHS	Annual reports
I-WM-11	5/13/93	R. Haffenden	D&M	Project Geologist/Project Coordinator	Sampling of purge waste and soil borings
I-WM-12	5/14/93	R. Haffenden	UCD Fire Department	Incident Commander	Contingency plan and emergency procedure for mixed waste storage facility at LEHR
I-WM-13	5/17/93	R. Haffenden	SF	Environmental Engineer, Waste Management Division, Waste Management Operations	DOE 5400.2A.5d(5)(b) submission

LIST OF CONTACTS AND INTERVIEWS CONDUCTED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Ref. No.	Date	Auditor	Organization	Position	Topic
I-WM-14	5/17/93	R. Haffenden	SF	Chief, Environmental and Technical Resources Branch	DOE 5400.2A.5d(5)(b) submission
Toxic and Chemical Materials (TCM)					
I-TCM-1	5/10/93	D. Dolak	EMO	Assistant Project Manager	Hazardous material storage
I-TCM-2	5/10/93	D. Dolak	BEI	Supervisor	Hazardous material storage
I-TCM-3	5/11/93	D. Dolak	BEI	Superintendent	Chemical use, asbestos removal, D&D procedures, mobile generator
I-TCM-4	5/11/93	D. Dolak	EMO	Assistant Project Manager	Stormwater and toxic and chemical storage
I-TCM-5	5/13/93	D. Dolak	UCD	LEHR Project Manager	Transformers on UCD property
I-TCM-6	5/13/93	D. Dolak	UCD	Site Superintendent	PCB items removed from LEHR
Quality Assurance (QA)					
I-QA-1	5/12/93	P. Lindahl	Battelle	Senior Quality Engineer	LEHR project quality assurance
I-QA-2	5/12/93	P. Lindahl	UCD	Acting QA Officer	LEHR project quality assurance
I-QA-3	5/12/93	P. Lindahl	BEI	Project QA Supervisor	LEHR project quality assurance (telephone)
I-QA-4	5/13/93	S. Barieau D. Dolak R. Kolpa P. Lindahl	UCD	Assistant Technologist	Air sampling
I-QA-5	5/13/93	P. Lindahl	Battelle	Senior Quality Engineer	LEHR project document review
I-QA-6	5/14/93	P. Lindahl	EMO	Assistant Project Manager	LEHR project quality assurance

LIST OF CONTACTS AND INTERVIEWS CONDUCTED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Ref. No.	Date	Auditor	Organization	Position	Topic
I-QA-7	5/17/93	C-S. Huang R. Kolpa P. Lindahl C. Salsbury A. P. Sikri	D&M D&M	Sampling Technician Field Geologist	Groundwater sampling
Radiation (RAD)					
I-RAD-1	5/10/93	C. Salsbury	SF	Nuclear Engineer, ESS	Airborne releases, QA/QC
I-RAD-2	5/11/93	C. Salsbury	PNL	Project Manager	Environmental airborne releases
I-RAD-3	5/11/93	C. Salsbury	EMO	Project Manager/Radiation Contract Manager	Radiation control committee
I-RAD-4	5/11/93	C. Salsbury	UCD	Assistant Technologist, EH&S	Air sampling program
I-RAD-5	5/11/93	C. Salsbury	UCD	Health & Safety Officer Assistant Technologist, EH&S	Environmental dosimetry
I-RAD-6	5/12/93	C. Salsbury	BEI	Superintendent	Site operation
I-RAD-7	5/12/93	C. Salsbury	ARC	H&S Supervisor	Air sampling
I-RAD-8	5/12/93	C. Salsbury	ARC	Instrumentation Specialist	Air sampling
I-RAD-9	5/12/93	C. Salsbury	BEI EMO EMO UCD	Superintendent Assistant Project Manager Senior Program Manager Low-Level Waste Coordinator	Site walkthrough
I-RAD-10	5/13/93	C. Salsbury	UCD	Assistant Technologist	Air sampler setup
I-RAD-11	5/13/93	C. Salsbury	D&M	Project Coordinator	D&M activities
I-RAD-12	5/14/93	C. Salsbury	UCD	Acting QA Officer	Sample counting UCD
I-RAD-13	5/14/93	C. Salsbury	UCD	Health Physicist	CO-60 food irradiator
I-RAD-14	5/19/93	C. Salsbury	EMO	Assistant Project Manager	Environmental dosimetry

LIST OF CONTACTS AND INTERVIEWS CONDUCTED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Ref. No.	Date	Auditor	Organization	Position	Topic
Inactive Waste Sites (IWS)					
I-IWS-1	5/10/93	R. Kolpa	SF	Chief, Environmental & Technical Resources Branch	Scope of site characterization, other sites, MOU with UCD, AIP with State of California
I-IWS-2	5/10/93	R. Kolpa	SF	SF Program Manager	Restoration program objectives, community relations, investigations at Far East landfill, RI/FS schedules, alternate water supplies
I-IWS-3	5/11/93	R. Kolpa	D&M	LEHR Restoration Project Manager	Phase II characterization report conclusions, RI/FS workplan, scope of characterization effort, previous characterization studies
I-IWS-4	5/11/93	C-S. Huang R. Kolpa	SF	Geologist Waste Management Branch	Site hydrogeology, site geology, Phase II Characterization Study conclusions, future characterization activities, offsite GW monitoring, conclusions from DOE's environmental walkthrough (April 1993)
I-IWS-5	5/11/93	C-S. Huang R. Kolpa	Uribe Associates	Hydrogeologist (Support contractor to SF)	Site hydrogeology, groundwater monitoring results from Phase II Characterization study, conclusions from DOE's Environmental Walkthrough (April 993)
I-IWS-6	5/11/93	R. Kolpa A. P. Sikri	Battelle	LEHR Senior Project Manager	Phase II Characterization study conclusions, scope of characterization activities, DOE/UCD interface, DOE/EPA interface, interagency Agreement for RI/FS work, schedule and scope of RI/FS

LIST OF CONTACTS AND INTERVIEWS CONDUCTED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Ref. No.	Date	Auditor	Organization	Position	Topic
I-IWS-7	5/12/93	R. Kolpa	SF	Occupational Safety & Health Manager	Health & Safety plans for LEHR characterization activities SF technical reviews of safety documents, impacts to UCD individuals on site
I-IWS-8	5/12/93	R. Kolpa	UCD	LEHR Project Manager	UCD's offsite well sampling, safety issues related to onsite, UCD individuals and animals, data sharing with DOE, site characterization projects under UCD control
I-IWS-9	5/12/93	R. Kolpa	SF	Technical advisor on CERCLA and UST program issues, Environmental Safety & Support Branch	DOE/EPA interactions, interagency agreements covering LEHR RI/FS activities, agreement in Principal program
I-IWS-10	5/13/93	R. Kolpa	D&M	Associate Group Manager	LEHR Phase II Characterization study conclusions, RI/FS Workplan scope, characterizations of other LEHR sites, data sharing with UCD, aquifer pumping tests, UCD landfill investigations, characterizations of third HSU, Health & Safety Plan's site specificity
I-IWS-11	5/13/93	R. Kolpa	D&M	Soil Scientist	Soil chemistries, contaminant migrations in the vadose zone, scope of RI/FS studies, soil gas analyses during RI/FS, impacts of UCD's POTW discharge to Putah Creek

LIST OF CONTACTS AND INTERVIEWS CONDUCTED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Ref. No.	Date	Auditor	Organization	Position	Topic
I-IWS-12	5/13/93	R. Kolpa	D&M	Senior Engineering Geologist	LEHR site hydrogeology, aquifer characterizations during RI/FS activities, off-site UCD domestic well sampling, contaminant migrations along utility lines, POTW discharges to Putah Creek and their impacts on groundwater, screen intervals in groundwater monitoring wells
I-IWS-13	5/14/93	R. Kolpa F. Russo	SF	LEHR Senior Project Manager	LEHR history, communications with EPA, DOE/SF's policy on IAG for LEHR remediation project, consequences of NPL listing for LEHR, LEHR restoration project objectives, priority for investigations of LEHR satellite locations, agreement in Principal with the State of California
I-IWS-14	5/14/93	R. Kolpa	Battelle	LEHR Senior Project Manager	California Preliminary Endangerment Assessment
I-IWS-15	5/14/93	R. Kolpa F. Russo A. P. Sikri	SF	Chief, Environmental & Technical Resources Branch	Agreement in Principal with the State of California, AIP information exchanges between DOE and State of CA, AIP impact on regulatory enforcement vehicles
I-IWS-16	5/17/93	R. Kolpa	EMO	Assist t Project Manager	Coordination between EMO and ITEH regarding critical activities on site

LIST OF CONTACTS AND INTERVIEWS CONDUCTED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Ref. No.	Date	Auditor	Organization	Position	Topic
Environmental Management (EM)					
I-EM-1	4/21/93	P. Lindahl	EM	Program Manager	LEHR program management
I-EM-2	4/27/93	P. Lindahl A.P. Sikri	EM	Division Director, SF Operations	LEHR program management
I-EM-3	5/10/93	C-S. Huang P. Lindahl	SF SF	Chief, Environmental Technical Restoration Branch Director, Division	LEHR program management
I-EM-4	5/10/93	C-S. Huang P. Lindahl	SF	SF Program Manager	LEHR program management
I-EM-5	5/10/93	P. Lindahl	SF	Waste Management Specialist, Waste Management Operations	LEHR project waste management
I-EM-6	5/11/93	P. Lindahl	UCD	LEHR Project Manager	LEHR project management
I-EM-7	5/11/93	P. Lindahl A.P. Sikri	UCD	Director, Office of ESH	LEHR project
I-EM-8	5/11/93	P. Lindahl	D&M	Program Coordinator	LEHR project management
I-EM-9	5/11/93	S. Barises P. Lindahl	EMO	Senior Program Manager	LEHR project management
I-EM-10	5/11/93	P. Lindahl	EMO	Assistant Project Manager	LEHR project management
I-EM-11	5/12/93	P. Lindahl	BEI	Site Superintendent	LEHR project management
I-EM-12	5/13/93	P. Lindahl	SF	SF Program Manager	Technical Advisory Committee
I-EM-13	5/13/93	P. Lindahl F. Russo	EMO	Assistant Project Manager	Radiation Control Committee
I-EM-14	5/14/93	C-S. Huang P. Lindahl F. Russo A. P. Sikri	SF	Assistant Manager for Environmental Management and Support	LEHR program management and steering committee

LIST OF CONTACTS AND INTERVIEWS CONDUCTED BY THE ENVIRONMENTAL AUDIT TEAM (continued)

Ref. No.	Date	Auditor	Organization	Position	Topic
I-EM-15	5/14/93	P. Lindahl	SF	Chief, Environmental Technical Restoration Branch	LEHR project management
I-EM-16	5/14/93	C-S. Huang R. Kolpa P. Lindahl F. Russo A. P. Sikri	SF	Chief, Environmental Technical Restoration Branch	Agreement in Principle

APPENDIX F

DEFINITIONS OF CAUSAL FACTORS AND CONTRIBUTING FACTORS

APPENDIX F:

DEFINITIONS OF CAUSAL AND CONTRIBUTING FACTORS

Causal Factor	Definition
Policy	Evaluate if ineffective, outdated, or nonexistent policies contributed to the finding.
Policy Implementation	Ascertain if written policies reflecting Federal, state, and local laws and regulations, codes, and standards were appropriately disseminated, implemented, and updated.
Procedures	Identify if written procedures that have bee ı prepared to effectively implement site policy, DOE Orders, and Federal, state, and local laws and regulations were a contributing factor to the finding. Determine if unfamiliarity with, or unavailability of those procedures contributed to the finding.
Personnel	Identify if the educational and work experience backgrounds for personnel holding responsible positions contributed to the finding. Determine if the level of personnel knowledge about the technical and environmental aspects of their jobs contributed to the finding.
Resources	Ascertain if the number of personnel or extramural resources available to a job were a contributing factor to the finding. Evaluate if inadequacies in facilities and equipment were a contributing factor to the finding.
Training	Identify if adequate personnel training on implementing site policy, DOE Orders, and Federal, state, and local laws and regulations was a contributing factor to the finding.
Change	Evaluate if changes in site mission, function, operation, and established requirements, which rendered existing policies or procedures inadequate or inappropriate, were contributing factors to the finding. Evaluate if the timeliness and effectiveness of changes to site and DOE policy, and the implementing procedures, were a contributing factor to the finding.

DEFINITIONS OF CAUSAL AND CONTRIBUTING FACTORS (continued)

Causal Factor	Definition
Risk	Evaluate if the site personnel responsible for a situation contributing to a finding have assessed and were aware of the relative degree of risk involved in the action.
Design	Evaluate if inadequate design of a system was a contributing factor to the finding.
Human Factors	Ascertain if human factors, such as fatigue or deliberate circumvention of a safety system, were contributing factors to the finding.
Barriers and Controls	Determine if inadequacies in established barriers and controls, both administrative and physical, including operational readiness, routine inspections, and preventive maintenance, and/or a lack of these controls contributed to the finding.
Supervision	Identify if ineffective supervisory controls for implementing policies, procedures, standards, laws, etc., were a contributing factor to the finding.
Quality Assurance/ Quality Control	Identify if inadequacies in the quality assurance/quality control program were causal factors to the identified finding. This includes inadequate followup to previously identified findings.
CONTRIBUTING FACTOR Appraisals/Audits/Reviews	Determine if ineffective or insufficient appraisals/ audits/reviews or oversight were contributing factors to the finding. These factors should only be used as secondary contributing factors to the finding.

APPENDIX G

LIST OF ACRONYMS AND ABBREVIATIONS

APPENDIX G:
LIST OF ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
^{60}Co	Cobalt-60
A	Air
AEA	Atomic Energy Act
AIP	Agreement in Principal
AMEMS	Assistant Manager for Environment Management and Support
bgs	Below Ground Surface
BMPF	Best Management Practice Finding
BMPs	Best Management Practices
CAA	Clean Air Act
CAP-88	Clean Air Act Assessment Package 1988
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CF	Compliance Finding
CFR	Code of Federal Regulations
CWA	Clean Water Act
D&D	Decontamination and Decommissioning
D&DSC*	Decommissioning and Decontamination Subcontractor
DHS	California Department of Health Services
DOE*	U.S. Department of Energy
EM	Environmental Management
EML	U.S. Department of Energy Measurement Laboratory
EMO*	Environmental Management Operations
EPA	U.S. Environmental Protection Agency
ES&H	Environmental, Safety and Health
GMP	Groundwater Monitoring Plan
GPMPP	Groundwater Protection Management Program Plan

* Indicates acronym is not defined or spelled out after the first usage in the body of the report.

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

Acronym/Abbreviation	Definition
GW	Groundwater
HEPA	High Efficiency Particulate Air
HSUs	Hydrostratigraphic Units
IAG	Inter-Agency Agreement
IWS	Inactive Waste Sites
LEHR-ER*	DOE LEHR-Environmental Restoration Project
LEHR*	Laboratory for Energy-Related Health Research
MCLs	Maximum Contaminant Levels
MOA	Memorandum of Agreement
NCP	National Contingency Plan
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OSSC*	Onsite Support Contractor
QA	Quality Assurance
QC	Quality Control
RAD	Radiation
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
RWQCB	California Regional Water Quality Control Board
S&GSC*	Soil and Groundwater Subcontractor
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SER	Site Environmental Report
SF*	DOE San Francisco Operations Office
SOPs	Standard Operating Procedures
SW	Surface Water
TCM	Toxic and Chemical Materials

* Indicates acronym is not defined or spelled out after the first usage in the body of the report.

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

Acronym/Abbreviation	Definition
TLDs	Thermoluminescent Dosimeters
UCD*	University of California at Davis
WM	Waste Management

* Indicates acronym is not defined or spelled out after the first usage in the body of the report.

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