U.S. Department of Energy Office of Environment, Safety and Health

Tiger Team Assessment of the Lawrence Berkeley Laboratory

February 1991

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U.S. Department of Energy Office of Environment, Safety and Health

Tiger Team Assessment of the Lawrence Berkeley Laboratory Washington, DC 20585

February 1991

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PREFACE

This report documents the Tiger Team Assessment of the Lawrence Berkeley Laboratory (LBL), located in Berkeley, California. The LBL is operated for the Department of Energy (DOE) by the University of California. The assessment was conducted under the auspices of the DOE Headquarters, Office of Special Projects which is under the Assistant Secretary for Environment, Safety and Health. The assessment was conducted between January 14 and February 15, 1991.

The scope of the review included all facilities at the site and LBL activities on the University of California at Berkeley campus, was comprehensive, encompassing environmental, safety, and health (including Occupational Safety and Health Act compliance) and management areas. The overall objective was to determine the Laboratory's compliance with applicable Federal (including DOE), state, and local laws, directives, and/or regulatory requirements. Where formal requirements are absent, compliance with best industrial practices was determined.

Activities of the Tiger Team Assessment resulted in identification of compliance findings or concerns and noteworthy practices and an analysis as to the root causes for noncompliance.

The LBL Tiger Team Assessment is one component of a larger, comprehensive DOE Tiger Team Assessment program planned for DOE facilities that will eventually encompass over 100 of the Department's operating facilities. The assessment program is part of a 10-point initiative announced by the Secretary of Energy, Admiral James D. Watkins, USN (Retired), on June 27, 1989, to conduct independent compliance oversight and management assessments of the environment, safety, and health programs and waste management operations at DOE facilities. The objective of the initiative is to provide the Secretary with information on the compliance status of DOE facilities with regard to environment, safety, and health requirements; root causes for noncompliance; adequacy of DOE and contractor environment, safety, and health management programs; response actions to address the identified problem areas; and DOE-wide environment, safety, and health compliance trends and root causes.

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Washington, DC

TABLE OF CONTENTS

	<u>Page</u>
GLOSSARY OF ABBREVIATIONS AND ACRONYMS	xi
EXECUTIVE SUMMARY	ES-1
1.0 INTRODUCTION	1-1
1.1 PURPOSE	1-1
1.2 SCOPE	1-1
1.3 APPROACH	1-2
1.3.1 Pre-Assessment Site Planning	1-2
1.3.2 Onsite Activities	1-3
1.3.3 Reporting	1-3
1.3.4 Followup	1-5
1.4 FACILITY DESCRIPTION	1-5
2.0 KEY FINDINGS, ROOT CAUSES, AND NOTEWORTHY PRACTICES	2-1
2.1 ENVIRONMENTAL	2-1
2.1.1 Key Findings	2-1
2.1.2 Causal Factors	2-2
2.2 SAFETY AND HEALTH	2-3
2.2.1 Key Concerns	2-3
2.2.2 Root Causes	2-6
2.2.3 Noteworthy Practices	2-6
2.3 MANAGEMENT	2-6
2.3.1 Key Findings	2-6
2.3.2 Probable Root Causes	2-8
3.0 ENVIRONMENTAL ASSESSMENT	3-1
3.1 PURPOSE	3-1
3.2 SCOPE	3-1
3.3 APPROACH	3-1
3.4 ENVIRONMENTAL ASSESSMENT SUMMARY	3-2
3.5 ENVIRONMENTAL FINDINGS	3-13
3.5.1 Air	3-13
3.5.1.1 Overview	3-13
3.5.1.2 Compliance Findings	3-18
3.5.1.3 Best Management Practicctice Findings	3-33
3.5.2 Surface Water/Drinking Water	3-37
3.5.2.1 Overview	3-37
3.5.2.2 Compliance Findings	3-41
3.5.2.3 Best Management Practice Findings	3-55
3.5.3 Groundwater	3-57
3.5.3.1 Overview	3-57
3.5.3.2 Compliance Findings	3-60

3.5.4	Waste Management	3-71
3.5.4.1	Overview	3-71
3.5.4.2	Compliance Findings	3-80
3.5.4.3	Best Management Practice Findings	3-113
3.5.5	Toxic and Chemical Materials	3-117
3.5.5.1	Overview	3-117
3.5.5.2	Compliance Findings	3-123
3.5.5.3	Best Management Practice Findings	3-132
3.5.6	Quality Assurance	3-137
3.5.6.1	Overview	3-137
3.5.6.2	Compliance Findings	3-141
3.5.6.3	Best Management Practice Findings	3-151
3.5.7	Radiation	3-153
3.5.7.1	Overview	3-153
3.5.7.2	Compliance Findings	3-156
3.5.7.3	Best Management Practice Findings	3-161
3.5.8	Inactive Waste Sites	3-163
3.5.8.1	Overview	3-163
3.5.8.2	Compliance Findings	3-169
3.5.8.3	Best Management Practice Findings	3-180
3.5.9	National Environmental Policy Act	3-189
3.5.9.1	Overview	3-189
3.5.9.2	Compliance Findings	3-192
3.5.10	Environmental Monitoring	3-207
3.5.10.1	Overview	3-207
3.5.10.2	Compliance Findings	3-209
3.5.10.3	Best Management Practice Findings	3-215
3.5.11	Soils, Sediments, and Biota	3-217
3.5.11.1	Overview	3-217
3.5.11.2	Compliance Findings	3-220
3.5.12	Environmental Oversight and Reporting	3-223
3.5.12.1	Overview	3-223
3.5.12.2	Compliance Findings	3-224
4.0	SAFETY AND HEALTH ASSESSMENT	4-1
4.1	PURPOSE	4-1
4.2	SCOPE	4-1
4.3	APPROACH	4-1
4.4	SAFETY AND HEALTH ASSESSMENT SUMMARY	4-3
4.5	SAFETY AND HEALTH FINDINGS AND CONCERNS	4-7
4.5.1	Organization and Administration(OA)	4-7
4.5.1.1	Overview	4-7
4.5.1.2	Findings and Concerns	4-10
4.5.2	Quality Verification(QV)	4-21
4.5.2.1	Overview	4-21
4.5.2.2	Findings and Concerns	4-23

4.5.3	Operations (OP)	4-34
4.5.3.1	Overview	4-34
4.5.3.2	Findings and Concerns	4-36
4.5.4	Maintenance (MA)	4-45
4.5.4.1	Overview	4-45
4.5.4.2	Findings and Concerns	4-47
4.5.5	Training and Certification (TC)	4-56
4.5.5.1	Overview	4-56
4.5.5.2	Findings and Concerns	4-58
4.5.6	Auxiliary Systems (AX)	4-66
4.5.6.1	Overview	4-66
4.5.6.2	Findings and Concerns	4-67
4.5.7	Emergency Preparedness (EP)	4-70
4.5.7.1	Overview	4-70
4.5.7.2	Findings and Concerns	4-73
4.5.8	Technical Support (TS)	4-92
4.5.8.1	Overview	4-92
4.5.8.2	Findings and Concerns	4-94
4.5.9	Packaging and Transportation (PT)	4-99
4.5.9.1	Overview	4-99
4.5.9.2	Findings and Concerns	4-101
4.5.10	Experimental Activities (EA)	4-111
4.5.10.1	Overview	4-111
4.5.10.2	Findings and Concerns	4-113
4.5.11	Site/Facility Safety Review (FR)	4-115
4.5.11.1	Overview	4-115
4.5.11.2	Findings and Concerns	4-117
4.5.12	Radiological Protection (RP)	4-121
4.5.12.1	Overview	4-121
4.5.12.2	Findings and Concerns	4-124
4.5.13	Worker Safety and Health Compliance (WS)	4-147
4.5.13.1	Overview	4-147
4.5.13.2	Findings and Concerns	4-151
4.5.14	Industrial Hygiene (IH)	4-161
4.5.14.1	Overview	4-161
4.5.14.2	Findings and Concerns	4-163
4.5.15	Occupational Safety (OS)	4-169
4.5.15.1	Overview	4-169
4.5.15.2	Findings and Concerns	4-171

4.5.16	Fire Protection (FP)	4-177
4.5.16.1	Overview	4-177
4.5.16.2	Findings and Concerns	4-179
4.5.17	Medical Services (MS)	4-187
4.5.17.1	Overview	4-187
4.5.17.2	Findings and Concerns	4-189
4.6	NOTEWORTHY PRACTICES	4-192
4.7	SYSTEM FOR CATEGORIZING CONCERNS	4-193
4.8	CATEGORIZATION AND TABULATION OF CONCERNS	4-195
4.8.1	Categorization of Concerns	4-195
4.8.2	Tabulation of Concerns	4-199
4.8.3	DOE/EH-0096	4-215
4.9	TEAM COMPOSITION AND AREAS OF RESPONSIBILITY	4-224
5.0	MANAGEMENT ASSESSMENT	5-1
5.1	PURPOSE	5-1
5.2	SCOPE	5-1
5.3	APPROACH	5-1
5.4	MANAGEMENT ASSESSMENT SUMMARY	5-2
5.5	MANAGEMENT FINDINGS	5-4
5.5.1	Planning and Resource Allocation	5-4
5.5.2	Organization	5-8
5.5.3	ES&H Roles, Responsibilities and Authorities	5-11
5.5.4	Staff Development and Training	5-17
5.5.5	Management Systems	5-20
5.5.6	Oversight	5-26
5.5.7	Quality Management	5-36
5.6	NOTEWORTHY PRACTICES	5-39
5.7	TEAM COMPOSITION AND AREAS OF RESPONSIBILITY	5-40
6.0	EVALUATION OF LBL AND SAN SELF-ASSESSMENT REPORTS AND PROGRAMS	6-1
6.1	SUMMARY OF EVALUATION RESULTS	6-1
6.1.1	LBL Self-Assessment	6-2
6.1.2	SAN Self-Assessment Program	6-4
6.2	COMPARISON OF TIGER TEAM AND SELF-ASSESSMENT FINDINGS	6-6
6.2.1	Environmental Subteam Comparison of Findings	6-6
6.2.2	Safety and Health Subteam Comparison of Findings	6-8
6.2.3	Management Subteam Comparison of Findings	6-10

APPENDICES

APPENDIX A	TIGER TEAM PERSONNEL AND BIOGRAPHICAL SKETCHES	A-1
	LBL Tiger Team Organization	A-1
	Biographical Sketches of the Tiger Team Leader and Team Leader Staff	A-1-1
	Biographical Sketches of the Environmental Subteam Members	A-2-1
	Biographical Sketches of the Safety and Health Subteam Members	A-3-1
	Biographical Sketches of the Management Subteam Members	A-4-1

APPENDIX B	ENVIRONMENTAL SUBTEAM ASSESSMENT PLAN	B-1
1.0	Introduction	B-2
2.0	Environmental Assessment Information	B-3
2.1	Pre-Assessment Activities	B-3
2.2	On-Site Activities and Reports	B-4
3.0	Air	B-8
3.1	Issue Identification	B-8
3.2	Records Required	B-8
4.0	Waste Management	B-10
4.1	Issue Identification	B-10
4.2	Records Required	B-11
5.0	Surface Water	B-12
5.1	Issues Identification	B-12
5.2	Records Required	B-13
6.0	Radiation	B-14
6.1	Issue Identification	B-14
6.2	Records Required	B-15
7.0	Groundwater	B-16
7.1	Issue Identification	B-16
7.2	Records Required	B-16
8.0	Inactive Waste Sites and Releases	B-17
8.1	Issue Identification	B-17
8.2	Records Required	B-17
9.0	Toxic and Chemical Materials	B-18
9.1	Issue Identification	B-18
9.2	Records Required	B-19
10.0	Quality Assurance	B-20
10.1	Issue Identification	B-20
10.2	Records Required	B-20
11.0	National Environmental Policy Act	B-22
11.1	Issue Identification	B-22
11.2	Records Required	B-22
APPENDIX C	ENVIRONMENTAL SUBTEAM DAILY AGENDAS	C-1
Week 1		C-1
Week 2		C-3
APPENDIX D	ENVIRONMENTAL AND MANAGEMENT SUBTEAMS CONTACTS AND INTERVIEWS (attached on microfiche)	
APPENDIX E	SITE DOCUMENTS REVIEWED BY THE ENVIRONMENTAL TEAM (attached on microfiche)	
APPENDIX F	OSHA NONCOMPLIANCES (attached on microfiche)	

APPENDIX G	TIGER TEAM HOT LINE CALLS AND RESPONSES	G-1
APPENDIX H	COMPARISON OF TIGER TEAM AND SELF-ASSESSMENT FINDINGS	H-1
	Environmental Subteam	H-1
	Safety and Health Subteam	H-5
	Management Subteam	H-11

LIST OF FIGURES AND TABLES

Figures		Page
1-1	Location of Lawrence Berkeley Laboratory	1-6
1-2	Lawrence Berkeley Laboratory -- Site Layout	1-8
3-1	Environmental Subteam Findings by Discipline	3-8
3-2	Number of Findings Per Causal Factor	3-9
A-1	Lawrence Berkeley Laboratory Tiger Team Organization	A-1

Tables

3-1	Environmental Subteam Findings	3-3
3-2	List of Applicable Air Regulations/Requirements/ Guidelines	3-14
3-3	List of Applicable Surface Water/Drinking Water Regulations/Requirements/Guidelines	3-38
3-4	Summary of EBMUD Discharge Excursions in 1990 (0370)	3-42
3-5	List of Applicable Groundwater Regulations/ Requirements/Guidelines	3-58
3-6	List of Applicable Waste Management Regulations/ Requirements/Guidelines	3-72
3-7	List of Applicable Toxic and Chemical Materials Regulations/Requirements/Guidelines	3-118
3-8	Aboveground Storage Tanks at LBL Lacking Secondary Containment	3-124
3-9	List of Applicable Quality Assurance Regulations/ Requirements/Guidelines	3-138
3-10	List of Applicable Radiation Regulations/ Requirements/Guidelines	3-154
3-11	List of Applicable Inactive Waste Sites Regulations/Requirements/Guidelines	3-164
3-12	List of Applicable National Environmental Policy Act Regulations/Requirements/Guidelines	3-190
3-13	LBL NEPA Documents Reviewed	3-199
3-14	List of Applicable Environmental Monitoring Regulations/Requirements/Guidelines	3-108
3-15	List of Applicable Soils, Sediments, and Biota Regulations/Requirements/Guidelines	3-218
3-16	Status of Corrective Actions for the 1988 Environmental Survey Findings	3-230
4-1	Self-Assessments Summary	4-2
WS-1	Buildings Inspected and Noncompliance Information	4-150
6-1	Summary of Lawrence Berkeley Laboratory Finding Comparison	6-2
6-2	Summary of San Francisco Operations Office Finding Comparison	6-4
6-3	Environmental Findings Comparison	6-6

6-4	Safety and Health Subteam Finding Comparison	6-8
6-5	Lawrence Berkeley Laboratory Concern Summary	6-9
6-6	San Francisco Operations Office Concern Summary	6-10
6-7	Management Findings Comparison	6-10
H-1	LBL and SAN Self-Assessment Evaluation	H-1
H-2	Comparison of S&H Concerns and Self-Assessment Findings	H-5
H-3	Comparison of Management Subteam and Self-Assessment Findings	H-11

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

A	Air
A&E	Architectural and Engineering (Contractor)
ACM	Asbestos-Containing Material
ALARA	As Low As Reasonably Achievable
*ALS	Advanced Light Source
ANPRM	Advanced Notice of Proposed Rulemaking
*ANSI	American National Standards Institute
*ASME	American Society of Mechanical Engineers
AST	Aboveground Storage Tank
BAAQMD	Bay Area Air Quality Management District
BMP	Best Management Practice
BMPF	Best Management Practice Finding
C&M	Construction and Maintenance Department
CARB	California Air Resources Board
CATS	Computer-Assisted Tracking System
CDWR	California Department of Water Resources
CEM	Continuous Emission Monitor
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CF	Compliance Finding
*CFR	Code of Federal Regulations
CHWCA	California Hazardous Waste Control Act
COC	Chain-of-Custody
CWA	Clean Water Act
CWRCB	California State Water Resources Control Board
CX	Categorical Exclusion
D&D	Decontamination and Decommissioning
DHS	California Department of Health Services
*DOE	Department of Energy
EA	Environmental Assessment
EBMUD	East Bay Municipal Utility District
EH	Office of Environment, Safety and Health
EIS	Environmental Impact Statement
EISACD	Environmental Impact and Safety Analysis Classification Document
EM	Office of Energy Research Environmental Monitoring
EOR	Environmental Oversight and Reporting
*EPA	Environmental Protection Agency
*EPHC	Environmental Protection, Health and Safety Division
ER	Office of Energy Research
ESD	Earth Sciences Division
ES&H	Environment, Safety, and Health
*ESHC	Environment and Safety Hazards Control Department

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

FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FONSI	Finding of No Significant Impact
FR	Federal Register
FS	Feasibility Study
FTP	Field Task Proposal
GMP	Groundwater Monitoring Plan
GPMP	Groundwater Protection Management Program Plan
GW	Groundwater
HEPA	High-Efficiency Particulate Air
HRS	Hazard Ranking Score
HSWA	Hazardous and Solid Waste Act
HTO	Tritiated Water Vapor
HWHF	Hazardous Waste Handling Facility
IES	Integrated Environmental Systems
IRAD	Independent Review and Assurance Department
IQAP	Institutional Quality Assurance Plan
IWS	Inactive Waste Sites
*LBL	Lawrence Berkeley Laboratory
LDR	Land Disposal Restriction/Restricted
LLNL	Lawrence Livermore National Laboratory
LLW	Low-Level Waste
M&O	Management and Operations (Contractor)
MCDS	Materials Chemistry and Science Division
MCL	Maximum Contaminant Level
MD	Management Directive
MDA	Methylene Dianiline
MMD	Materials Management Department
MOU	Memorandum-of-Understanding
MSDS	Material Safety Data Sheet
MTF	Memorandum-to-File
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NOD	Notice of Decision
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPRM	Notice of Proposed Rulemaking
*NQA-1	ANSI/ASME NQA-1, "Quality Assurance Requirements for Nuclear Facilities"
NTLF	National Tritium Labeling Facility
OJT	On-the-Job Training
*OSHA	Occupational Safety and Health Administration
*OSP	Operational Safety Procedure

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

PA	Preliminary Assessment
PCB	Polychlorinated Biphenyl
POTC	Publicly Owned Treatment Works
PSO	Program Senior Official
*QA	Quality Assurance
QAPP	Quality Assurance Program Plan
QC	Quality Control
R	Radiation
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
*S&H	Safety and Health (Subteam)
SAA	Satellite Accumulation Area
*SAN	San Francisco Operations Office
SARA	Superfund Amendments and Reauthorization Act
SEN	Secretary of Energy Notice
SI	Site Investigation
SIC	Standard Industrial Classification
SOP	Standard Operating Procedure
SPCC	Spill Prevention Control and Countermeasures
*SRC	Safety Review Committee
SSB	Soil, Sediment, and Biota
STLC	Soluble Threshold Limit Concentration
SW	Surface Water
SWMU	Solid Waste Management Unit
TCM	Toxic and Chemical Materials
TRU	Transuranic
*TSA	Technical Safety Appraisal
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage, and Disposal
TSDF	Treatment, Storage, and Disposal Facility
TT	Tiger Team
TTLC	Total Threshold Limit Concentration
* UC	University of California
* UCB	University of California at Berkeley
USPCI	United States Pollution Control, Inc.
UST	Underground Storage Tank
WAA	Waste Accumulation Area
WHC	Westinghouse Hanford Company
WIPP	Waste Isolation Pilot Plant
WM	Waste Management

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

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This report documents the results of the Department of Energy's (DOE's) Tiger Team Assessment of the Lawrence Berkeley Laboratory (LBL) conducted from January 14 through February 15, 1991. The Tiger Team Assessment was conducted by a team comprised of professionals from DOE, contractors, and consultants. The purpose of the assessment was to provide the Secretary of Energy with the status of environment, safety, and health (ES&H) programs at LBL.

LBL provides national scientific leadership and technological innovation through its mission to provide leading multidisciplinary research in the energy sciences, general sciences and life sciences; develop and operate unique national experimental facilities for use by qualified investigators; educate and train future generations of scientists and engineers; and foster productive relationships between LBL research programs and industry.

LBL and DOE's San Francisco Operations Office (SAN) conducted comprehensive self-assessments prior to the arrival of the Tiger Team although neither have institutionalized the self-assessment process.

The Tiger Team concluded that curtailment or cessation of any operations at LBL is not warranted. However, the number and breadth of findings and concerns from this assessment reflect a serious condition at this site. An early, proactive, aggressive ES&H program in concert with the Secretary's initiatives was not put in place. Followup activities from the previous Environmental Survey and the Technical Safety Appraisal did not receive aggressive management attention. Many of the findings and concerns from this assessment had been previously identified. Repeat findings generally reflect inadequate root cause analysis and followup.

In spite of its late start, LBL has recently made progress in increasing ES&H awareness at all staff levels and in identifying ES&H deficiencies. Corrective action plans are inadequate, however, many compensatory actions are underway. Also, LBL does not have the technical expertise or training programs nor the tracking and followup to effectively direct and control sitewide activities. The situation is further compounded by the lack of adequate guidance and oversight by DOE of ES&H activities at LBL. As a result of these deficiencies, the Tiger Team has reservations about LBL's ability to implement effective actions in a timely manner and, thereby, achieve excellence in their ES&H program.

Summary of Key Findings and Probable Root Causes

Environmental

Environmental and waste management programs at LBL are not consistently complying with regulatory and DOE requirements. Lack of compliance and failure to implement best management practices are widespread, applying to virtually all of the environmental disciplines assessed by the Tiger Team. To give perspective, it is important to note that none of the Tiger Team findings represents a substantial threat of large-scale environmental contamination or danger to human health. This is because operations at LBL do not involve large sources of potential environmental contaminants. However, it must be stated that current line management and oversight do not meet the requirements

of DOE Secretary of Energy Notice (SEN)-6-89, SEN-7-89, and SEN-11-89 and their subsequent revisions and have not been effective in achieving compliance or monitoring and controlling the impacts of LBL activities on the environment.

The Environmental Subteam's findings involving line management indicate weaknesses on the part of LBL, SAN, and ER in the areas of providing clear policy direction, preparing and implementing formal procedures, ensuring adequate training, and providing effective oversight of LBL activities. Environmental programs have not been accorded the appropriate priority and, thus, suffer from a lack of resources. In particular, in the area of waste management, the number and scope of Tiger Team findings, as well as the recurrence of problems noted in the 1988 DOE Environmental Survey and in several Notices of Violation issued by the California Department of Health Services, indicate a serious problem in line management's performance.

Key environmental programmatic findings are as follows:

- Waste management at LBL exhibits pervasive and long-standing noncompliances and deficiencies which indicate a serious lack of management and oversight on the part of LBL and SAN.
- Virtually all LBL and SAN-related environmental programs and activities lack quality assurance and quality control plans, procedures, documentation, and auditing.
- The environmental monitoring program at LBL lacks sufficient strategic planning to establish comprehensive monitoring requirements and then integrate them into the total LBL operations program.
- There is a pervasive lack of effective oversight on the parts of both LBL and SAN for environmental programs and activities at LBL. In this usage, oversight is defined as providing guidance, documenting requirements and objectives, and setting up programs of routine supervision, as well as formal audits and appraisals, to assure that procedures are followed and objectives are met.

Safety and Health

LBL is undergoing change as it moves toward institutionalizing a new safety culture. The institutionalization of this culture appears to be occurring more rapidly than the implementation of a formal sitewide safety program. Management is committed to an improved safety culture, but has not fully demonstrated its ability to implement and manage the changes necessary to bring it about. Communicating the new safety culture to its people, correcting significant safety and health resource deficiencies, demonstrating its ability to implement an effective sitewide safety and health program, and developing the management tools to assess LBL safety programs are critical challenges facing LBL management.

The Safety and Health section of this report cites 136 concerns. Seven of these concerns were classified as Category II; none were Category I. Key concerns relate to the execution of the ES&H program and the organization in place to carry it out; both are judged to fall short of enabling compliance

with DOE requirements, which is attributed to inexact definition and poor management implementation of program elements. Other concerns and their probable root causes derive from (1) serious deficiencies in personnel resources available to management to provide the necessary expertise and depth required to meet DOE requirements, (2) an employee training program that lacks formality in organization and execution, and (3) administrative practices that fail to provide the measures and discipline needed to meet DOE requirements.

An underlying problem is less SAN oversight than needed. A stringent system of controls to ensure compliance with DOE requirements, enforced by proactive SAN oversight measures, is not currently in place. As a result, there is widespread noncompliance with DOE Orders and other Federal regulations.

Occupational Safety and Health Administration (OSHA) Compliance

A comprehensive safety and health compliance appraisal covering general industry and construction standards was conducted to determine compliance with existing OSHA regulations as adopted by DOE. During this appraisal, the team primarily looked for "serious" noncompliances. Therefore, there is a higher percentage of "serious" versus "other than serious" noncompliances, as classified by OSHA. Of the 456 noncompliance issues identified, 420 were considered "serious" and 36 were classified as "other than serious."

This appraisal confirmed deficiencies in hazard communication related to training, the availability of Material Safety Data Sheets, labeling, written programs for work locations, appropriateness of hazard warnings, and the use of the Hazardous Material Information System. A major problem noted in construction activities is the failure to install and use fall protection. Significant deficiencies were identified with the program for inspection of slings, chokers, and related rigging. The handling and storage of regulated carcinogens was also found to be inconsistently administered across Laboratory facilities.

Management and Organization

LBL has recently begun a number of actions which can help establish an effective ES&H program. Examples of these actions include:

- top management attention to increase ES&H awareness at all levels of the Laboratory;
- recent reorganization to better focus on ES&H requirements;
- recognition that ES&H needs must be integrated into sitewide strategic planning;
- recognition that ES&H policies and procedures, and the process for their implementation, are weak;
- first steps to acquire additional ES&H staff for policy guidance, assessment and technical support needs; and
- completion of a comprehensive self assessment prior to the Tiger Team Assessment.

LBL has made a start, but faces a significant challenge in implementing an effective ES&H program. Concerns and reservations regarding LBL's ability to follow through and effectively implement ES&H requirements are based on the following Tiger Team observations:

- LBL does not possess the experience and expertise to effectively plan, develop and implement an ES&H program that meets DOE's requirements. LBL's actions to secure the additional resources needed are inadequate.
- LBL's informality of operations does not lend itself to the more rigorous management style and systems needed to implement ES&H requirements.
- LBL's current policies and procedures are inadequate and there is not an effective mechanism to ensure that the Laboratory is complying with ES&H requirements.
- Management systems are inadequate to provide management with information on the status and performance of ES&H activities.

The Tiger Team is concerned that without more aggressive actions by LBL to address these deficiencies the Laboratory may not be able to follow through on its planned actions.

Another key component of a successful ES&H program at LBL is the existence of adequate oversight of ES&H activities. DOE Headquarters has not accorded ES&H oversight the priority needed to ensure that these requirements are being met. SAN has not demonstrated that it assigns a high priority to ES&H. Additionally, the University of California has not provided adequate policy guidance or oversight with regard to LBL's ES&H activities. Oversight, which is the cornerstone of management's responsibility, must be significantly enhanced to help ensure that LBL will fully implement DOE's ES&H requirements.

1.0

INTRODUCTION

1.0 INTRODUCTION

On June 27, 1989, Secretary of Energy, Admiral James D. Watkins, USN (Retired), announced a 10-point initiative to strengthen environment, safety and health (ES&H) programs and waste management operations in the Department of Energy (DOE). One of the initiatives involved conducting independent Tiger Team Assessments at DOE operating facilities. The Office of Special Projects in the Office of Environment, Safety and Health (EH) has the responsibility to conduct Tiger Team Assessments for the Secretary of Energy. This report presents the assessment of the Lawrence Berkeley Laboratory (LBL), Berkeley, California. LBL is the nineteenth DOE site to be reviewed by a Tiger Team.

LBL is a multi-program laboratory operated by the University of California for DOE. The mission of LBL is to perform multidisciplinary research in energy and general and life sciences. The management of LBL operations is assigned to the DOE San Francisco Operations Office (SAN). The major DOE program office with programmatic responsibilities for LBL is the Office of Energy Research (ER).

1.1 PURPOSE

The purpose of the LBL Tiger Team Assessment is to provide the Secretary of Energy with concise information on the following:

- current ES&H compliance status at the site and the vulnerabilities associated with that compliance status,
- root causes for noncompliance,
- adequacy of DOE and site contractor ES&H management programs, and
- adequacy of response actions needed to address identified problem areas.

This information will assist DOE in determining patterns and trends in ES&H compliance and probable root causes and will provide guidance for management to take needed corrective actions.

1.2 SCOPE

The scope of the LBL Tiger Team Assessment is comprehensive and includes an evaluation of applicable site management systems, facilities, and operations in the context of ES&H. The ES&H areas reviewed included, but were not limited to

- compliance with applicable Federal, state, and local regulations, requirements, permits, agreements, and enforcement actions;
- compliance with DOE Order requirements for ES&H activities;
- compliance with the Occupational Safety and Health Administration/Act (OSHA) regulations and standards;

- adequacy of DOE and LBL ES&H management programs, including policy and procedures, internal oversight, planning and budgeting, organization, resources, training, and quality assurance;
- conformance with applicable "best" or "accepted" industry practices;
- identification of root causes; and
- identification of noteworthy practices.

1.3 APPROACH

The Tiger Team Assessment at LBL was conducted in accordance with the Tiger Team Guidance Manual (February 1990), the "Performance Objectives and Criteria for Technical Safety Appraisals at DOE Facilities and Sites" (June 1990), and generally accepted audit techniques. The assessment was conducted by a team of specialists from various DOE offices and support contractors. The team was managed by a senior DOE official and three experienced subteam leaders, one for each of the three disciplines of Environment, Safety and Health, and Management. Team members, with their areas of responsibility and work-related experience, are identified in Appendix A.

Each subteam focused on major facilities, operations, and systems to conduct a comprehensive evaluation that was representative of the overall status of LBL ES&H programs. The Environmental Subteam performed an assessment of all applicable elements of LBL environmental programs. Environmental issues related to management were referred to the Management Subteam for followup. The Safety and Health Subteam conducted an evaluation of the adequacy of LBL occupational safety/industrial safety programs and a comprehensive, multidisciplined Technical Safety Appraisal following protocols for these appraisals. Technical Safety Appraisals are operationally focused evaluations. As such, they appraise how safely a facility or site is being operated and the condition of equipment. To ensure consistency, the causal factors identified by all the subteams and during the management evaluation of the ES&H program are considered by the Management Subteam in the identification of probable root causes.

A systematic approach was implemented to perform the probable root cause analyses. This approach began with the analysis and evaluation of detailed background information and assessment data by the individual subteams to develop their findings and concerns. These individual findings were integrated by the subteams through identification of probable causal factors. The last step in the process was a collective determination of a set of probable root causes for the findings and concerns identified.

The Tiger Team Assessment process includes four distinct phases: planning, onsite assessment, reporting, and followup.

1.3.1 Pre-Assessment Planning

Planning for the assessment included the issuance of an introduction and information request memorandum, a pre-assessment site visit, an initial review

of the requested documentation provided to the Tiger Team by LBL and development of an assessment agenda.

The pre-assessment site visit was conducted by the Tiger Team Leader, the Environmental, Safety and Health, and Management Subteam Leaders, and representatives from the EH Office of Special Projects and the ER Program Office on December 4 and 5, 1990. The Manager, SAN, and LBL management provided overviews of site operations and ES&H programs. The Tiger Team Leader and subteam leaders discussed the Tiger Team Assessment program and necessary support requirements for the onsite assessment. Federal, state, and local regulators were invited, and representatives of Federal, state, and local agencies participated in the pre-assessment activity.

1.3.2 Onsite Activities

Onsite activities for the assessment took place from January 14 through February 15, 1991. These activities included field observations; document reviews; observation of routine operations, emergency exercises, and the physical condition of the site and facilities; reviews of previous audits and assessments; and interviews with DOE, contractor, and subcontractor site personnel, as well as personnel from Federal, state, and local regulatory agencies.

Using these sources of information, the Tiger Team developed issues that are reported as findings (Environmental and Management Subteams), concerns (Safety and Health Subteam), and noteworthy practices (all three subteams). Section 1.3.3 discusses this development process in more detail.

The Tiger Team process was conducted in an open manner with the site, to enhance communication and to ensure the accuracy of information and issues. During the process, all three subteams conducted daily debriefing sessions which were open to site personnel. The daily debriefing sessions had high attendance, and site personnel actively participated in the sessions. In addition, the Tiger Team Leader held weekly meetings with senior managers from SAN and LBL to provide a summary overview of the team's progress and to discuss major issues identified by the subteams. Prior to the closeout briefing, each subteam provided copies of draft findings and concerns to site personnel and conducted factual accuracy reviews.

1.3.3 Reporting

Section 2.0 is an overall summary of the key Tiger Team Assessment findings, concerns, noteworthy practices, and probable root causes identified by the discipline subteams. Sections 3.0 through 5.0 contain the Environmental, Safety and Health, and Management findings and concerns, respectively. Section 6.0 provides an evaluation of SAN and LBL Self-Assessment programs.

The Environmental Subteam categorizes each identified issue as one of the following: compliance finding (CF), best management practice finding (BMPF), or noteworthy practice (NWP). Compliance findings are conditions that, in the judgment of the Assessment Team, may not satisfy applicable ES&H regulations, DOE Orders (including internal DOE memoranda, where referenced), internal ES&H site operating standards, enforcement actions, agreements with regulatory agencies, or permit conditions. Best management practice findings are derived

from regulatory agency guidance, draft DOE Orders, accepted industry practices, and professional judgment. Each finding is prefaced by a statement of an applicable performance objective. Performance objectives for compliance findings are derived from promulgated regulations and final DOE Orders, consent orders, agreements, and permit conditions. Performance objectives for best management practice findings are derived from regulatory agency guidance, accepted industry practices, and professional judgment. Findings for the Environmental and Management Subteams are not necessarily arranged in order of relative significance.

The Safety and Health Subteam employed a reporting format that maintains consistency and integrity with the Technical Safety Appraisal process. Each identified issue was developed into a "concern," which is supported by findings, and has the characteristics of being explicit (stating the problem), measurable (auditable), and justifiable. A concern addresses a situation that, in the judgment of the subteam, meets one or more of the following criteria: (1) reflects less than full compliance with a DOE safety and health requirement or mandatory safety standard, (2) threatens to compromise safe operations, or (3) if properly addressed, would substantially enhance the excellence of that particular situation even though that part of the operation was judged to have a currently acceptable margin of safety. Because of this last category addressing the excellence of the operation, more concerns are reported than would result from a strictly compliance-oriented assessment. Each concern is categorized by its seriousness, potential hazard consideration, and compliance consideration. Findings and concerns are prefaced by a statement of the performance objective in each discipline area.

The objective of the OSHA portion of the review of LBL facilities was to measure workplace safety and health against OSHA regulations. OSHA's "General Industry Standards" (29 CFR 1910) and "Construction Industry Standards" (29 CFR 1926) were used as criteria. Appendix F provides a full report of the OSHA assessment.

The Management Subteam evaluated the effectiveness of management processes relative to ES&H programs to identify findings and further insights into probable root causes for ES&H findings and concerns developed by the other subteams. The Management Subteam's findings were derived from analysis of key management areas that impact ES&H activities and considered DOE policy and Orders, generally accepted management principles, and industry standards. Each finding is supported by a summary and discussion which identifies further detail as to the background, factual basis, and, where appropriate, management implications of the finding.

In addition to identifying findings and concerns, the subteams looked for exceptional practices in accomplishing performance objectives or meeting ES&H objectives. Any noted exceptional practices, which may have general application at other DOE facilities, are identified as "noteworthy practices" and are documented for the purpose of information transfer.

The assessment reflects a fixed point in time. Improvements in the ES&H areas that were planned, but were not completed at the time of this assessment, are identified in the report to provide a complete and accurate picture of the site's conditions from the onset of the assessment.

This Draft Tiger Team Report was transmitted to the Manager, SAN and LBL management personnel, DOE Headquarters program senior officials, and Federal, state and local regulators for technical and factual accuracy reviews. Upon receipt of comments, the Tiger Team will be responsible for preparation and issuance of the final report, incorporating review comments, suggested changes, and modifications, as appropriate.

1.3.4 Followup

SAN and LBL will prepare a draft action plan that addresses the findings and concerns identified by the Tiger Team Assessment. The draft action plan will be submitted by the Manager, SAN, to the appropriate Secretarial Program Office for submission to EH-1 for review and concurrence. The Secretary will approve the final action plan and direct its implementation.

1.4 FACILITY DESCRIPTION

The LBL is a multiprogram national laboratory located in Berkeley, California and operated by the University of California for DOE.

LBL is located in the east bay side of the San Francisco Bay Area in Alameda County, California. The site is 3 miles east of the San Francisco Bay and 15 miles northeast of the City of San Francisco, as shown on Figure 1-1. The 130-acre site is situated on the west-facing slope of the Berkeley Hills above the main campus of the University of California at Berkeley (UCB). The property line between two cities divides the site, with the western three-quarters in Berkeley and the eastern quarter in Oakland. Much of the area is urbanized, with the communities abutting each other. LBL lies in the northwest corner of UCB property. It is bounded on the north by private single-family homes, on the west by private multi-unit dwellings and UCB student halls, and on the south and east by UCB property. The southern portion of the UCB property includes recreational facilities and a botanical garden, while the eastern portion of the property is maintained in its natural state. LBL is located in the ridges and draws of Blackberry Canyon, which receives drainage from the central part of the site, and Strawberry Canyon, which generally forms the southern boundary. As a result of the hilly terrain, grading and filling have often been necessary to provide suitable building sites. Areas have been covered with soil up to several tens of feet thick in some of the original ravines and depressions.

The seismically active Hayward Fault, part of the San Andreas Fault System, developed as the Berkeley Hills were uplifted. The Hayward Fault trends in a northwest-southeast direction along the base of the hills below LBL and has the potential to produce an earthquake of approximately Richter magnitude 7.0. The San Andreas fault zone, which has a potential for an 8.3 magnitude earthquake, lies about 20 miles west of the site, offshore beyond the Golden Gate. This fault and the Calaveras fault zone, which lies about 15 miles east of the site, would produce less intense ground shaking at the site than would the Hayward Fault.

LBL is located on land owned by the Regents of the University of California (UC). DOE-owned buildings are constructed on land leased to DOE under a long-term agreement. Additional UC space utilized for DOE programs is supplied

Figure 1-1. Location of Lawrence Berkeley Laboratory

under the terms of the DOE-UC prime contract without added lease costs. SAN is responsible for oversight of LBL operations.

LBL's activities are located both onsite and at a number of locations offsite. Approximately 85 percent of the gross office/laboratory space utilized by LBL is onsite. Onsite space consists of approximately 1.5 million gross square feet (gsf) in 81 buildings (Figure 1-2). The offsite space consists of 21 buildings on UCB campus and 3 offsite leased buildings. Two of the offsite leased buildings are used as warehouse space and one as a printing facility. The LBL has ES&H responsibility for 2 of the 21 buildings on the UCB campus, namely Donner and Melvin Calvin Laboratories. UCB retains ES&H responsibility for the other 19 buildings.

LBL originated on the UCB campus in 1932. In 1940, it was relocated to its present site. The first major facility, the 184-inch Synchrocyclotron, was built with funds from both private and university sources. After 1948, LBL was funded by the U.S. Atomic Energy Commission and its successor agencies. In 1972, the name was changed from the Lawrence Radiation Laboratory to LBL. Today LBL is one of three multiprogram national laboratories operated by UC for DOE. LBL currently has a full-time staff of 3,304, including 713 students and post-doctoral associates.

LBL supports nationwide university-based research by providing facilities including the National Center for Electron Microscopy, four large accelerators, several small accelerators, a number of radiochemical laboratories, several large gamma irradiators, and the National Tritium Labeling Facility (NTLF).

LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA

LBL SITE MAP

2/6/91

Figure 1-2. Lawrence Berkeley Laboratory - Site Layout

2.0

KEY FINDINGS, ROOT CAUSES, AND NOTEWORTHY PRACTICES

2.0 KEY FINDINGS, ROOT CAUSES, AND NOTEWORTHY PRACTICES

2.1 ENVIRONMENTAL

2.1.1 Key Findings

The Environmental Subteam identified 70 compliance findings and 16 best management practice findings. While none of these present an imminent, large-scale danger to public health or the environment, taken together, they represent a serious deficiency in environmental protection, monitoring, and oversight by LBL and SAN.

The Tiger Team always selects a limited number of each subteam's findings as keys to understanding the nature and scope of ES&H problems at the site undergoing assessment. For LBL, the environmental problems were so pervasive that a slightly different approach has been taken. Those program elements and environmental management functions were selected which exhibit significant and widespread deficiencies having cross-cutting impacts on the entire environmental program, LBL, and SAN. These key findings are supported by large numbers of environmental findings which have been grouped together into key programmatic findings; the finding numbers of the supporting findings, enclosed in parentheses, follow. These key programmatic findings are

- Waste management at LBL exhibits pervasive and long-standing noncompliances and deficiencies, indicating a serious lack of management and oversight on the part of LBL and SAN. The body of waste management findings covers virtually every phase of waste management activities at the site. Many of the findings represent the same issues that have been cited in the 1988 Environmental Survey Preliminary Report, functional appraisals, and in regulatory agency inspections. This leads to the conclusion that while LBL may have addressed specific instances of noncompliance, it has failed to identify and correct the root causes of known waste management problems (all waste management findings (21 total)).
- There are a lack of quality assurance (QA) and quality control (QC) plans, procedures, documentation, and auditing in virtually all LBL- and SAN-related environmental programs and activities. LBL has failed to take an integrated approach to applying QA/QC, and has proceeded with several monitoring and investigative projects without QA plans in place to assure the achievement of project objectives and the validity of data produced (all quality assurance findings (8 total)).
- The Environmental Monitoring program at LBL lacks strategic planning. This lack of strategic planning to establish comprehensive monitoring requirements and integrate them into the LBL operations program leads to several programmatic problems. First, monitoring activities sitewide are in a reactive mode, responding to outside directives and requirements, instead of setting LBL's own goals. Second, monitoring at LBL may involve at least some wasted effort and resources, because LBL cannot demonstrate via its monitoring results that monitoring goals and regulatory limits are being met. Third, the monitoring program as

currently managed cannot meet the stated objective in DOE Order 5400.1 of anticipating environmental problems. Finally, the lack of a comprehensive monitoring plan (Finding EM/BMPF-1) leads directly to a number of specific deficiencies, such as lack of documentation and rationale for parameters sampled, sampling frequency, monitoring equipment siting, and configuration and calibration; lack of procedures; failure to conform to existing procedures; and lack of QA/QC for sampling, sample analyses, and data management (Findings A/CF-1, A/CF-6, A/BMPF-2, SW/CF-2, SW/CF-4, GW/CF-1, GW/CF-2, GW/CF-4, GW/CF-5, RAD/CF-1, RAD/BMPF-1, EM/CF-1, EM/CF-2, and EM/BMPF-1 (14 total)).

- There is a pervasive lack of effective oversight on the part of both LBL and SAN for environmental programs and activities at LBL. Here, oversight is defined as providing guidance, documenting requirements and objectives, and setting up programs of routine supervision, as well as formal audits and appraisals, to ensure that procedures are followed and objectives are met. The number, scope, and nature of the environmental findings, especially the large number of compliance findings (70), demonstrates the lack of effectiveness of LBL and SAN oversight. Further, this key programmatic finding encompasses only those problems where the lack of oversight was deemed important enough by the Environmental Subteam to constitute a stand-alone issue. In addition to these, the lack of oversight/supervision was cited as a causal factor in 21 environmental findings (Findings EOR/CF-1, EOR/CF-2, EOR/CF-3, A/CF-4, WM/CF-16, WM/CF-17, WM/BMPF-2, QA/CF-6, QA/CF-7, IWS/CF-6, and NEPA/CF-1 (11 total)).

2.1.2 Causal Factors

The Environmental Subteam identified, to the best of its ability, the causes which contributed most directly to each finding. By establishing trends among these causal factors, DOE can formulate root causes. Corrective actions are to be directed at these root causes, rather than at the specific elements of the findings, to set up programs that prevent recurrence or the occurrence of similar problems.

- **Waste Management** - Of the 21 findings making up this key programmatic finding, 15 related to failure to establish programs to adequately provide DOE policy implementation. Ten of the findings involved failure to develop and implement formal procedures. Nine reflect a lack of effective training. A lack of allocated resources was cited in six findings. Five were caused by lack of engineered barriers or administrative controls. In four of the findings, the cause was failure to adequately analyze the risks associated with waste management. A lack of oversight was the cause for five of the findings, and failure to perform required audits was cited in two findings.
- **Quality Assurance/Quality Control** - Six of the eight findings cited failure of programs to provide DOE policy implementation. Lack of quality assurance documentation was a cause in five findings. Failure to perform required audits and appraisals

contributed to two findings. Other causes (not detailed here) were cited in only one finding each.

- **Environmental Monitoring** - Of the 14 findings in this key programmatic finding, 10 relate to a lack of DOE policy implementation and 10 relate to failure to develop and implement procedures. A lack of allocated resources is cited in eight findings. Inadequate quality assurance/quality control contributed to four of the findings. Three findings cite inappropriate personnel. Four cite inadequate supervision/oversight, while three findings involve a lack of effective training. Other causes (not detailed here) are cited in only one finding each.
- **Lack of Environmental Oversight** - Of the 11 findings in this programmatic category, 6 relate to the failure of programs to provide DOE policy implementation. Six cite lack of formal procedures. Five show lack of allocated resources. Failure to perform required audits and appraisals contributed to four findings. Lack of training and lack of supervision are cited in two findings each. Other causes (not detailed here) are cited in only one finding each.

2.2 SAFETY AND HEALTH

2.2.1 Key Concerns

Concerns were expressed by the Safety and Health Subteam in all functional areas examined. Seven Category II concerns were identified that addressed significant risks or noncompliance with DOE Orders in the functional areas of radiological protection, worker safety and health (OSHA) compliance, industrial hygiene, and occupational safety. The seven Category II concerns are, by functional areas, as follows:

Radiological Protection

- The film badge dosimeter and thermoluminescent dosimeter programs do not incorporate the requirements of DOE Order 5480.4 and ANSI N13.7 and N319-1976. LBL has not been able to obtain Department of Energy Laboratory Accreditation as required by DOE Order 5480.11.
- Portable survey instruments in use at LBL may not correctly establish radiological conditions as required by DOE Order 5480.4 and ANSI N323.
- LBL has not assured that material released for uncontrolled use is free of radiological materials and radioactive contamination in accordance with the requirements of DOE Orders 5480.11 and 5400.5.

Worker Safety and Health (OSHA) Compliance

- LBL does not comply with 29 CFR 1900.253, Oxygen-Fuel Gas Welding and Cutting, in that incompatible materials could form an explosive substance.

Industrial Hygiene

- LBL has not defined or implemented a permit-required confined space program as required by DOE Order 5480.4 and ANSI Z117.1-1989.
- The Lawrence Berkeley Laboratory chemical carcinogen control program was deficient in meeting Department of Energy Occupational Safety and Health Administration requirements mandated by DOE Order 5480.10.

Occupational Safety

- Program documentation, monthly inspections of equipment, a lack of high consequence lift requirements, and rigging practices do not conform to Occupational Safety and Health Administration requirements or DOE Order 5480.4.

The following key concerns were identified:

- **Important safety and health programs and initiatives have not been fully developed and implemented.** A comprehensive sitewide safety and health program has not been developed. The process by which existing program deficiencies will be corrected has not been developed and documented. The lack of a permit-required confined space program, a chemical carcinogen control program that does not meet the Occupational Safety and Health Administration requirements, and a poorly defined, inconsistently implemented eye protection program are but a few of the industrial hygiene and occupational safety program deficiencies cited. Numerous worker safety program deficiencies dealing with machine guarding, fall protection, and hazard communication exist across the site. There is no comprehensive documented fire protection program. The lack of a quality control program for bioassay and the lack of as low as reasonably achievable (ALARA) control measures for internal tritium exposures are examples of deficiencies cited with the radiological protection program area.
- **Critical safety and health resources have not been provided to support the safety and health program needs of the site.** Some operations staff are highly matrixed, having to share time between research operational responsibilities and important safety and health responsibilities, thus diluting the effectiveness of both roles. The PLUS "5" voluntary employee incentive retirement program, scheduled for 1991, will further impact the site's limited safety and health resources. Resource deficiencies within emergency preparedness, radiological protection, industrial hygiene, and medical services were identified during the course of this appraisal. Presently, there

is no formalized management strategy in place to deal with these cited deficiencies.

- **A formal comprehensive training program has not been established for LBL.** Job task analyses are not performed to determine training needs. A consistent sitewide system for maintaining up-to-date training records does not exist. The effectiveness of training courses is not formally and routinely evaluated. The lack of fully developed and implemented training programs within the Machine Shops Department, Construction and Maintenance Department, and the emergency preparedness, packaging and transportation, and fire protection functional areas are examples of the pervasive training deficiencies across the site.
- **Policies, procedures, and program documentation have not been properly developed and implemented.** There are no quality assurance policies and procedures established to ensure suspect/counterfeit items are not purchased or used and most quality acceptance inspections are not performed in accordance with written policies. System configuration control and administrative procedures do not provide for control of maintenance and modification activities. The emergency planning program is not properly documented in that training lesson plans have not been developed and emergency plan implementing procedures as well have not been developed. The Safety and Health Subteam observed Operational Safety Procedures in use that had not been properly approved; documented procedures in the Medical Services Department were found to be lacking in content and outdated; and important testing procedures, such as those for testing fume hoods, had not been developed. Packaging and storage procedures for hazardous wastes are not uniformly communicated to Laboratory personnel. Radiation protection procedures were found that do not conform to SAN requirements in that some were missing and not properly documented.
- **There is widespread noncompliance with DOE Orders, Federal regulations, and other safety and health requirements.** As a result of this Safety and Health Subteam appraisal, a total of 128 concerns, directed at LBL, were identified, 74 (58%) of which were cited as noncompliance deficiencies. Many of the quality assurance requirements specified in the Institutional Quality Assurance Program Plan have not been implemented as required by DOE Order 5700.6B. Sixteen concerns were cited with the Emergency Preparedness functional area, all of which dealt with noncompliance issues. Numerous noncompliance deficiencies were similarly cited within the packaging and transportation, site/facility safety review, radiological protection, worker safety, industrial hygiene, occupational safety, and medical services functional areas. Many of the noncompliances dealt with either unfamiliarity with DOE requirements or the lack of sufficient resources to implement requirements.

2.2.2 Root Causes

The concerns identified by the Safety and Health Subteam have the following principal causal factors:

- Personnel resources available to LBL management do not provide the necessary expertise or depth to ensure that Laboratory programs comply with all DOE requirements.
- Many ES&H program elements are ill-defined and poorly implemented.
- SAN does not oversee LBL programs and performance with sufficient frequency or impact.
- LBL management does not provide formal training to its employees that would enable the Laboratory to meet all DOE requirements.
- Formal management practices do not assure quality of site operations.
- LBL administrative practices do not consistently ensure compliance with DOE requirements or even with the requirements of good management.

2.2.3 Noteworthy Practices

One Noteworthy Practice was observed within occupational safety:

- The Cell and Molecular Biology Division has made advances in high voltage safety in cell electrophoresis work in terms of specifying floating power supplies, special shielded connectors, ground fault interrupters, interlocks, and ground fault protection circuits. The division is working to transfer these advances to manufacturers of electrophoresis cells and high-voltage power supplies and to train Laboratory personnel in other divisions.

2.3 MANAGEMENT

2.3.1 Key Findings

The Management Subteam identified 23 findings. These findings were distilled into the following four key findings which address the most significant management issues impacting LBL's ES&H performance:

- **LBL does not have an integrated laboratory-wide strategic planning process with subordinate implementation planning to define and accomplish its environment, safety, and health objectives.** LBL has not integrated ES&H requirements into its laboratory-wide strategic planning process. LBL has not translated management's vision of ES&H implementation into a formal, documented, integrated planning system. LBL's traditional vertical programmatic planning and budgeting process

has not been integrated with the horizontal laboratory-wide planning process, crossing program lines, that ES&H requires. Consequently, the Laboratory has no organized way to set laboratory-wide requirements for the planning, budgeting, and allocation of resources to meet ES&H needs.

- **LBL does not have adequate laboratory-wide policies or procedures in place.** In addition, there is little evidence that LBL's management systems are adequate to ensure implementation of environment, safety, and health requirements. An integrated, hierarchical policies and procedures system is the foundation of management control to ensure that ES&H requirements are communicated, understood, and implemented at all levels of an organization. LBL does not have such a system in place. Instead, the LBL management philosophy has been one of providing minimal laboratory-wide direction. For example, relationships of line management and ES&H support personnel are not clearly defined and formally communicated throughout LBL; there is little documentation and communication of the roles, responsibilities, authorities, and interfaces of organizational units; there is no laboratory-wide policy that addresses training and certification requirements; there is no environmental policy manual; and there is no document control system to ensure that policies and procedures used in the workplace are tracked and kept current. As a result, ES&H requirements are not adequately reflected in day-to-day operations.
- **LBL systems do not provide management with the information needed to determine the status and quality of environment, safety and health activities.** For management to control work, it must establish performance standards consistent with planning objectives, compare actual performance against these standards, assess the reasons for and significance of deviations from expected performance, and expeditiously take actions to correct these deviations. However, LBL management has not established systems to provide necessary information. For example, it has not developed performance indicators; quality assurance programs are inadequate; there is an absence of independent ES&H review; little useful trend information is available; root cause analysis is infrequently performed; and few lessons learned are developed from the operational experience of either LBL or outside organizations. As a result, management does not obtain accurate and timely information on the performance of ES&H activities and is, therefore, unable to determine those actions needed to meet DOE ES&H requirements.
- **DOE Headquarters has not accorded environment, safety, and health (ES&H) oversight the priority necessary to ensure that DOE ES&H requirements are being met.** The San Francisco Operations Office has not demonstrated a priority commitment for ES&H oversight. Additionally, the University of California has not provided adequate policy guidance or oversight with regard to LBL ES&H. Oversight is a cornerstone of DOE's management responsibilities. Secretary of Energy Notice (SEN)-11-89 addresses DOE's oversight responsibilities as follows: "While current periodic external

oversight is useful, it is not sufficient to carry out day-to-day, shift-by-shift internal line management oversight responsibilities at many of our field activities. In this connection, senior DOE field and headquarters officials will be expected to ensure that their contractors comply with operational, environmental, safety, health and security standards established by law, regulation, or Departmental policy, while at the same time ensuring that they meet their production or research mission." DOE Headquarters has not given sufficient priority to line management oversight of LBL ES&H activities. The lack of a formal agreement between ER and SAN impairs SAN's ability to assist ER with its line oversight responsibilities. Additionally, SAN has not devoted the resources necessary to carry out an effective ES&H oversight program. The University of California has not provided adequate oversight of LBL, nor has it set definitive policy stating its expectations in meeting DOE ES&H requirements.

2.3.2 Probable Root Causes

The Management Subteam attempted to identify the causes which contributed most directly to the findings. The most probable root causes are:

- LBL's management style which relies on the experience, academic credentials, and professionalism of researchers, without formality of operations and objective verification by centralized management, does not ensure the accomplishment of environment, safety, and health requirements. LBL has achieved eminence as a world-class scientific institution. LBL's management style can be characterized as unstructured, with limited central direction by senior management, permitting autonomy in most matters related to research efforts. Division directors have been provided the authority, responsibility, resources, and organization to succeed in their research programs. Committees and task forces are often used in the Laboratory to make recommendations to the Director and to develop consensus on management issues. However, the roles of these groups are not always well-defined and some Laboratory staff see these groups as decisionmaking units. In contrast, the rigors of ES&H demand formality of operations, strong management control, and strict accountability. LBL's management style often conflicts with, and is unsuitable for, achieving and sustaining compliance with ES&H requirements. To provide the management culture needed for ES&H requirements, greater leadership efforts at all levels of the organization are needed to achieve overall staff acceptance of, and personal accountability for implementation of ES&H requirements.
- The nature, magnitude, and increasing demands of ES&H and the urgency of incorporating it into the fabric of LBL have presented LBL with a challenge unlike any it has confronted. The ES&H arena, with its complex regulatory framework, its extreme visibility, and its changing and burgeoning requirements is not within the individual or organizational experience of LBL. ES&H requirements are neither program- nor discipline-specific.

Rather, they are Laboratory-wide, pervasive, and the assigned responsibility of every employee, visitor, user, and subcontractor. As a result, every part of the Laboratory is overwhelmed by the volume and complexity of the new and existing requirements, and the demand for new expertise and for new procedures and documentation associated with implementation of ES&H requirements.

- DOE's established practices with regard to program direction and oversight have not placed adequate emphasis on environment, safety, and health requirements at LBL. ER provides appropriate attention to programmatic direction and program oversight at LBL, but not to ES&H requirements. ER's program management and oversight style, emphasizing peer review and research results, does not lend itself to the ongoing oversight needed for ES&H. ER has not given high priority to oversight of LBL. ER's emphasis on programmatic and scientific accomplishments has contributed to a perception that ES&H compliance occurs at the expense of research. SAN has not been given a clear statement of ES&H expectations by ER. This adversely effects SAN's ability to plan and implement effective oversight of LBL. SAN has been more aggressive in providing ES&H oversight at some of its other facilities. DOE's limited oversight of LBL's adherence to ES&H requirements has contributed to many of the deficiencies in this report.

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3.0

ENVIRONMENTAL ASSESSMENT

3.0 ENVIRONMENTAL ASSESSMENT

This assessment report presents findings developed by the Environmental Subteam during the Tiger Team Assessment of the Department of Energy's (DOE's) Lawrence Berkeley Laboratory (LBL) in Berkeley, California, conducted from January 14, 1991 through February 15, 1991.

LBL is operated by the University of California under contract to DOE.

3.1 PURPOSE

The purpose of the environmental assessment is to provide the Secretary of Energy with information on the current environmental regulatory compliance status and associated vulnerabilities of LBL, root causes for noncompliance, adequacy of DOE and LBL environmental management programs, response actions to address the identified problem areas, and DOE-wide environmental compliance trends.

3.2 SCOPE

The scope of the environmental assessment for LBL was comprehensive, covering all environmental media and applicable Federal, state, and local regulations as well as DOE Orders and internal LBL and San Francisco Operations Office (SAN) requirements. Also covered were best management practices (BMP's). The environmental disciplines addressed in this assessment are air; soils, sediments and biota; surface water and drinking water; groundwater; waste management; toxic and chemical materials; radiation; quality assurance; inactive waste sites; the National Environmental Policy Act (NEPA); and environmental monitoring. In addition, several issues applicable to all of these environmental disciplines are presented in the section on environmental oversight and reporting.

3.3 APPROACH

The Environmental Subteam assessment of LBL was conducted in accordance with the DOE Tiger Team Guidance Manual (February 1990) and followed accepted audit practices and techniques. The assessment was conducted by a team managed by a Team Leader and Assistant Team Leader from the DOE Office of Environmental Audit, as well as an Assistant Team Leader from the DOE Office of Special Projects. The team consisted of a multidisciplinary group of technical specialists provided by a support contractor (NUS Corporation) and by the Argonne National Laboratory. The names, responsibilities, affiliations, and biographical sketches of the team members and leaders are provided in Appendix A. The environmental assessment consisted of planning, onsite activities, and reporting.

The Environmental Assessment Plan, which outlines the key issues to be addressed, general approach to be taken during the assessment, and specific onsite activities, is provided in Appendix B. The agenda, included as part of the assessment plan, was continually updated during the onsite assessment to accurately reflect the daily activities of the team. Appendices C and D list the contacts/interviews and site documents, respectively, the team used to develop its assessment and findings.

The Pre-Assessment Site Visit was conducted December 4 and 5, 1990. SAN and LBL provided an overview of the following: management of the site, the environmental, safety, and health (ES&H) policies and programs at the site, and the results of self-assessments that were performed by both LBL and SAN. The Tiger Team provided LBL and SAN with the scope and purpose of the Tiger Team assessment and with logistical and support requirements of the Tiger Team. Federal and state regulators were invited to attend the Pre-Assessment Site Visit and to participate in subsequent assessment activities. Representatives of the EPA Region 9, the Bay Area Air Quality Management District, and the East Bay Municipal Utilities District attended and participated in later activities. In addition, the Tiger Team met with collective bargaining units active at LBL.

The onsite activities for the environmental assessment took place from January 14 through February 15, 1991. Onsite activities included document reviews; observation of site operations; interviews with SAN and LBL staff as well as personnel from the Federal, state, and local regulatory agencies; and review of previous audits, surveillances, appraisals, and assessments. The Environmental Subteam held daily debriefings to share with the site and with invited observers the issues identified and being developed by the assessment. Finally, the subteam developed findings and other sections of the LBL Tiger Team Assessment Report. The findings development process included validation in the form of a formal Technical Accuracy Review with SAN and LBL.

The Environmental Subteam identified findings in two categories: compliance findings and BMP findings. Compliance findings represent conditions that, in the judgment of the subteam, may not satisfy the requirements of environmental regulations, applicable DOE Orders (including internal DOE directive memoranda, where referenced), consent orders, agreements with regulatory agencies, or permit conditions. BMP findings represent situations where, in the judgment of the subteam, sound and accepted management practices are not being employed.

3.4 ENVIRONMENTAL ASSESSMENT SUMMARY

The Tiger Team Assessment of the LBL identified 86 environmental findings. None of the findings represent situations that warrant an immediate cessation of operations. Of the 86 findings, 69 reflect potential noncompliance with the requirements of DOE Orders and directives, Federal regulations, State of California and local (Alameda County/City of Berkeley) regulations, or internal LBL and SAN procedures. The remaining 17 findings represent conditions in which best management practices have not been employed. Table 3-1 presents the finding titles and page numbers. Figures 3-1 and 3-2 present summaries of the findings by disciplines and causal factors, respectively.

LBL Environmental Policy

Environmental policy is recommended by the Director's Action Committee, and set by the Director. This committee acts upon recommendations by the Environment and Safety Management Committee. Currently, LBL environmental policies are stated in two "Policy and Procedure Memoranda" (January 1990 and September 1990).

**TABLE 3-1
ENVIRONMENTAL SUBTEAM FINDINGS**

	Page Number	Finding Number	Title	Self-Assessment	Survey Finding	Performance Criteria
3-3	3-20	A/CF-1	Improper and Inadequate Radiological Sample Exchange and Handling Practices	No (-)	No	R
	3-22	A/CF-2	Noncompliance with Requirements of the National Emissions Standards for Hazardous Air Pollutants, Subpart H	Yes (p)	No	R
	3-25	A/CF-3	Inadequate Evaluation of Air Permit Requirements and Regulations	Yes (p)	No	R
	3-27	A/CF-4	Inadequate Supervision of Permitted Air Emission Sources	No (-)	No	R
	3-29	A/CF-5	Incomplete Regulatory Compliance for Asbestos Removal Operations	No (-)	No	R
	3-31	A/CF-6	Deficiencies in the Indoor Air, Ambient Air, and Meteorological Monitoring Networks	Yes (p)	Yes	D
	3-36	A/BMPF-1	Inadequate Program for Maintenance of High-Efficiency Particulate Air Filter Systems	Yes (p)	No	D
	3-39	A/BMPF-2	Inadequate Meteorological Monitoring Program	Yes (p)	Yes	D
	3-46	SW/CF-1	East Bay Municipal Utility District Permit Excursions	Yes (p)	No	R
	3-49	SW/CF-2	Inadequate Environmental Protection and Surveillance for Surface Water Discharges	Yes (p)	Yes	D,R
	3-52	SW/CF-3	Lack of an Approved Spill Prevention Control and Countermeasures Plan	Yes	Yes	R
	3-54	SW/CF-4	Noncompliance with East Bay Municipal Utility District Wastewater Discharge Permit Requirements	No (-)	No	R
	3-56	SW/CF-5	Inadequate Standard Operating Procedures for Wastewater Treatment Systems	No (-)	No	D
	3-58	SW/CF-6	Floodplain Management	No (-)	No	D
	3-60	SW/CF-7	Lack of Backflow Prevention Devices	Yes	Yes	D
	3-61	SW/BMPF-1	Inadequate Training Program for Wastewater Treatment System Operators	No (-)	No	

TABLE 3-1 (Continued)
ENVIRONMENTAL SUBTEAM FINDINGS

3-4	Page Number	Finding Number	Title	Self-Assessment	Survey Finding	Performance Criteria
	3-62	SW/BMPF-2	Stormwater National Pollutant Discharge Elimination System Permit Requirements	No (-)	No	R
	3-67	GW/CF-1	Lack of a Comprehensive Groundwater Protection Management Program and Groundwater Monitoring Plan	Yes (p)	No	D
	3-69	GW/CF-2	Incomplete Hydrogeologic Characterization of the Site	Yes (p)	Yes	R
	3-71	GW/CF-3	LBL Operations Have Contaminated Groundwater	Yes	Yes	D
	3-73	GW/CF-4	Inadequate Placement of Monitoring Wells for Closure of Underground Storage Tanks	No	No	R
	3-75	GW/CF-5	Lack of a Comprehensive Program to Inventory, Maintain, Inspect, and/or Abandon Wells and Boreholes	No	No	R
	3-86	WM/CF-1	Inadequate Training for Generators and Handlers of Hazardous, Radioactive, and Mixed Wastes	Yes	No	R
	3-88	WM/CF-2	Lack of an Effective Waste Tracking System	Yes (p)	No	R
	3-90	WM/CF-3	Deficiencies in Hazardous Waste Inspections	Yes (p)	No	R
	3-92	WM/CF-4	Deficiencies in Development and Implementation of Waste Minimization Plans	Yes (p)	No	R
	3-95	WM/CF-5	Lack of Generator Waste Certification Plans for Low-Level and Transuranic Radioactive Wastes	Yes (p)	No	D
	3-97	WM/CF-6	Lack of Implementation of DOE Order 5820.2A Requirements	Yes (p)	No	D
	3-99	WM/CF-7	Lack of a Comprehensive Waste Characterization Program	Yes	No	R
	3-101	WM/CF-8	Deficiencies in Secondary Containment of the Hazardous Waste Handling Facility	Yes	No	R
	3-102	WM/CF-9	Lack of an Underground Storage Tank Response Plan	No (-)	No	R
	3-104	WM/CF-10	Inadequate Management of Generator Waste Accumulation Areas and Satellite Accumulation Areas	Yes (p)	No	R
	3-108	WM/CF-11	Inadequate Land Disposal Restriction Notifications	No (-)	No	R
	3-111	WM/CF-12	Solvent/Oil-Contaminated Rags	Yes	No	R
3-113	WM/CF-13	Lack of Autoclave Documentation	No (-)	No	R	

TABLE 3-1 (Continued)
ENVIRONMENTAL SUBTEAM FINDINGS

Page Number	Finding Number	Title	Self-Assessment	Survey Finding	Performance Criteria
3-114	WM/CF-14	Inadequate Treatment, Storage, and Disposal Facility	Yes	No	R
3-115	WM/CF-15	Storage of Land Disposal Restricted Mixed Wastes	No (A)	No	R
3-116	WM/CF-16	Lack of Effective DOE Oversight of LBL Waste Management Activities	Yes (S)	No	D
3-118	WM/CF-17	Lack of Effective Oversight of Waste Management Activities by LBL	Yes	No	D
3-119	WM/CF-18	Laboratory Closeout Procedures	Yes	No	R
3-121	WM/BMPF-1	Radioactive and Mixed Waste Tags	Yes	No	-
3-122	WM/BMPF-2	Lack of Documented Oversight of Commercial Treatment, Storage and Disposal Facilities	Yes	No	-
3-124	WM/BMPF-3	Lack of Adequate Waste Management Procedures			
3-131	TCM/CF-1	Lack of Secondary Containment at Aboveground Storage Tanks Containing Petroleum Products	Yes	Yes	R
3-133	TCM/CF-2	Inadequate Containment at Bulk Storage Areas for Petroleum Products and Hazardous Chemicals	Yes	Yes	R
3-135	TCM/CF-3	Asbestos Management Program is Not Fully Developed	Yes	No	R
3-137	TCM/CF-4	Inadequate Storage and Labeling of Toxic/Hazardous Materials in Laboratories	Yes	No	I
3-140	TCM/BMPF-1	Inadequate Organization of PCB Management Program	No	No	-
3-142	TCM/BMPF-2	Inadequate Procedures for Tracking Potentially Hazardous Materials at LBL Warehouse Facilities	No	No	-
3-144	TCM/BMPF-3	Improper Containment of Inline Chemical Transport Pipes at the Building 77 Wastewater Treatment Facility	Yes	No	D
3-149	QA/CF-1	Lack of Quality Assurance Plans for Environmental Protection, Environmental Restoration, and Waste Management Programs and Projects at LBL	Yes (p)	Yes	D
3-151	QA/CF-2	Inadequate Divisional Quality Assurance Plans	Yes (p)	No	D
3-152	QA/CF-3	Lack of Quality Assurance Procedures for the Procurement and Audits of Contracted Services for Environmental Protection, Environmental Restoration, and Waste Management Programs	Yes (p)	No	D

TABLE 3-1 (Continued)
ENVIRONMENTAL SUBTEAM FINDINGS

3-6	Page Number	Finding Number	Title	Self-Assessment	Survey Finding	Performance Criteria
	3-154	QA/CF-4	Lack of Quality Assurance Plans for Environmental Analytical Laboratories	No	No	D
	3-155	QA/CF-5	Lack of Quality Assurance Plans for SAN Environmental Protection, Environmental Restoration, and Waste Management Programs	No (S)	No	D
	3-156	QA/CF-6	Lack of LBL Internal Reviews of Quality Assurance in Environmental Protection, Environmental Restoration, and Waste Management Programs and Projects	No	No	D
	3-157	QA/CF-7	Deficiencies in SAN's Oversight of Quality Assurance in LBL's Environmental Protection, Environmental Restoration, and Waste Management Programs	Yes	No	D
	3-159	QA/BMPF-1	Deficiencies in Good Laboratory Practices	Yes (p)	No	-
	3-164	RAD/CF-1	Deficiencies in Radiological Dose Assessment Practices	Yes (p)	No	D
	3-166	RAD/CF-2	Lack of a Formal, Documented Environmental As Low as Reasonably Achievable Program	No	No	D
	3-168	RAD/CF-3	Deficiencies Associated with Decontamination and Decommissioning Activities	No	No	D
	3-170	RAD/CF-4	Lack of a Formal Calibration Schedule for Radiological Environmental Monitoring Equipment	Yes	No	D
	3-171	RAD/BMPF-1	Inadequate Staffing Levels, Training, and Procedures for Emergency Response	Yes (p)	No	D
	3-179	IWS/CF-1	Inadequate Preliminary Assessment	No	Yes	D
	3-181	IWS/CF-2	Unreported Releases of Radioactive Contamination into the Environment	No (-)	No	D
	3-183	IWS/CF-3	Inadequate Strategy for Identifying and Meeting Applicable Regulatory Requirements	Yes (p)	No	D
	3-186	IWS/CF-4	Inadequate SAN Oversight	Yes (p)	No	D
	3-188	IWS/CF-5	Inadequate Conduct of Natural Resource Trustee Responsibilities	No (S)	No	D
	3-190	IWS/BMPF-1	Inadvertent Disturbances of Potentially Contaminated Soils	Yes (p)	No	-
3-192	IWS/BMPF-2	Deficient Health and Safety Plans	Yes (p)	No	R	

**TABLE 3-1 (Continued)
ENVIRONMENTAL SUBTEAM FINDINGS**

Page Number	Finding Number	Title	Self-Assessment	Survey Finding	Performance Criteria
3-194	IWS/BMPF-3	Preliminary Work in the Site Characterization Project Proceeding in Advance of a Final Project Management Plan, a Final DOE Headquarters Quality Assurance Project Plan, or a Final Project Sampling and Analysis Plan	Yes (p)	No	D
3-196	IWS/BMPF-4	Undetermined Need for SARA Title III, Section 313 Reporting	Yes (p)	No	D
3-203	NEPA/CF-1	LBL and SAN National Environmental Policy Act Guidance Inconsistent with DOE Headquarters Guidance	Yes	No	D
3-205	NEPA/CF-2	Inadequate National Environmental Policy Act Review, and Inappropriate NEPA Determination of Ongoing and Proposed Actions	Yes(p)	No	D,R
3-208	NEPA/CF-3	National Environmental Policy Act Documentation is Not Completed Prior to Either Project Start or Decisionmaking Process	Yes (p)	No	D,R
3-209	NEPA/CF-4	Inadequacy of National Environmental Policy Act Documentation	Yes (p)	No	R
3-214	NEPA/CF-5	Inadequate Tracking and Recordkeeping for National Environmental Policy Act Documentation	Yes (p)	No	D
3-215	NEPA/CF-6	Incomplete Implementation of SEN-15-90 and DOE Order 5440.1C	Yes	No	D
3-220	EM/CF-1	Inconsistencies and Deficiencies in the LBL Environmental and Effluent Monitoring Procedures	Yes (p)	No	D
3-224	EM/CF-2	Annual Site Environmental Report Deficiencies	Yes (p)	No	D
3-226	EM/CF-3	Deficiencies in the General Environmental Protection Program	Yes	No	D
3-228	EM/BMPF-1	Lack of an Environmental Monitoring Plan	Yes	No	D
3-234	SSB/CF-1	Inadequate Characterization of Soil, Sediment, and Biota at LBL	Yes	Yes	D
3-238	EOR/CF-1	Lack of Appropriate Level of Involvement by SAN in Regulatory Agency Interactions	Yes (p)	No	D
3-240	EOR/CF-2	Inadequate SEN-7A Reporting	No (-)	No	D
3-243	EOR/CF-3	Lack of Implementation and Tracking for Corrective Actions in Response to the 1988 Environmental Survey Findings	Yes (S)	No	D

A = Aware of Finding
S = SAN Aware of Finding
(-) = Site Not Aware of Finding
(p) = Site Partially Aware

D = DOE Orders
I = Internal LBL Procedure
R = Regulatory Requirement

FIGURE 3-1
ENVIRONMENTAL SUBTEAM FINDINGS BY DISCIPLINE

FIGURE 3-2
NUMBER OF FINDINGS PER CAUSAL FACTOR

* Causal factors which appeared in less than 10 percent of the findings.

Although LBL identified the LBL Health and Safety Manual (PUB 3000) as the primary ES&H document for policy communication, the manual does not include an environmental policy in its most recent (October 1990) version. The manual does, however, identify an Environmental Protection Group within the Environment and Safety Hazards Control Department and outlines their roles and responsibilities to include environmental quality concerns, permitting activities, assessment of pollution abatement programs, and liaison with environmental protection agencies (Chapter 2, p. 2-2). Other than that, the manual is largely directed towards the protection of health and safety and does not specifically address protection to the environment. This is a Tiger Team Assessment finding; however, it is included and cited as an example in a broader Management Subteam finding (Finding MF-11).

Line Management and Environmental Oversight

The environmental and waste management programs at LBL are in general not in compliance with regulatory and DOE requirements. Lack of compliance and failure to implement best management practices are widespread, applying to virtually all of the environmental disciplines assessed by the Tiger Team. To give perspective, it is important to note that none of the Tiger Team findings represents a substantial threat of large-scale environmental contamination or danger to human health. This is because operations at LBL do not involve large sources of potential environmental contaminants. However, it must be stated that current line management and oversight do not meet the requirements of DOE Secretary of Energy Notice (SEN)-6-89, SEN-7-89, and SEN-11-89 and their subsequent revisions and have not been effective in monitoring and controlling the impacts of LBL activities on the environment.

The Tiger Team Environmental Subteam findings involving line management indicate weaknesses on the part of LBL, SAN, and ER in the areas of providing clear policy direction, preparing and implementing formal procedures, ensuring adequate training, and providing effective oversight of LBL activities. In particular, in the area of waste management, the nature and scope of Tiger Team findings, as well as the recurrence of the same problems noted in the 1988 DOE Environmental Survey Preliminary Report and in several Reports of Violation issued by the California Department of Health Services, indicates a serious problem in line management's performance.

With regard to oversight, many of the Environmental Subteam findings related to failure of LBL and SAN to perform routine inspections, appraisals, audits, or assessments. The line management and environmental oversight deficiencies and corresponding findings are discussed in more detail in Section 5.0, Management Assessment, of this report (see Findings MF-11, MF-12, MF-13, MF-14, MF-16, MF-20, and MF-21).

The LBL environmental program responsibilities have been assigned to a small number of people within the Environmental Protection, Health and Safety Division, upon whom the entire site relies heavily for guidance and assistance in day-to-day operations. As such, there is a general lack of knowledge by the site employees as to environmental regulatory requirements and the proper procedures for dealing with environmental protection and monitoring. The nature and scope of the findings cited by the Environmental Subteam are evidence of this fact.

LBL and SAN Self-Assessment Reports

The Environmental Subteam reviewed the SAN Self-Assessment and the LBL Self-Assessment to determine the adequacy of the programs established by each to carry out the self-assessment process, the quality assurance implemented during the process, the degree to which the site or the operations office identified and comprehended the findings that were also identified by the Environmental Subteam, and to determine if a formal tracking system had been established to carry out and audit corrective actions. In addition, the subteam assessed whether root causes were sufficiently developed and findings were being trended and prioritized.

The Environmental Subteam concludes that the LBL Self-Assessment performed well on identifying findings, relative to other DOE facilities assessed by the Tiger Teams. However, the self-assessment process has not been institutionalized and is poorly documented. There are also problems that concern failure to provide adequate quality assurance to the process, inadequate prioritization of findings (and associated corrective actions), lack of trending for findings, failure to address finding-specific root causes, failure to require corrective actions to address root causes, lack of training for personnel involved in self-assessment, and lack of a process for tracking and auditing corrective actions. These observations are detailed in Findings MF-9, MF-10, MF-13, and MF-22 in Section 5.0.

The SAN Self-Assessment also performed relatively well in identifying those Tiger Team environmental findings which apply to the operations office. However, the subteam identified deficiencies similar to those in the LBL Self-Assessment (see Finding MF-23). In addition, while sections of the SAN Self-Assessment contain valuable information, the Tiger Team found that overall, it varied so much in content and format from section to section that it was confusing and difficult to read.

An expanded discussion about the overall results of the self-assessment reviews is included in Section 5.0 of this report.

The Environmental Subteam also reviewed the Environmental Compliance Quarterly Reports required by SEN-7-89 and SEN-7A-90. The subteam's evaluation is that while the reports contain major compliance issues, some of the format and content requirements contained in the SENs and associated guidance are not being met and there are some reporting deficiencies. This evaluation is detailed in Finding EOR/CF-2 in Section 3.5 of this report.

During the Tiger Team Assessment, the Environmental Subteam followed up on the status of corrective actions taken by LBL and SAN in response to the findings of the 1988 Environmental Survey. In general, the subteam noted a lack of progress in addressing the findings, as well as the persistence of several of the findings in LBL operations at the present time. DOE Headquarters, SAN, and LBL have all failed to effectively track and follow up on these corrective actions. These problems are detailed in Finding EOR/CF-3 in Section 3.5 of this report.

Relationships with Regulatory Agencies

LBL's relationship with the regulatory agencies appears to be reasonably cooperative. In part, this is due to the collegial atmosphere surrounding the

LBL operations and the fact that the state and local regulators have other impending priorities to address with limited resources. It was noted by the Environmental Subteam that for the most part, LBL, as opposed to SAN, has taken the lead on environmental issues involving the regulators, particularly those issues concerning permitting and reporting. As the "owner" of the LBL operations, SAN has not assumed an active leadership role and its participation and interface with regulators is lacking. A finding on this issue is discussed in more detail in Finding EOR/CF-1 in Section 3.5 of this report.

Strengths and Weaknesses

The strengths of LBL lie in the commitment on the part of their top-level management to achieving environmental compliance and excellence in environmental management, and in the positive environmental culture being instilled in employees through the efforts of management. The recent reorganization of LBL, and the many plans in preparation or currently being implemented, are designed to address many of the concerns documented in this assessment.

The findings of this assessment indicate certain weaknesses on the part of LBL and SAN. LBL and SAN management have not yet demonstrated the ability to formulate and implement the management systems (including planning, budgeting, policies, procedures, and information systems) necessary to ensure achievement of environmental goals and objectives. Further, neither SAN nor LBL has consistently provided effective oversight of environmental programs. Finally, both SAN and LBL have failed to accord the priority to environmental programs necessary to ensure that adequate resources are allocated.

Findings

The Environmental Subteam findings are provided in Section 3.5; the key findings and associated causal factors are discussed in Section 2.1.

3.5 ENVIRONMENTAL FINDINGS

3.5.1 Air

3.5.1.1 Overview

The LBL site and associated offsite facilities are located in Alameda County, California, which is part of the San Francisco Bay Area Intrastate Air Quality Control Region 30. Air emissions from LBL facilities are regulated by EPA Region 9, the California Air Resources Board (CARB), and the Bay Area Air Quality Management District (BAAQMD). Table 3-2 provides a listing of the applicable regulations and DOE Orders.

The site experiences the general climatic and meteorological conditions of the San Francisco Bay region with some local influences exerted by topography. The climate of the site experiences a good deal of maritime influence due to its proximity to the Pacific Ocean and San Francisco Bay. The prevailing winds at the site originate from the west and result in generally mild winters and cool summers with little mean temperature variation between the two seasons. The San Francisco Bay region is frequently subject to poor atmospheric dispersion conditions due to temperature inversion layers that develop over the area. Pollutants released below these layers are greatly limited in vertical dispersion and can result in relatively high ambient air concentrations. Above an inversion, when breezes are light, a stagnant air mass often develops. Releases of pollutants under these circumstances often result in "smoggy days."

Air emission sources at LBL involve both radioactive and nonradioactive materials. The primary source of radioactive releases is the National Tritium Labeling Facility (NTLF) in Building 75, which is designed to handle kilocurie quantities of tritium. Several other laboratories at LBL are involved in radiochemical and radiobiological studies that typically use millicurie quantities of various radionuclides, including carbon-14, iodine-125, and sulfur-35. Sources of nonradiological emissions generally involve releases of various organic compounds, including 1,1,1-trichloromethane, toluene, xylene, and methylene chloride from laboratories and support shops throughout the site.

The major radionuclide being emitted from LBL is tritium, in the form of tritiated water vapor (HTO), with virtually all releases occurring at the NTLF. These emissions constitute almost all airborne radionuclides released from LBL. Much smaller amounts of various radioactive materials (typically less than 1 Ci/yr total) are released from laboratory stacks. Those sources using quantities of radioactive materials with the potential to result in a concentration greater than 1 percent of the offsite radiation protection standard are confined to glovebox operations with exhaust controlled through high-efficiency particulate air (HEPA) filters. Radionuclide emissions from the site are regulated by DOE Orders and by the EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) for DOE facilities.

The site currently maintains BAAQMD air permits for 36 sources, most of which relate to solvent cleaning and industrial spray-painting operations. An additional 83 sources have been issued certificates of exemption by the BAAQMD. Laboratories engaged in nonradiological chemistry studies typically generate negligible quantities of air emissions and, therefore, are exempt

**TABLE 3-2
LIST OF APPLICABLE AIR
REGULATIONS/REQUIREMENTS/GUIDELINES**

<u>Regulations/ Requirements/ Guidelines</u>	<u>Section/Title</u>	<u>Authority</u>
40 CFR Parts 50 through 88	Clean Air Act Implementing Regulations	EPA
California Health and Safety Code, Divisions 26 and 27	California Air Pollution Control Laws	CARB
California Health and Safety Code, Section 43000	Air Toxics Information and Assessment Act (AB 2588)	CARB
California Public Resources Code, Division 13	California Environmental Quality Act	CARB
California Administrative Code, Title 17	California Air Pollution Control Regulations	CARB
DOE Order 5400.1	General Environmental Protection Program	DOE
DOE Order 5400.5	Radiation Protection of the Public and the Environment	DOE
Draft DOE Order 5400.xy	Radiological Effluent Monitoring and Environmental Surveillance	DOE
DOE Order 6430.1A	General Design Criteria	DOE
EPA-450/2-78-027R	Guideline on Air Quality Models (Revised)	EPA
EPA-450/4-87-013	On-site Meteorological Program Guidance for Regulatory Modeling Applications	EPA

from regulatory permitting requirements. Nonradioactive emissions are regulated by CARB and BAAQMD.

The Environmental Monitoring Program at the LBL includes stack emissions monitoring for radionuclides, air sampling (both indoor and ambient) for radionuclides, and meteorological monitoring. Workplaces and effluent release points of LBL facilities with the highest potential for radiological airborne releases are continuously monitored. With the exception of the NTLF stack, samples from these locations are collected weekly using the following sampling techniques:

- membrane filters for radioactive particulates,
- carbon filters for reactive gases,
- silica gel cartridges for HTO, and
- NaOH-solution bubblers for carbon-14.

The NTLF stack is sampled daily and weekly for HTO. Indoor air monitoring for HTO is also performed at two UCB locations, the Lawrence Hall of Science and the Mathematics and Science Research Institute.

Ambient air monitoring networks are established at and around the site for sampling of particulate, reactive gases, and HTO using the above techniques and sampling schedule, as well as a network of precipitation/dry deposition collectors used for monitoring HTO and gross alpha and beta activity. In addition, there is one ambient air monitoring station for carbon-14. A network of 12 radioactive particulate samplers are employed throughout the site along with 2 offsite monitors. HTO is sampled at two locations along the extreme western edge of the site and four offsite locations (two each north and south). Monitoring of reactive gases (primarily iodine-125) also occurs at the two western site locations, as well as two offsite locations (one each north and south). The precipitation/dry deposition sampling network consists of 11 onsite and 2 offsite monitors. In addition, the site employs two rain gauges used to measure precipitation depths and collect samples on a storm-by-storm basis for HTO and alpha/beta analysis.

A fairly extensive air monitoring network is employed at LBL which, for most pollutants monitored, provides adequate spatial distribution to characterize impacts from site activities. The monitoring network for HTO, however, is not adequate to ensure that impacts from site activities are fully assessed. Of the eight stations in this network, only five monitor ambient air concentrations, and none are located in quadrants to the northeast and southeast of NTLF. For the ambient air monitoring program as a whole, improper siting of monitoring stations and a lack of routine maintenance procedures may bring into question the validity of the data being collected. In addition, current field practices are being used which either do not follow established procedures or further jeopardize sample integrity. The site has identified the need to upgrade the air monitoring networks, and a program has been initiated to this end. To ensure that adequate and valid monitoring data are collected, this program must incorporate initial and periodic review of station locations, routine maintenance and calibrations of equipment, and full quality control documentation of field activities (e.g., field logs, sample chain-of-custody, etc.).

Federal, state, and local laws and regulations require the site to assess air emissions of a variety of radiological and nonradiological pollutants. These requirements range from annual radionuclide evaluations under the NESHAP regulations to sitewide assessment and reporting of air toxic emissions. Current NESHAP assessments for new facilities at LBL are performed with concurrence of EPA Region 9 and adequately address the respective regulations. Annual NESHAP compliance demonstrations, however, are lacking in that they do not include all radionuclide sources at the site. Further, facilities on the UCB campus, which either support or are used exclusively for DOE-funded activities, have not had NESHAP assessments performed. LBL has an ongoing program to evaluate all radionuclide sources at and associated with the site for effluent monitoring as required by NESHAP. As a result of this program, a sitewide radionuclide emissions inventory is being compiled and, when complete, will be used for annual compliance analyses. UCB facilities at which DOE-funded activities are performed will not be included because responsibility for ES&H oversight of DOE activities in these buildings has been relegated to UCB in a Memorandum of Understanding with LBL (see Finding MF-17).

LBL has an extensive sitewide air toxic emissions inventory developed in response to California air toxic legislation. However, there has been no comprehensive air emissions inventory compiled for use in a regulatory permitting program. Currently, the site has an informal air permitting program which operates strictly on a reactive basis. Oversight of regulatory-permitted operations is also handled in an informal manner in that no formal training is provided to responsible personnel to ensure that operations are performed within regulatory limitations. Conduct of these informal programs does not adequately ensure that facilities and activities at the site are in compliance with state and local legislation.

There were three Tiger Team findings that were not addressed in the LBL Self-Assessment. These deal with field practices in the Environmental Monitoring Program, oversight of permitted air emission sources, and asbestos removal operations. As to the remaining findings, none were fully addressed in the self-assessment.

The LBL finding that deals with siting of the meteorological monitoring station adequately defines this issue. Similarly, other LBL findings sufficiently define additional deficiencies in the meteorological monitoring program. The site's awareness demonstrates its understanding of the need to thoroughly evaluate and upgrade the program. As for the remaining Tiger Team findings, the LBL Self-Assessment addressed very few of the issues identified. Most of the related self-assessment findings do not clearly define or adequately document Tiger Team issues discussed. In some cases (e.g., evaluation of air permit requirements and monitoring network deficiencies), the self-assessment does not demonstrate a comprehensive understanding of the problems related to the issues discussed.

Discussions regarding causal factors, root causes, or other underlying reasons for the issues presented were not provided in the LBL Self-Assessment for any of the air findings.

In most cases, the corrective actions recommended are adequate to resolve the findings. However these actions were not detailed and, in general, did not

define clear lines of responsibility, funding, or a timetable for implementation.

The air portion of the Environmental Subteam assessment identified eight compliance findings and two best management practice (BMP) findings. The compliance findings relate to 1) noncompliance with Federal and local regulatory requirements and limitations, 2) an inadequate regulatory review program, and 3) deficiencies in the air/meteorological monitoring program. The BMP findings involve inadequacies in the general maintenance and oversight of the air/meteorological monitoring network and, with the exception of air toxics, lack sitewide assessments of air emission sources.

3.5.1.2 Compliance Findings

FINDING A/CF-1: Improper and Inadequate Radiological Sample Exchange and Handling Practices

Performance Objective

The Environmental Monitoring Group Procedures provide guidance to field personnel on air monitoring practices, including exchange and handling of radiological samples.

Section 7 A(1) indicates that particulate filter samples are to be accompanied by a Filter Paper Change Record ("chit") which provides such information as sampler location, on/off date and time, and flow rates. Section 15 A(1) provides instruction on sampler inspections to be performed at each sample exchange (i.e., weekly).

Draft DOE Order 5400.xy, "Radiological Effluent Monitoring and Environmental Surveillance," provides further guidance that facilitates the collection of valid and defensible samples. Chapter VI, paragraph 2.b requires adherence to procedures that minimize cross-contamination of samples; it further states that handling practices that minimize sample degradation should be used.

Finding

Site personnel are not performing air sample exchanges, as required by the Environmental Monitoring Group Procedures. In addition, the deficiencies in the practices currently being employed do not safeguard the integrity of radiological air samples.

Discussion

Site personnel receive training, although undocumented, on sample exchange and handling practices which expounds on the instructions provided in documented procedures (I-A-3). This includes instruction on the requirements to check and record particulate sampler flow rates at filter installation and removal, and adjust flow rates, if required, to the ideal setting of 4 cf/m. Accurate flow rate information is imperative to correctly assess the volume of air sampled during the sampling period and ensure that a sufficient sample has been captured.

While accompanying a field technician on routine collection of outdoor monitoring samples, Tiger Team members noted that no flow rates were being recorded. The technician stated that flow rates are not recorded unless they are found to be in excess of ± 20 percent of 4 cf/m (I-A-2). This practice is contrary to the procedure used during training of technicians (I-A-3) and may result in erroneous estimates of airborne radionuclide concentrations.

The manner in which samples are to be handled in the field are not explicitly described in documented sample exchange procedures. Further, the handling practices employed in the field for exchange of particulate filter samples do not adequately provide for minimization of sample degradation or cross-contamination. During the Tiger Team Assessment, it was noted that for each round of sample collection, particulate samples are placed in a common container after being transported in an exposed manner from the monitoring

station to the technicians vehicle. Handling of samples in this fashion may lead to a loss of sampled particulate during transport and cross-contamination of samples in the common container.

Discussions with site personnel indicated that SAN provides minimal oversight of the LBL air monitoring program (I-A-2 and I-A-26). For example, no representative from SAN has accompanied a technician on routine collection of samples, and the current operating procedures have not received SAN review. The SAN Self-Assessment also identifies a limited role in support of and direct involvement in LBL environmental programs.

The issues discussed in this finding were not identified in either the LBL Self-Assessment or SAN environmental compliance appraisal of the site.

The causal factors responsible for the issues addressed in this finding appear to be inadequate procedures, insufficient training, and lack of supervision. The currently documented procedures being employed do not adequately describe all necessary steps for sample exchange, sample handling, and site inspection which will ensure that valid and defensible samples are collected. Additionally, the informal training provided technicians and current program supervision are not sufficient in ensuring that required practices are being accomplished.

FINDING A/CF-2:**Noncompliance with Requirements of the National Emissions Standards for Hazardous Air Pollutants, Subpart H****Performance Objective**

EPA has established standards for radionuclide emissions from DOE-owned or -operated facilities. These emissions are regulated under 40 CFR Part 61, Subpart H. Subsection 61.93(a) stipulates that radionuclide sources shall be determined and compliance with the standards demonstrated using EPA-accepted procedures. Subsection 61.93(b)(4) states that emission measurements shall be made at all release points which have the potential, based on uncontrolled emissions, to discharge radionuclide emissions which could cause an effective dose equivalent in excess of 1 percent of the standard. To comply with these requirements DOE facilities must identify and evaluate all sources of airborne radionuclide emissions associated with site activities.

Draft DOE Order 5400.xy, "Radiological Effluent Monitoring and Environmental Surveillance," Chapter IV, paragraph 1.c, stipulates that for meteorological data obtained from offsite sources to be acceptable for a site, the data must be representative of conditions at the site. When using offsite data, the EPA "Guidelines on Air Quality Models" (A-10) recommends that the most recent 5-year period of data be applied in analysis for air quality compliance demonstrations.

Finding

LBL has not adequately demonstrated compliance with the requirements of NESHAP, Subpart H.

Discussion

LBL performs annual NESHAP compliance demonstrations using the codes AIRDOSE and MICROAIRDOSE, which have received approval from EPA Region 9. This assessment is performed using an emissions inventory based on those sources in the LBL effluent sampling program and a 5-year mean meteorological data set derived from data acquired at Oakland Airport from 1960 to 1964. Site personnel (I-A-16) indicated that unmonitored sources of radionuclide emissions at the site, such as the ventilation system servicing the analytical bench in Room 107 of Building 75 (part of the National Tritium Labeling Facility), are not included in these assessments (I-A-3). Additionally, release points associated with offsite activities (e.g., Melvin Calvin Hall and Donner Hall laboratories) have also been excluded from assessments. Determination of compliance in this manner does not fully assess the impacts of site activities on the public as required by NESHAP, Subpart H.

LBL received approval from EPA Region 9 to use the Oakland Airport data set. However, these data were not applied in a manner consistent with the intent of EPA. The correspondence from EPA to LBL authorizing use of the data indicates: "The idea behind using at least five years of data is to cover the natural variability in the meteorological conditions from year to year" (A-11). The EPA Region 9 Regional Meteorologist confirmed that for assessments demonstrating compliance with an annual standard using offsite data, the analysis should be conducted using individual annual data sets from a consecutive 5-year period and the maximum annual impact should be selected for

comparison to the applicable standards (I-A-20). The application of a 5-year mean data set "smoothes-out" meteorological variability and, therefore, does not fulfill the intended objectives of data use.

While the site has received approval for the use of offsite data, the representativeness of these data to the site has not been determined, although a comparative assessment is planned. This will involve a statistical analysis of the Oakland Airport data using site meteorological data from 1970 to 1975. These site data, however, do not provide sufficient information to assess comparability of atmospheric stability conditions between the two locations. Given the differences in topography between the site and Oakland Airport, it is not likely that the airport data adequately represent the atmospheric transport and diffusion characteristics of LBL.

The site has not completely assessed radionuclide emission sources with respect to monitoring requirements under Subpart H, Section 4(i), as identified in the LBL Self-Assessment. The LBL Environment and Safety Hazards Control Department (ESHC) does have an ongoing program which is evaluating those sources currently in the effluent sampling program. Assessment of unsampled sources of radionuclide emissions is scheduled for the future. However, it appears that this assessment may be hampered in that the site does not maintain a comprehensive air emissions inventory of dispersible radionuclide sources. Further, site personnel have indicated that the assessment performed to date may not have completely addressed the regulatory requirements (I-A-16). Due to a misinterpretation of the regulations, the personnel performing the assessment were not aware that the monitoring requirement was for installation of continuous emissions monitors (CEMs) in the effluent streams of sources which exceed the regulatory criteria (I-A-16). The understanding was that current daily or weekly sampling practices were sufficient. At least one of the previously assessed sources (the NTLF stack) is subject to the monitoring requirements. This source is not equipped with CEMs and, therefore, does not comply with Subpart H. Coincidentally, however, CEMs have been placed on order for this stack.

The Tiger Team Assessment included visits to several UCB-operated laboratories conducting DOE-funded activities that cause minimal atmospheric releases of radionuclides. Discussions with UCB personnel determined that virtually no action has been taken with regard to NESHAP compliance (I-A-19). While it is understood that the question of NESHAP applicability to UCB-operated facilities is extremely complicated, no attempt to clarify regulatory applicability to DOE-funded activities has been made.

Similarly, the site was aware of the compliance and monitoring deficiencies associated with the requirements of Subpart H. Although programs are underway to correct these problems, no compliance agreement exists between LBL and EPA Region 9.

The LBL Self-Assessment and the SAN Compliance Assessment of LBL provide findings on deficiencies in the assessment of radionuclide sources with regard to NESHAP monitoring requirements. Additionally, the LBL Self-Assessment points to the need for determining representativeness of Oakland data to the site. There have been no similar findings in any site assessment for other issues addressed in this finding.

The probable causal factors for these issues are inappropriate policy, lack of procedures, and insufficient resources. Although the site is aware that compliance demonstrations are incomplete, it has continued to operate in the same manner without attempting to establish required agreements with the regulatory agency. The lack of a formal documented review program and sufficient personnel to accomplish assessments in a timely manner also contribute to this finding.

FINDING A/CF-3:**Inadequate Evaluation of Air Permit Requirements and Regulations****Performance Objective**

Regulations 1 and 2, promulgated by the Bay Area Air Quality Management District (BAAQMD), specify procedures for reviewing air emission sources through the application for and issuance of operating permits. The provisions of BAAQMD Regulation 2, Rule 1 significantly limit permit exemptions for new, modified, and existing sources. The BAAQMD interprets Section 112 as applicable to installation of all pollution abatement equipment installed after October 19, 1983. Section 425 significantly increases the potential need to obtain operating permits for toxic air contaminant sources that may have been exempt in the past.

A program needs to be in place to ensure that organizational responsibilities for permitting of air sources are delineated and that a systematic review of permitting requirements is accomplished in a timely manner. An integral part of this program should be the development and periodic review of an air emissions inventory describing appropriate source characteristics of each stack, vent, and fugitive emission source.

Finding

LBL has not evaluated air permit requirements for all sources at the site and cannot demonstrate that all sources conform with regulatory requirements. There is no formal permitting program in place which will ensure regulatory conformance with all air emission sources. LBL has not developed a detailed emissions inventory of all regulated air pollutants.

Discussion

The site has not performed a comprehensive evaluation of air emission sources to ensure adequate compliance with Federal, state, and local regulatory requirements. During the Tiger Team Assessment, several examples of LBL's failure to adequately ensure conformance were identified. The following examples of operations/air emission sources subject to permit review were observed:

- the surface coating operation in the Wood Shop of Building 76 based on the type (0381) and quantity (I-A-9) of adhesive solution used;
- the ventilation system for Room 142A of Building 77, due to a newly installed pollution abatement device; and
- the epoxy mixing and curing operation in Room 160 of Building 77, based on the use of materials which result in emissions of regulated air toxic contaminants. (Permitting action for this source is not required until notification is received from BAAQMD; however, best management practice dictates that permitting be initiated by the site.)

The LBL Self-Assessment provides additional examples of operations in need of permitting review.

Discussions with site personnel (I-A-22) have determined that no formal comprehensive permitting program exists at the site. Responsibility for air permitting lies with the Environmental and Safety Hazards Control Department (ESHC) which currently employs a reactive approach to permitting activities. Efforts are initiated only when the ESHC is notified by other site organizations as to the possibility of permitting requirements. This policy is hindered by insufficient interdepartmental communication and by a lack of regulatory training. The Plant Engineering Division maintains a documented procedure that requires the review and approval by ESHC of design plans developed for projects under this division (A-17). While this procedure may be applicable to a majority of construction projects involving air emission sources, this or similar procedures are not employed in other divisions/departments. In addition, there is a lack of regulatory training provided by the site such that responsible personnel would be able to identify projects and operations with the potential for permit requirements.

LBL has not developed a comprehensive air emissions inventory of regulated air pollutants which would facilitate permitting activities. The site has compiled an air toxics emissions inventory in response to state legislation. By state law, it is required that this inventory receive biannual review to incorporate new sources or modifications to previously assessed sources. According to site personnel, this review is scheduled to be performed in 1991 (I-A-28); however, there are currently no documented procedures to accomplish this task.

The LBL Self-Assessment addresses specific operations with deficiencies in permitting requirements and discusses deficiencies in the air toxic monitoring program regarding an inadequate quantitative assessment of emissions. There is, however, no discussion in any site assessment addressing the issues presented in this finding.

The causal factors involved in this finding appear to be related to policy, procedures, and resources. The lack of a formal permitting program providing for a systematic approach to permitting activities appears to be the primary cause. The site has recognized the need for additional personnel in improving this situation.

FINDING A/CF-4:**Inadequate Supervision of Permitted Air Emission Sources****Performance Objective**

Regulations promulgated by the Bay Area Air Quality Management District (BAAQMD) detail operating restrictions and recordkeeping requirements for permitted air emission sources. Regulation 8, Rule 16 specifies the restrictions and requirements applicable to solvent cleaning operations. Sections 301.3 and 301.4 provide specific safety equipment requirements and operating control devices. Section 501 stipulates the need for facility-wide, quarterly solvent make-up records to be maintained, available for inspection, and retained for 2 years. BAAQMD Regulation 8, Rule 19 provides requirements applicable to surface coating operations.

To ensure conformance to regulatory requirements, a program should be in place that provides both clear delineation of responsibilities and knowledge of regulatory requirements to those organizations responsible for operation of the permitted source.

Finding

LBL air emission sources are not being operated or supervised in a manner that ensures full compliance with BAAQMD rules and regulations.

Discussion

No formal program exists to ensure that personnel responsible for oversight of air emission sources receive regulatory training or information commensurate with their responsibilities. There are no facility-wide solvent makeup records being maintained. Records for individual site operations are not being maintained accurately or in a manner to facilitate immediate inspection.

LBL currently operates 35 air emission sources permitted by the BAAQMD (0384). These sources are situated throughout the site and are supervised by the respective building managers or operations supervisors. However, there is no formal training provided to those with oversight responsibility (I-A-11). Personnel with the Environment and Safety Hazards Control Department described a practice in which as new permits are received, copies of the permit and appropriate regulations are transmitted by memorandum to those personnel designated with oversight responsibility. Discussions with site personnel during the Tiger Team Assessment indicated that, in some cases, this information was not being received (I-A-11 and I-A-14).

During the Tiger Team Assessment, approximately 19 permitted sources were inspected. The following conditions that do not comply with BAAQMD regulations were found:

- The operating permits for a vapor solvent cleaning unit being operated in Building 76, Room 202 were not applied for until June 1990; although, it was installed in November 1989. In addition, this unit was being operated without required operating control devices, and the solvent makeup records for this unit were not being communicated to a central location.

- A vapor solvent cleaner in Building 77, Room 156, although operating under an adequate permit, was in violation of certain regulatory requirements (ones it had been exempt from until January 1, 1991). Also, this unit was being operated without the require control devices and safety equipment, and the solvent makeup logs for this unit were not being communicated to a central location.
- The solvent makeup logs for an inactive vapor solvent cleaner in Building 25A, Room 101 were not being maintained.
- In Building 77, Room 165, operations and equipment records were not maintained in a central location, and the records contained incomplete date entries.

Without standardized recordkeeping procedures, it would be difficult to readily compile facility-wide records of various site operations. In addition, incomplete records of individual operations are not in keeping with regulatory requirements.

The lack of complete and centralized records of sitewide solvent makeup precludes the ability of LBL to meet regulatory requirements.

The issues discussed in this finding were not addressed in the LBL Self-Assessment.

The causal factors associated with this finding appear to be the lack of a formal procedure and inadequate training. The site has not instituted a formal program to ensure adequate supervision over permitted sources. Site personnel responsible for source operations do not receive training on regulatory air issues commensurate with their responsibilities.

FINDING A/CF-5:**Incomplete Regulatory Compliance for Asbestos Removal Operations****Performance Objective**

Asbestos handling and removal operations are regulated by Federal, state, and local rules and regulations. These restrictions govern all aspects of removal from notification of intent to perform an operation to final disposal of removed material. Federal regulations under 40 CFR Part 61, "National Emission Standards for Hazardous Air Pollutants," Subpart M provides National Emission Standards for Asbestos. Sections 61.145 and 61.146 detail the requirements for written notice to the EPA Administrator for all demolition and renovation operations. The Bay Area Air Quality Management District (BAAQMD) Regulation 11, Rule 2 provides local legislation for renovation operations. This rule provides specific definitions of renovation, standards for operation, and exemptions for notification requirements.

Finding

LBL has not provided EPA Region 9 or BAAQMD with written notification of intent to perform friable asbestos removal operations. LBL does not request copies of notices of intent filed by subcontractors employed to perform operations at the site.

Discussion

The LBL Construction and Maintenance Department (C&M) is responsible for performing all in-house asbestos removal operations. Individual operations are limited to removal of less than 100 linear feet, 100 square feet, or 35 cubic yards of friable material. (Operations at or above these limits are performed by subcontractors.) C&M currently has one employee who is certified with the State of California as an asbestos removal operations supervisor. Two other site personnel are certified with the state to perform removal operations. All certified personnel receive annual recertification.

The in-house asbestos removal operations are being conducted in a manner that ensures that all workplace and ambient air asbestos emissions standards are being met. Although the small removal operations performed in-house, by themselves, are exempt from BAAQMD notification requirements, notification of intent is required by the EPA before initiating removal. In addition, notification of these operations to the BAAQMD would be required if a series of operations (including subcontractor work) within 1 calendar year cumulatively reach the above-stated limits. Personnel overseeing removal operations were not aware of this requirement (I-A-10). Interviews with C&M personnel also determined that no notifications of intent have been issued from this group (I-A-10). Further, it was not clear to those interviewed as to which site organization had notification responsibility. Typically, annual sitewide removal of all asbestos-containing materials (ACMs) exceeds regulatory exemption limits, and it is possible that friable materials may also exceed the exemption (I-A-10).

Subsequent discussions with Environment and Safety Hazards Control Department (ESHC) personnel determined that responsibility for notification of in-house operations is with this organization (I-A-11). No notifications have been submitted by ESHC nor copies of subcontractor notification requested.

However, it was indicated that ESHC would occasionally contact the BAAQMD to inquire if a subcontractor had filed notification. ESHC personnel are also responsible for disposal of all ACM and think that it is not likely that the limits for friable materials in BAAQMD regulations are being jeopardized. No documentation to support this could be produced because records of disposal do not differentiate friable materials from other ACMs (I-A-11).

Since asbestos removal operations have been performed over the past several years in the same manner, the site has been operating in noncompliance with Federal regulations. In addition, because no accurate records as to the amount of friable materials being removed are maintained, it is possible that BAAQMD regulations are not being complied with as well.

The issues addressed in this finding were not identified in any previous site assessment reviewed during the Tiger Team Assessment.

The causal factors related to this finding appear to be (1) a lack of policy implementation in that there is no procedure being employed to ensure adequate review of operations before initiation and there is no clear delineation of responsibility and (2) insufficient training to provide personnel information commensurate with their responsibilities.

FINDING A/CF-6:

Deficiencies in the Indoor Air, Ambient Air, and Meteorological Monitoring Networks

Performance Objective

DOE Order 5400.5, "Radiation Protection of the Public and the Environment," stipulates that demonstration of compliance with radioactive dose limits be based on calculations that make use of information obtained from monitoring and surveillance programs. It further states: "It is the intent of DOE that the monitoring and surveillance programs for DOE activities, facilities, and locations be of high quality."

Draft DOE Order 5400.xy, "Radiological Effluent Monitoring and Environmental Surveillance," stipulates the following:

- 1) An evaluation shall be conducted and used as the basis for establishing an environmental surveillance program. The results of this shall be documented in the Environmental Monitoring Plan to show sampling locations used for determining ambient environmental levels resulting from facility operations.
- 2) It is essential that overall objectives for environmental monitoring programs be established, including determination of compliance with applicable public exposure limits. It is imperative that the program be periodically reviewed.
- 3) Unless documented, site-specific evidence exists to justify otherwise, air samples should be collected at a height of 2 meters in a location free from localized effects (e.g., in proximity to a large building or trees) that could result in artificially low or high concentrations.

Draft DOE Order 5400.xy sets forth an objective to properly and accurately conduct environmental surveillance programs in support of DOE operations and activities. Chapter III, paragraph 4 states that sampling and monitoring systems should be calibrated before use and recalibrated after maintenance or modification, and at least annually. Chapter 4, paragraph 8 states that the meteorological monitoring program shall provide for routine maintenance and calibration of meteorological instrumentation conducted in accordance with written procedures, and calibrations should occur at least semiannually. Chapter 5, paragraph 3 stipulates that air sampling rates shall not vary more than ± 20 percent and air systems shall be flow-calibrated, leak-tested, and inspected on a routine basis. Monitoring equipment must be properly maintained to ensure compliance with these requirements. Additionally, equipment used for calibrations should be routinely recertified to ensure accuracy.

Finding

There are deficiencies in the indoor air, ambient air, and meteorological monitoring networks employed at and around LBL. These include a lack of documentation of the criteria used for establishing the monitoring network; a lack of periodic review in assessing network performance; insufficient distribution of monitoring stations; improperly sited samplers; lack of

calibration, inspection, and maintenance of the monitoring stations; and inadequate training of technicians.

Discussion

Discussions with site personnel during the Tiger Team Assessment determined that, during installation of the ambient air monitoring network, consideration was primarily afforded to nearby residences with additional consideration given to topography, source locations, and predominant meteorology. However, documentation as to the exact criteria used and their application is not available. Further, no periodic or subsequent review of the network has been performed to ascertain if these criteria are appropriate or if, given the changing nature of laboratory activities and configurations, the network continues to meet the intended objectives. Additional discussion on environmental monitoring program documentation is provided in Finding EM/BMPF-1.

An assessment of the ambient airborne tritium monitoring network reveals that the current configuration of sampler locations does not appear sufficient to ensure that maximum impacts to the environment and public are adequately assessed. For example, there is no tritium monitoring station located east of the National Tritium Labeling Facility exhaust stack even though site data indicate that winds originate predominantly from the west (0380).

The Tiger Team Assessment included a tour of the ambient air monitoring network. This involved inspection of 11 monitoring stations employing a variety of air monitoring equipment. The following deficiencies were observed during this tour:

- A majority of the air sample intakes were located below the recommended 2-meter height.
- Several situations were observed which could result in the collection of samples with artificially high or low concentrations of pollutants. These included
 - (1) sites ENV-55, ENV-15, and ENV-74, which were sited such that airflows reaching the samplers could be influenced by aerodynamic wake effects from nearby structures and vegetation, and
 - (2) "shack" location ENV-B13D, where the sampler intake was observed to be protruding through the shelter wall to the ambient air. This station also had a slatted chain-link fence surrounding the shelter. Both of these conditions may result in aerodynamic influences on airflow to the intake.
- A majority of the stations did not have markings as to station identification numbers.
- At "shack" locations ENV-B13B and ENV-B13C, the sampling methodology employed does not ensure that representative ambient air samples are being taken by the particulate monitors. In these cases, the monitors are housed in the station shelter where air is drawn in through louvered doors by a ceiling-mounted fan. This

situation does not guarantee a representative sample of ambient air to the wall-mounted intake because there is no forced mixing within the shelter.

Current LBL practice regarding calibration of air monitoring equipment (both indoor and outdoor) is to perform calibrations when air samplers are initially installed at a station or when they have received service for malfunction. However, the equipment used in calibrating field units does not undergo periodic recertification for accuracy and, therefore, may not accurately assess sampler performance. There are no programs in place at LBL for routine audits or calibrations of the air and meteorological monitoring equipment. Further, the meteorological monitoring instrumentation has never received calibration in the field (I-A-1).

Inspection and maintenance practices being employed in the field do not adequately ensure that sample flow rates are maintained within ± 20 percent. Field personnel receive undocumented training in the requirements of weekly monitoring station visits when initially hired, but subsequent refresher training is not provided. This initial training includes instruction in site inspections, reporting of inadequate conditions, and adjustments of flow rates to the ideal setting of 4 cf/m. The existing operating procedures governing these activities do not specify either the items to be inspected or the requirements for flow rate adjustment (see Finding A/CF-1). The apparent results of this lack of documented procedure are inadequately maintained and improperly functioning air samplers. These results are supported by the following observations noted while inspecting samplers during the Tiger Team Assessment:

- At Stations ENV-54 and ENV-55, the sampler flow rates were found to be operating at approximately 3.6 cf/m and 4.5 cf/m, respectively, and were adjusted immediately. Despite the fact that these samplers were supposedly adjusted the previous day, no further visitations were planned to ensure proper sampler performance over the sampling period.
- In Building 25, Room 108, an air sampler was inspected and found to have a worn hose connection at the sampler head, which was resulting in leakage below the sample intake. The flow rate was also indicated to be running at 5 cf/m.
- In Building 75, Room 127, an air sampler was found to be operating at greater than or equal to 5 cf/m (the flowmeter was pegged at the maximum rate) and was immediately adjusted. When it was reinspected approximately 1 hour later, the unit was operating at 5 cf/m; it was indicated that the sampler would be serviced at the next weekly inspection (approximately 4 days later).
- In Building 88, several air samplers were inspected and found to have either hose connections lacking clamps and/or secured with plastic tape or frayed or tearing hoses. In one instance, a unit was completely out of service.

Four air monitoring stations which employed a variety of air sampling techniques were visited. At all stations, no site inspections were observed with regard to sample hose connections, hose integrity and positioning, or

debris collection at sample intake. Subsequent visits to seven additional stations in the outdoor air monitoring network revealed that routine inspections may not be performed. For example, at two locations, the intake hoses were found to be wedged against the hose cover attached to the side of the sampler housings which resulted in restricting access and airflow to the intake. Additionally, an accumulation of insect debris was noted on or around the intakes of most samplers inspected. While these did not result in a restriction to the airflow, routine inspection should involve clearing of these areas of all debris to ensure adequate flow.

The 1988 Environmental Survey Preliminary Report of LBL (0404) noted similar deficiencies in ambient air sampling, including the situation described for "shack" locations ENV-B13B and ENV-B13C. Most of the problems noted in the 1988 report have been corrected, but the "shack" locations situation has not.

Discussions with site personnel have indicated that SAN oversight of the environmental program at LBL is minimal (I-A-2 and I-A-26). This includes a lack of any physical inspection of monitoring stations and review of network adequacy.

This finding was partially addressed in the LBL Self-Assessment. LBL is aware of the need to upgrade the ambient air monitoring network and recognized the need for documentation and implementation of procedures for routine calibration of air samplers using traceable calibration standards. To this end, the site has allocated funds for improvement of the ambient air program and the development of a maintenance and calibration program which will include periodic recertification of calibration equipment. Environment and Safety Hazards Control Department personnel have submitted a request to the Engineering Division for updated monitoring equipment. The site has begun soliciting subcontractor assistance which will include evaluation of and recommendations on the monitoring networks, and the development of operational procedures as well as a quality assurance program. No findings on the inadequate and informal training provided field personnel or the equipment conditions existing in the monitoring network were found in the LBL Self-Assessment.

The causal factors that led to the development of this finding appear to be the lack of adequate siting procedures in that existing procedures do not sufficiently address siting criteria; lack of routine appraisals and reviews in that, given the continually changing operations and activities at LBL, there are no periodic inspections of environmental programs to ensure that goals are continually being met; lack of a formal training program; and insufficient personnel to properly service the monitoring network.

3.5.1.3 Best Management Practice Findings

FINDING A/BMPF-1: Inadequate Program for Maintenance of High-Efficiency Particulate Air Filter Systems

Performance Objective

High-efficiency particulate air (HEPA) filters have received wide acceptance as state-of-the-art controls against release of radionuclide particulates. The high efficiency of these systems can only be ensured if precautions are taken to demonstrate that the designed performance has not been compromised. Formal programs that ensure adequate performance of HEPA filtration systems should be implemented. These programs should include written procedures for the installation, replacement, maintenance, periodic inspection, and routine testing of systems. The Nuclear Air Cleaning Handbook (ERDA 76-21) provides guidance for testing of HEPA filters. The handbook recommends testing before system start-up, following major repair or modification, after filter replacement, and periodically on at least an annual basis. Measurement of pressure differential for all new sources is required by DOE Order 6430.1A, "General Design Criteria." Good management practice extends this requirement along with routine recording of pressure readings to all existing sources.

Finding

There are no documented procedures at LBL for the installation, maintenance, replacement, and testing of HEPA filter systems. Systems are not routinely tested after repair or filter replacement.

Discussion

LBL uses HEPA filtration systems to control the release of radioactive particulates to the ambient air. These systems are managed under the Industrial Hygiene Department. There are currently three site personnel responsible for maintenance and replacement of the existing HEPA filter systems at LBL, and they have been responsible for these activities for the past 20-plus years. One of these individuals has received certified training through formal instruction in system installation and maintenance. The other two, however, have received only informal on-the-job training. There is no site documentation of training provided. Installation and maintenance activities at the site are performed using a knowledge of, and familiarity with, the existing systems.

Periodic efficiency testing is not performed. Not all HEPA filter systems are equipped with pressure differential monitors. Not all pressure monitors are routinely checked, and no records are kept during periodic pressure/flow rate inspections. Also, there is no inventory of HEPA filter systems for the site describing locations, types, and configurations.

LBL does not have documented HEPA filter testing procedures and does not perform efficiency testing either periodically or after system repair or filter replacement. Previous practice at the site did involve routine testing of HEPA filter systems on gloveboxes. However, these practices were ceased due to a concern of the potential for glovebox pressurization. The site currently uses effluent monitoring of manifolds which provide common ventilation to any number of HEPA systems. When abnormally high levels of

radioactivity are noted in the effluent, all systems vented through that particular manifold are tested using approved test methods. However, other than the personal field notes of the technician administering the test, there are no records maintained as to the testing performed or results obtained. While monitoring of filter efficiency in this manner may be sufficient to identify catastrophic filter failure, it may not adequately identify gradual failure or degradation of filters.

Several site personnel are cognizant as to system locations, types, and configurations, however, there is no documented list of systems that provides this information. In the event of personnel turnover, this lack of documentation could result in a loss of necessary information.

During the Tiger Team Assessment, nine HEPA filtration systems were inspected. Of these, only three were equipped with magnehelic pressure differential monitoring devices. All other systems were equipped with in-line flowmeters installed downstream of the filters. Two of the three magnehelic devices had labels indicating that filter replacement was required when 2 inches of water in pressure differential was reached. There was no indication of flow limits on the third magnehelic or any of the flowmeters. Discussions with site personnel (I-A-24) determined that the 2-inch limit is also used for the third unit. In addition, it was stated that as long as the flowmeters were registering between 6 and 10 cf/m, the associated HEPA system was assumed to be functioning properly.

All flow rate monitoring devices, with the exception of a magnehelic at Building 88, were found to be readily accessible for inspection and are checked periodically by site personnel. These periodic flow rate checks are not recorded such that trends at individual units could be readily detected.

A fume hood on the Mezzanine level of Building 88 is serviced by a HEPA filter situated on the roof. The filters and associated pressure differential are housed in a locked cabinet. Since at this station the pressure monitor is neither readily accessible nor routinely checked, a system failure could go undetected. At the time the unit was inspected, the pressure monitor was noted to be registering approximately 1.8 inches of water. Site personnel were unable to identify the last time this monitor was read (I-A-27).

The LBL Self-Assessment provides discussions on a lack of HEPA systems for some operations and inadequate maintenance of radiological ventilation systems. Initial responses to these findings indicate that a HEPA filter maintenance program will be evaluated and, if warranted, implemented and that the plan for maintenance and repair of ventilation systems will be improved. There were no findings in any site-assessment regarding other issues addressed in this Tiger Team finding.

The causal factors leading to the development of this finding appear to be policy, in that no formal program exists governing HEPA systems, lack of procedures for maintenance of the filtration systems, insufficient personnel resources to adequately manage the program, and lack of formal or refresher training for site personnel.

FINDING A/BMPF-2:

Inadequate Meteorological Monitoring Program

Performance Objective

DOE Orders provide requirements for facilities to maintain meteorological monitoring programs to demonstrate compliance with regulatory requirements, confirm adherence with environmental protection policies, and support environmental management decisions. DOE Order 5400.1, "General Environmental Protection Program," Chapter IV stipulates that representative meteorological information shall be available to characterize atmospheric transport and diffusion in the vicinity of facilities for assessments of routine and nonroutine airborne releases. In addition, this program must provide a consistent database upon which decisions concerning appropriate control activities can be made. The Order requires that meteorological monitoring programs are to be in place by November 11, 1991. Draft DOE Order 5400.xy, "Radiological Effluent Monitoring and Environmental Surveillance," provides supporting detail to these requirements. Chapter IV describes the requirements for meteorological monitoring programs, including the following:

- consideration in selecting measurement locations should include topography, obstructions, and special requirements imposed by other agencies;
- measurement systems should include two separate data-recording systems;
- data used in dose assessments should be collected in 15-minute averages for use in emergency response; and
- guidance in data collection and processing is provided in various EPA documents.

Finding

LBL does not maintain a meteorological monitoring program consistent with DOE and EPA guidance. Meteorological monitoring equipment is sited such that it is subject to aerodynamic influences which may preclude use of the data for regulatory and emergency response applications.

Discussion

The current LBL meteorological monitoring program includes the collection of data from a tower on the roof of Building 70. Measurements of wind speed, wind direction, and temperature are taken, and the data are telemetered to an IBM personal computer in Building 75, Room 124. The data are then used to calculate 10-minute average values of wind speed, wind direction, temperature, and the standard deviation (σ_y) of the horizontal wind fluctuation (A-1).

An inspection of the meteorological monitoring station on Building 70 identified a small group cluster of trees to the southwest with a height above ground level approximately equal to that of the meteorological sensors. Given the height of these trees and their proximity to the monitoring station, the potential exists for aerodynamic effects to be exerted on southwesterly airflows reaching the sensors. Under these conditions, data collected by the system would not be representative of the general airflow. Further, it was

appraised that the tower was not of sufficient height to extend above the aerodynamic effects generated by Building 70 (A-16).

An inspection of the data processing equipment in Building 75, Room 124 and interviews with site personnel (I-A-1 and I-A-16) confirmed that the meteorological data recording and processing is not in keeping with acceptable practice or DOE and EPA guidance. Examples of these deficiencies are lack of a backup data recording device and failure to obtain data in a manner recommended by acceptable guidelines (A-16). These deficiencies preclude the use of data, as currently obtained, from use in regulatory compliance and emergency response applications.

Both the 1988 Environmental Survey of LBL and the LBL Self-Assessment have identified similar deficiencies in station siting. The LBL Self-Assessment indicates relocation of the existing tower and possibly the installation of an additional tower as requirements to adequately represent the complex transport and diffusion conditions at the site. While not explicit in any previous site assessment reviewed, site personnel were aware of the need to correct the deficiencies in data processing and collection (I-A-16). To this end, the site has allocated funds and initiated action for upgrading the meteorological monitoring program.

The causal factors of this finding appear to be lack of procedure to implement DOE policy, in that the environmental monitoring group procedures do not adequately address the meteorological monitoring program and inadequate program design, in that the system configuration does not allow for the collection of valid and defensible data.

3.5.2 Surface Water/Drinking Water

3.5.2.1 Overview

LBL is located on hilly terrain that drains into two watershed areas. Strawberry Creek drains the southern portion of LBL while the Blackberry Creek drains the northern portion of LBL. Both creeks flow through the UCB campus and then into the City of Berkeley stormwater drainage system, which ultimately discharges into the San Francisco Bay. An extensive stormwater sewer system was installed at LBL in the 1960s and is designed to handle runoff from a 25-year storm event.

LBL has installed an elaborate groundwater drainage system to decrease the potential for landslides. The system consists of a number of horizontally installed pipes, commonly referred to as hydraugers, in various locations throughout the LBL hillsides. Groundwater, which drains from these hydraugers, discharges into the LBL stormwater sewer system.

LBL receives potable water from the East Bay Municipal Utility District (EBMUD) Orinda treatment plant. The LBL water distribution system operates entirely by gravity flow. The system supplies makeup water for cooling towers, irrigation water, and water for other miscellaneous uses, including industrial, deionized, and distilled water systems. Backflow prevention devices are installed in most cases where a potential for cross-contamination of the domestic water and wastewater exists.

The LBL sanitary sewer system connects to the City of Berkeley sewer main at Hearst Avenue and to the UCB system on the south side of LBL. The sanitary sewer system on the north side of LBL collects and transports only LBL wastewater. The sanitary sewer system on the southern side of LBL collects and transports LBL and UCB wastewater. The sanitary sewer system discharges to the EBMUD Sewage Treatment Facility which consists of primary and secondary treatment prior to discharge into the San Francisco Bay.

In addition to domestic sewage, LBL generates wastewater from a printed circuit board shop, plating shop, research laboratories, photo processing units, cooling tower blowdown, and a steam cleaning operation. The printed circuit board shop (Building 25) and plating shop (Building 77) have pretreatment systems that remove heavy metals from the wastewaters prior to discharging to the sanitary sewer. Two acid neutralization systems (Building 2 and Building 70/70A) treat laboratory wastewaters prior to discharge to the sanitary sewer system. Only rinse wastewaters from the photo processing units are discharged to the sanitary sewer. Photo processing wastes are treated via silver recovery units, while spent fixer and developer solutions are collected and shipped offsite. Cooling tower blowdown is discharged directly to the sanitary sewer. An oil/water separator discharges wastewater from the steam cleaning operation at Building 76.

The surface water section of the assessment addresses the laws, regulations, and DOE Orders enacted, promulgated, and/or issued in response to the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA). Table 3-3 lists the regulations, requirements, and guidelines used in the assessment.

In California, the State Water Quality Management Board has the authority to issue National Pollutant Discharge Elimination System (NPDES) permits for

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

<u>Regulations/ Requirements/ Guidelines</u>	<u>Sections/Title</u>	<u>Authority</u>
40 CFR Part 109	Criteria for State, Local, and Regional Oil Removal Contingency Plans	EPA
40 CFR Part 110	Discharge of Oil	EPA
40 CFR Part 112	Oil Pollution Prevention	EPA
40 CFR Part 116	Designation of Hazardous Substances	EPA
40 CFR Part 117	Determination of Reportable Quantities for Hazardous Substances	EPA
40 CFR Parts 122 and 125	National Pollutant Discharge Elimination System	EPA
40 CFR Part 136	Test Procedures for the Analysis of Pollutants	EPA
40 CFR Parts 141 and 142	National Primary Drinking Water Regulations	EPA
40 CFR Part 143	National Secondary Drinking Water Regulations	EPA
40 CFR Part 403	Pretreatment Standards	EPA
40 CFR Part 433	Effluent Guidelines and Standards for Metal Finishing	EPA
California Code of Regulations, Title 23, Chapter 3	California Water Regulations	CSWRCB
California Water Code, Division 7	California Porter-Cologne Water Quality Act	CSWRCB
California Harbors and Navigation Code, Division 1.5, Navigable Waters, Chapters 3 and 4	California Oil Pollution Control Acts	CSWRCB

TABLE 3-3 (Continued)
LIST OF APPLICABLE SURFACE WATER/DRINKING WATER
REGULATIONS/REQUIREMENTS/GUIDELINES

<u>Regulations/ Requirements/ Guidelines</u>	<u>Sections/Title</u>	<u>Authority</u>
EBMUD Ordinance No. 311	Wastewater Control Ordinance	EBMUD
DOE Order 5000.3	Unusual Occurrence Reporting System	DOE
DOE Order 5400.1	General Environmental Protection Program	DOE
DOE Order 5400.5	Radiation Protection of the Public and Environment	DOE
Draft DOE Order 5400.xy	Radiological Effluent Monitoring and Environmental Surveillance	DOE
DOE Order 5480.1	Environmental Protection, Safety and Health Protection Program	DOE
DOE Order 5482.1B	Environmental Safety and Health Appraisal Program	DOE
DOE Order 5484.1	Environmental Protection, Safety and Health Protection Information Reporting Requirements	DOE
DOE Order 5484.19	Environmental Protection, Safety, and Health Protection Information Reporting Requirements	DOE
DOE Order 5700.6B	Quality Assurance	DOE
DOE Order 6430.1A	General Design Criteria	DOE
Executive Order 11988	Floodplain Management	Office of President

wastewater discharges and to implement a pretreatment program, as required under the CWA. California has required the local Publicly Owned Treatment Works (POTW) to enforce pretreatment provisions.

At LBL, the pretreatment standards are enforced by EBMUD. These standards have been incorporated into EBMUD Ordinance No. 311, which established the regulations for the interception, treatment, and disposal of wastewater. LBL currently has three wastewater discharge permits issued by EBMUD. These permits cover the printed circuit board shop (Building 25), plating shop (Building 77), and general site discharges.

LBL's Environment and Safety Hazards Control Department (ESHC) is responsible for ensuring compliance with CWA. ESHC monitors wastewater discharges, as required under the EBMUD discharge permits, and surface water, as required under DOE Order 5400.1.

The Construction and Maintenance Department (C&M) is responsible for maintaining backflow prevention devices. A regular maintenance program consisting of annual inspections and testing is performed by the C&M.

Although LBL is not required to perform any sampling and analysis of potable water under the SDWA, LBL drinking water from selected building faucets is periodically sampled by an industrial hygiene technician. Analyses for coliform bacteria are routinely performed. Since 1988, periodic checks are also made for lead, copper, and zinc.

The DOE 1988 Environmental Survey of LBL identified five Surface Water/Drinking Water findings. Four findings have not yet been corrected, but plans are under development to address these findings. One finding has been corrected.

The surface water issues covered in the LBL Self-Assessment did not fully identify programmatic deficiencies at the site. Deficiencies that were not identified involved quality assurance/quality control, standard operating procedures (SOPs), floodplain management, wastewater treatment operator training, and stormwater NPDES permitting.

There were seven compliance findings and three best management practice findings identified in this assessment. In general, these related to wastewater discharge permit excursions, lack of spill control plans for petroleum products and hazardous materials, inadequate SOPs for wastewater treatment systems, and inadequate training of wastewater treatment system operators. The surface water program at LBL is generally in need of improvement.

Future activities should include more attention to keeping abreast of regulations, developing appropriate plans to maintain compliance, implementing those plans in a well-documented manner, and conducting periodic audits to ensure compliance.

3.5.2.2 Compliance Findings

FINDING SW/CF-1: East Bay Municipal Utility District Permit Excursions

Performance Objective

LBL must comply with the wastewater discharge limitations given in East Bay Municipal Utility District (EBMUD) wastewater discharge permits 776-00025, 776-00077, and 066-00791, as well as EBMUD Ordinance Numbers 270 and 311.

Finding

LBL has exceeded wastewater discharge limitations for heavy metals and volatile organics given in the EBMUD permits.

Discussion

Building 25 Plating Shop

On August 17, 1990, the Building 25 Plating Shop treatment unit exceeded the discharge limits for copper (LBL, 1990-correspondence with EBMUD) (see Table 3-4). LBL suspected, but could not confirm, the cause of the excursion was the result of a nonuniform mixture in the holding tank. Corrective measures were implemented to address the problem.

In May 1989, the Building 25 Plating Shop treatment unit exceeded the discharge limits for copper and lead. LBL determined the cause of the excursion was the result of operator error, in that a water makeup line was accidentally left on, resulting in a wastewater flow that exceeded the capacity of the treatment unit (0004).

Building 77 Plating Shop

In January and April 1989, the Building 77 Plating Shop treatment unit exceeded the discharge limits for copper. LBL determined that the cause of the first excursion was due to the breakdown of a caustic feed pump (0004). The cause of the second excursion was not determined (0004). Subsequent monitoring has indicated that copper levels have been within the discharge limits.

Strawberry and Hearst Sanitary Sewer Monitoring Stations

During 1989, LBL exceeded the discharge limits for copper and zinc at the Strawberry and Hearst Sanitary Sewer Monitoring Stations. LBL determined the excursions were due to the onsite regeneration of building deionized water systems (0004). LBL has discontinued onsite regeneration activities for all but one ion exchange column. Portable units, which are returned to the supplier for regeneration, are now used. LBL has plans to replace the one remaining ion exchange column with a portable unit. Careful monitoring of regenerate discharge has precluded the recurrence of copper and zinc excursions during onsite regeneration.

TABLE 3-4
SUMMARY OF EBMUD DISCHARGE EXCURSIONS IN 1990 (0370)

LOCATION	DATE	CONSTITUENT	DISCHARGE	
			REPORTED	LIMIT
			(mg/L)	(mg/L)
Bldg. 25 Plating Shop	8/17/90	Copper	3.6	3.38
Strawberry Sanitary Sewer Monitoring Station	1/16/90	TCH	1.422	0.5
	1/24/90	TCH	2.873	0.5
	3/14/90	TCH	6.407	0.5
	9/28/90	TCH	1.9	0.5
Hearst Sanitary Sewer Monitoring Station	3/14/90	TCH	0.811	0.5

TCH = Chlorinated Hydrocarbons (total identifiable)

Source: LBL, 1990 - Correspondence with EBMUD.

Strawberry Sanitary Sewer Monitoring Station

On January 16 and 24, March 14, and September 28, 1990, discharges of chlorinated hydrocarbons exceeded the EBMUD limitations at the Strawberry Monitoring Station (0370) (see Table 3-4). During this period, LBL conducted an investigation to determine the source of the chlorinated hydrocarbons. The results of the investigation indicated that a UCB building was the source of the contaminants. Subsequent monitoring by the EBMUD in January 1991 confirmed the source LBL had identified.

In June and October 1989, discharges of chlorinated hydrocarbons, consisting of chloroform and methylene chloride, exceeded the EBMUD limitations at the Strawberry Monitoring Station. LBL determined that these chemicals came from a UCB building, whose discharges entered the sewer system upstream of the LBL monitoring station (0004).

Hearst Sanitary Sewer Monitoring Station

On March 14, 1990, discharges of chlorinated hydrocarbons exceeded the discharge limits for chlorinated hydrocarbons at the Hearst Monitoring Station (0370) (see Table 3-4).

During 1989, LBL exceeded the discharge limits for chlorinated hydrocarbons at the Hearst Monitoring Station. LBL determined that the source of the excursion was located in a Building 55 laboratory (0004). Laboratory methods were subsequently modified and no additional excursions have occurred.

LBL has proposed an Environmental Restoration/Waste Management-funded project to upgrade their sewer discharge monitoring network.

The subject material in this finding was included in the LBL Self-Assessment.

Several causal factors contribute to the finding. These include inadequate training of wastewater treatment plant operators and others generating sanitary sewer discharges, inadequate barriers or controls to ensure compliance with permit limits, and lack of written procedures to guide treatment plant and other sewer discharge generating operations.

FINDING SW/CF-2:**Inadequate Environmental Protection and Surveillance for Surface Water Discharges****Performance Objective**

DOE Order 5400.1, "General Environmental Protection Program," requires environmental monitoring programs for surveillance through measurement, monitoring, and calculation of the effects of DOE operations on the environment and public health. The objectives of the monitoring programs are to demonstrate compliance with legal and regulatory requirements imposed by applicable Federal, state, and local agencies. In addition, it is DOE policy to correct existing environmental problems, to minimize risks to the environment or public health, and to anticipate and address potential environmental problems before they pose a threat to the quality of the environment or the public welfare.

DOE Order 5400.1 further states that environmental monitoring shall be conducted at all DOE sites to identify potential environmental problems and evaluate the need for remedial actions or mitigation measures. Environmental surveillance shall be conducted to monitor the effects, if any, of DOE activities on onsite and offsite environmental and natural resources. Environmental surveillance shall be designed to identify and quantify new or existing environmental quality problems.

The National Pollutant Discharge Elimination System (NPDES) program regulations contained in 40 CFR 122.1 require permits for the discharge of pollutants from any point source into waters of the United States.

Finding

Conditions identified at LBL's hydraugers, storm sewers, and sanitary sewers indicate that there are potential environmental releases. LBL has not fully characterized and controlled these environmental releases to minimize risks to the environment or public health and to anticipate and address potential environmental releases before they pose a threat to the quality of the environment or public welfare.

Discussion**Hydrauger Discharge**

Hydrauger number 77-12H discharges contaminated groundwater to the soil on the north side of Building 77. The hydrauger discharge (average flow of 0.15 L/min) is contaminating soil and potentially groundwater; it could also potentially flow to a nearby stormwater drain that discharges to a tributary of Strawberry Creek. LBL monitors the tritium levels in the discharge on a monthly basis.

The discharge was analyzed for organic contaminants once. Perchloroethylene (PCE) was found in the discharge at a very low concentration (0.6 ppm). However, groundwater sampling upgradient of the discharge has indicated higher levels of PCE (concentrations ranging from 10 ppm to 65 ppm) and trichloroethylene (TCE) was identified (concentrations ranging from 0.2 ppm to 1.7 ppm) (0016). LBL has taken no measures to limit the spread of contamination and little progress has been made in characterizing and

remediating the sources of the contaminants, although a site investigation project is now underway to address this.

Although SAN has sent a letter to the Regional Water Quality Management Board (RWQCB) concerning the hydrauger discharge, the need for a NPDES permit has not been resolved.

Sewer Integrity

There is evidence that some sanitary sewers and stormwater sewers are of questionable integrity which may result in the discharge of chemical wastes to the groundwater and/or surface water. Video investigations of the sewer lines revealed cracked and damaged piping. In the past, ion exchange columns were regenerated onsite, and the regenerant was discharged to the sanitary sewer. These activities have been the cause of EBMUD wastewater discharge permit excursions for heavy metals (see Finding SW/CF-1). All but one ion exchange column is now regenerated offsite by a vendor. However, no sanitary sewer sediment sampling has been performed to determine if residual contamination exists in the sewer sediments or adjacent soils.

LBL has a proposed project to investigate contamination potentially resulting from the sewers and to upgrade the sewer lines.

Efforts have been made in the past to disconnect floor drains, cooling tower drains, and other inappropriate connections to stormwater sewers, but a comprehensive documented program has not been implemented and there are concerns that connections still exist between floor drains and stormwater sewers. No drain inventory has been prepared.

Storm sewer lines that had been disconnected from cooling towers were plugged at the cooling tower. Chromates that had been used in the cooling towers may still be present in the sediments of the stormwater sewers or in adjacent soils. No sediment sampling has been performed in the stormwater sewers to ensure that future stormwater sewer discharges will not be contaminated by chromates.

Sanitary Sewer Monitoring System

Deficiencies in the sanitary sewer monitoring stations have been identified that preclude optimal monitoring capabilities for ensuring compliance with the EBMUD permit requirements for sanitary sewer discharges. Problems identified at the Strawberry Monitoring Station include clogging of the stilling well with debris, soapy discharges, and unreliable pH monitor readings. LBL currently has a FY 1992 Budget Request to upgrade the sanitary sewer monitoring stations under the Environmental Restoration and Waste Management Program. The plan (activity data sheet 2006) includes the installation of a real-time response system telemetered to a central location for the monitoring of outflow, pH, organics, listed metals, and radioactivity. The system will be designed to initiate special grab sampling when any alarm level is reached and verify violations of EBMUD wastewater permit conditions. It is projected to be installed in 1992.

The sanitary sewer monitoring system problems were addressed in the LBL Self-Assessment. The hydrauger discharge and sewer integrity problems were not addressed in the LBL Self-Assessment; although, the site was aware of the

problems. The finding was addressed in the 1988 DOE Environmental Survey Preliminary Report.

Several causal factors contribute to the finding. These include failure to analyze the risks associated with surface water/sewer discharges, inadequate barriers or controls to limit contaminant migration, and failure to allocate resources necessary to characterize and remediate sources of contamination.

FINDING SW/CF-3:

Lack of an Approved Spill Prevention Control and Countermeasures Plan

Performance Objective

A Spill Prevention Control and Countermeasures (SPCC) Plan that is consistent with all requirements of 40 CFR 112 should be prepared and implemented.

Regulations promulgated on Oil Pollution Prevention in 40 CFR 112 established requirements and procedures to prevent the discharge of oil from non-transportation-related onshore and offshore facilities into navigable waters of the United States. Since the definition of navigable water includes tributaries to those waters that are obviously navigable, virtually all surface water drainage courses are covered by the rules. Federal facilities were included in the general applicability section at 40 CFR 112.1(c) as of March 26, 1976. The requirements for preparation and implementation of SPCC Plans at 40 CFR 112.3(a) set a due date of 6 months after the effective date (March 26, 1976) for the preparation of the plan, and a due date "not later than one year after the effective date" for full implementation of the SPCC Plan.

Finding

An SPCC Plan has not been issued by LBL as required under 40 CFR 112. The current draft LBL SPCC Plan is not consistent with requirements promulgated in 40 CFR 112.

Discussion

The current draft SPCC Plan does not contain the following required information:

- 40 CFR 112.3(d) requires that the SPCC Plan be reviewed and certified by a Registered Professional Engineer.
- 40 CFR 112.7(a) requires that the facility include a description of spill events within the 12-month period prior to the effective date of the SPCC Plan. The description, if a spill occurred within the 12-month period, should discuss corrective action taken and plans for preventing recurrence.
- 40 CFR 112.7(b) requires that "where experience indicates a reasonable potential for equipment failure (such as tank overflow, rupture, or leakage), the plan should include a prediction of the direction, rate of flow, and total quantity of oil which could be discharged from the facility as a result of each major type of failure."
- 40 CFR 112.7(e)(10) contains three subparts defining requirements for personnel training and spill prevention procedures.

LBL is aware of the deficiencies contained in the current draft SPCC Plan and has taken steps to have the plan revised by April 1991. However, it should be noted that these same deficiencies were identified in the previous draft SPCC Plan during the 1988 DOE Environmental Survey.

The subject material in this finding was included in the LBL Self-Assessment and the 1988 DOE Environmental Survey Preliminary Report.

Several causal factors contribute to the finding. These include failure to implement DOE policy on complying with regulations, failure to provide adequate quality assurance/quality control for the draft plan, and failure to implement effective barriers or controls in that the SPCC Plan is the focal point for engineered and administrative controls to prevent and clean up spills.

FINDING SW/CF-4:**Noncompliance with East Bay Municipal Utility District Wastewater Discharge Permit Requirements****Performance Objective**

The LBL's East Bay Municipal Utility District (EBMUD) wastewater discharge permits requires the permit holders to comply with all permit provisions and requirements. These include Section B. Monitoring, Reporting and Recordkeeping - items II, Twenty-Four Hour Violation Reporting, and V, Signatory Requirements; Section C. Sampling - item II, Chain-of-Custody, parts b, e, f, g, and h, plus other general chain-of-custody requirements; and Section C. Sampling - item III, Laboratory Results, parts d and e.

Finding

LBL is not complying with all quality control provisions and requirements in the EBMUD wastewater discharge permits.

Discussion

The Tiger Team reviewed LBL Self-Monitoring Reports, Notices of Violations, and other associated correspondence between LBL and EBMUD. The Effluent Meter Readings August through October 1990 (October 31, 1990) and Wastewater Sampling Analysis Self-Monitoring Reports, Locations 1 and 2 (October 18, 1990) do not contain the required certification statement and are not always signed by the authorized representative as required in the permit. In addition, the Self-Monitoring Reports for July 30, 1990 for Locations 1 and 2 were neither signed nor dated.

Sampling chain-of-custody records included with the October 18, 1990 Self-Monitoring Reports do not indicate the sample containers, preservation techniques, and whether the sample container is sealed, and the sampler's name is not legibly written. In addition, all persons handling and receiving the samples have not provided their printed name and company.

Laboratory analysis reports included with the October 18, 1990, Self-Monitoring Report do not indicate the date of analysis.

LBL's correspondence reporting "Notice of Violation" indicates that the site meets neither the requirement of reporting any violation within 24 hours from the time the permit holder becomes aware of the situation and the requirement to submit a written report of the situation within 5 working days of becoming aware of the situation. A specific example cited is LBL's correspondence on a total chlorinated hydrocarbon exceedance observed for the LBL Self-Monitoring Program (LBL to EBMUD, April 12, 1990). Wastewater samples were collected on March 14, 1990, analyzed by their contractor laboratory between March 15-20, 1990, and reported to the site on March 27, 1990. The site has no record that the exceedance was reported to EBMUD within 24 hours, and the written correspondence notifying EBMUD of the exceedance is dated April 12, 1990, in excess of the 5 working day requirement.

It should also be noted that the Occupational Health Division Director receives copies of EBMUD correspondence, but upper level LBL management are not copied on EBMUD correspondence from the site.

LBL was not aware of this finding, and it was not included in the LBL Self-Assessment.

Causal factors contributing to this finding include lack of adequate quality assurance for permit reporting requirements, inadequate quality control of sampling activities, failure to implement procedures to meet regulatory requirements, and failure to implement DOE policy on complying with regulation.

FINDING SW/CF-5:**Inadequate Standard Operating Procedures for Wastewater Treatment Systems****Performance Objective**

DOE Order 5700.6B, "Quality Assurance," states quality assurance activities shall be implemented by DOE organizations and contractors using written procedures and instructions appropriate to the activities to be performed.

DOE Order 5484.19, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements," requires operators at DOE facilities to have procedures in place to control the conduct of their operations.

Standard operating procedures (SOPs) should instruct personnel on the proper operation of wastewater treatment facilities. Topics that should be covered include routine procedures for operating and maintaining the treatment system. Procedures may include the frequency and method for calibrating/checking the accuracy of the pH meter, equipment inspection and cleaning methods, emergency procedures, routine maintenance of equipment, system monitoring, and requirements for maintaining an operating log book.

Finding

SOPs are either lacking or inadequate for wastewater treatment and handling facilities at LBL.

Discussion

The following wastewater treatment and handling facilities lack SOPs:

- Building 25 Wastewater Treatment System;
- Building 51 Sump Collection and Treatment System;
- Building 51 Hydrauger Collection and Treatment System;
- Building 76 Paint Spray Treatment System;
- Building 76 Parts Cleaner Tank; and
- Building 77 Wastewater Treatment System.

The following wastewater treatment and handling facilities have inadequate SOPs:

- Building 2 Acid Neutralization System;
- Building 70A Acid Neutralization System; and
- Building 76 Oil/Water Separator.

The following items were noted:

- At the Building 2 Acid Neutralization System, the pH meter had not been calibrated in 18 to 24 months. The operator was unaware of any requirement to have the pH meter calibrated. The only operating procedures prepared were (1) procedure for inspection and cleaning of acid waste sump float and (2) emergency procedures. There was no bound operators log book.

- At the Building 25 and Building 77 Wastewater Treatment Systems, no SOPs were prepared. No bound log book is maintained; although, there is a daily checklist form kept in a three-ring binder.
- At the Building 70A Acid Neutralization System, notes are not put on the pH meter strip chart to indicate when the meter was calibrated or if the chart is running fast. The pH meter is calibrated once a month. An Operating Safety Procedures Manual (0353) was prepared, but there were no signatures to indicate that the manual had been approved.

Standard industry practice is to have one bound operating log at each wastewater treatment plant wherein the operating staff responsible for the operation and maintenance of the facility make entries of status. Operating logs generally include recording alarm condition, operating adjustments/changes, key maintenance status, unusual items to report, signature of licensed operator or the licensed shift supervisor, signature of operator in-charge, routine equipment maintenance, repair or replacement, and similar issues. The log should be available and readily accessible to anyone and located at a central "control" point in each facility.

The site was not aware of this finding, and it did not appear in the LBL Self-Assessment.

Several causal factors contribute to the finding. These include failure to implement DOE policy, failure to develop procedures, and lack of quality assurance/quality control.

FINDING SW/CF-6:

Floodplain Management

Performance Objective

According to Executive Order 11988, all proposed Federal actions should be reviewed at the earliest possible stage to determine if they are in a floodplain. Any actions located in or impacting the base floodplain 100-year (500-year for critical actions) initiates part or all of the remaining Executive Order process. Action is defined as any "Federal activity including (1) acquiring, managing, and disposing of Federal lands and facilities; (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land use resources planning, regulating, and licensing activities."

Under Executive Order 11988, "Water Resources Council Floodplain Management Guidelines," critical action is defined as any activity for which even a slight chance of flooding is too great. A Federal action is determined to be a "critical one" if the action would create an added dimension to the flood disaster, as could be the case for liquefied natural gas terminals and facilities producing and storing highly volatile, toxic, or water-reactive materials.

Finding

LBL has not performed floodplain assessments for DOE-owned or leased facilities, or for facilities on the UCB campus where DOE activities take place.

Discussion

LBL was unaware that Executive Order 11988 applied to LBL activities. No review of proposed LBL actions within the 100-year floodplain nor proposed critical actions within the 500-year floodplain has been performed, in accordance with the Executive Order.

The extent of LBL actions within floodplains have not been determined. However, LBL has indicated Building 901 is located within the 100-year floodplain. Ethanol, which is flammable, is stored there.

The Executive Order and DOE and FEMA regulations implementing it require that floodplain assessments be incorporated with NEPA analyses where possible. LBL and SAN have not developed procedures to incorporate these requirements into their NEPA program.

The site was not aware of this finding, and it did not appear in the LBL Self-Assessment.

Several causal factors contribute to the finding. These include inadequate policy implementation, lack of procedures, lack of training, and lack of supervision by SAN.

FINDING SW/CF-7:

Lack of Backflow Prevention Devices

Performance Objective

DOE Order 6430.1A, "General Design Criteria," Section 0266-2 requires suppliers of potable water to install backflow prevention devices to prevent contamination of the potable water distribution system in the event of loss of pressure in the distribution system. This requires prevention of contamination of potable water systems within buildings by not allowing hoses that are attached to faucets to lie in a sink without antisiphon devices. These devices prevent backsiphoning of wastes from the sink.

Finding

Antisiphon devices are not installed on several faucets observed with hoses attached and lying in sinks or connected to photoprocessing baths.

Discussion

Hoses lying in sinks were attached to faucets or connected to photoprocessing baths without antisiphon devices in the following locations:

- Building 10, Room 118B;
- Building 25, Room 140;
- Building 62, Rooms 114 and 116;
- Building 75A; and
- Building 80, Room 004B.

In the event of loss of pressure due to a line break or maintenance within a building, any liquids in the associated sinks or photoprocessing baths could be siphoned into the water lines if the faucets were open. Although the examples listed above represent a limited number of sinks reviewed by the Tiger Team, the frequency of the problem is indicative of a potential sitewide problem. In addition, LBL does not have a program for identifying similar problems.

The subject material in this finding was included in the LBL Self-Assessment.

The causes of this finding appear to be lack of training and risk assessment and appraisals/audits/reviews. There is a lack of personnel training to identify potential backflow problems. The risk involved in this practice may not have been adequately assessed, and there are no appraisals/audits/reviews to identify potential backflow problems.

3.5.2.3 Best Management Practice Findings

FINDING SW/BMPF-1: Inadequate Training Program for Wastewater Treatment System Operators

Performance Objective

A formal training program should be maintained to ensure that all operators are familiar with plant operations and equipment maintenance procedures.

Although there is no requirement that industrial wastewater treatment operators be state certified, LBL should be able to demonstrate that the operators have the necessary level of competency in the operation of the treatment systems. This may be achieved through a formal training program that identifies the training each operator is required to have and documents that each operator has received the requisite training.

Finding

LBL does not have a formal training program for wastewater treatment system operators.

Discussion

Wastewater treatment systems are operated at Buildings 2, 25, 51, 70/70A, 76, and 77. These systems treat plating wastewater and acidic discharges from laboratories. LBL does not have a formal training program that identifies the skills and knowledge needed by a wastewater treatment system operator to operate these systems. Operators have received training from the manufacturer of a treatment system prior to start-up and informal on-the-job training, but these trainings are not documented. Without adequate operator training, LBL may have difficulty ensuring consistent plant operations and compliance with the East Bay Municipal Utility District wastewater discharge permit (see Finding SW/CF-1).

The site was not aware of this finding, and it did not appear in the LBL Self-Assessment.

The causal factor which contributes to the finding appears to be an inadequate assessment of the risk associated with not establishing a formal training program.

FINDING SW/BMPF-2:**Stormwater National Pollutant Discharge
Elimination System Permit Requirements****Performance Objective**

According to 40 CFR Part 122, facilities that discharge stormwater associated with industrial activity shall submit an application for a National Pollutant Discharge Elimination System (NPDES) permit. Facilities considered to be engaging in "industrial activity" include hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under Subtitle C of the Resource Conservation and Recovery Act (RCRA). This includes stormwater discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, waste material or by-products used or created by the facility; material handling sites; sites used for residual treatment, storage, or disposal; and shipping and receiving areas. An individual stormwater NPDES permit application must be submitted by November 18, 1991.

Finding

LBL had not determined the applicability of stormwater NPDES permit regulations to the Hazardous Waste Storage Facility operations.

Discussion

The site has been attending meetings with Alameda County and the City of Berkeley during the past year in anticipation of new stormwater permitting requirements and to formulate a strategy for compliance with the stormwater regulations. However, the site was not aware of the requirement for a NPDES permit for stormwater discharges associated with a Hazardous Waste Storage Facility, and no application preparations have been initiated. This requirement was included in the Final Rule on NPDES Permit Application Regulations for Stormwater Discharges, which was issued on November 16, 1990 and became effective on December 17, 1990. LBL will not be in compliance with the Clean Water Act if a NPDES permit application is not prepared and submitted to the State Water Quality Control Board for stormwater discharges associated with the Hazardous Waste Storage Facility by November 18, 1991.

The site was not aware of this finding, and it did not appear in the LBL Self-Assessment.

Several causal factors contribute to the finding. These include LBL staff lacked necessary training in regulatory issues and, thus, were unaware that the stormwater NPDES permit requirements applied to stormwater discharges from the Hazardous Waste Storage Facility. In addition, lack of SAN supervision allowed the issue to go unnoticed.

3.5.3 Groundwater

3.5.3.1 Overview

The groundwater portion of the environmental assessment of LBL involved the evaluation of the current groundwater protection, monitoring, and characterization activities. Compliance with groundwater requirements was evaluated on the basis of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), appropriate DOE Orders, and California State environmental statutes and regulations (see Table 3-5). In addition, the groundwater program was also assessed in terms of best management practices.

LBL is situated on the western flank of the Berkeley hills and covers approximately 130 acres. The elevations over the site vary from about 500 feet above mean sea level at the western boundary to a maximum of approximately 1,050 feet on the eastern boundary. The laboratory property contains three main canyons and related tributary features. The west trending Strawberry Canyon is present along the southern portion of the property. A north-south trending canyon along the east part of the property joins the head of Strawberry Canyon. Blackberry Canyon Creek drains the central portions of the property.

The LBL site is underlain by a sequence of sedimentary and volcanic bedrock ranging in age from Jurassic to Pliocene. Extensive folding and faulting since Cretaceous time has caused deformation of the volcanic and sedimentary rocks. The major rock types at the LBL property are composed of poorly consolidated sandstones, siltstones, claystones, and conglomerates of the Orinda Formation (late upper Miocene and/or lower Pliocene age). The volcanic rocks of the Moraga Formation (Miocene and Pliocene time) are present throughout most of the upper elevations of the property. The Moraga rocks are composed of numerous basalt and andesite flows, pyroclastic tuff beds, and agglomerates overlying the Orinda Formation. The Colluvial soils and the surface deposits vary in thickness and are composed of clays, silts, and weathered rock fragments originated from nearby parent material, primarily situated in the slopes and drainage depressions.

There have been 40 known landslides on the LBL property in the past 50 years. These slides vary in size from shallow, localized mudflows in the colluvium to deep-seated failures in bedrock. Most of the slides have been repaired by various means, such as rock riprap, slope reshaping, total removal of unstable materials and replacement with compacted fill, and use of retaining structures. Several types of drainage systems were installed as a part of the repairs, including gravel-filled subdrain trenches and horizontal drains (hydraugers). LBL has installed hundreds of dewatering wells, slope-indicators, and piezometers to monitor the groundwater table and hydrostatic pressure sitewide as part of the slope stabilization program.

The hydrogeology of LBL is highly complex. Surface runoff, year-round springs, and variable water levels in observation wells indicate discontinuous and localized aquifers. Groundwater seepage occurs in three canyons and related tributaries on the LBL property. In addition, the extensive earth moving required for slope stabilization, paving, and building construction have altered natural drainage patterns, which might have impacted the hydrogeologic conditions at the LBL property. The Orinda sandstone bedrock

**TABLE 3-5
LIST OF APPLICABLE GROUNDWATER
REGULATIONS/REQUIREMENTS/GUIDELINES**

<u>Regulations/ Requirements/ Guidelines</u>	<u>Sections/Title</u>	<u>Authority</u>
DOE Order 5400.1	General Environmental Protection Program	DOE
DOE Order 5400.4	Comprehensive Environmental Response, Compensation, and Liability Act Requirements	DOE
40 CFR Part 300	National Oil and Hazardous Substances Pollution Contingency Plan	EPA
OSWER Directive 9950.1	RCRA Groundwater Monitoring Technical Enforcement Guidance Document	EPA
OSWER Directive 9950.2	RCRA Comprehensive Groundwater Monitoring Evaluation Document	EPA
California State Water Resources Control Board Article 7	Underground Storage Tank Closure Requirements	CWQCB
California Department of Water Resources, Bulletin 74-90	California Well Standards, Part III	CDWR

underlying LBL provides a main source of groundwater. Groundwater near LBL is not used for drinking water.

There are several areas of known groundwater contamination at LBL. Organic contaminants (noted as maximum concentrations), including perchloroethylene (125 ppb), trichloroethylene (225 ppb), 1,1-dichloroethylene (75 ppb), and 1,2-dichloroethylene (10 ppb), have been detected at the Electronic Store Shops (Building 7), Advanced Light Source, Accelerator Development (Building 46), Bevalac/Bevatron (Building 51), Magnetic Fusion Energy Development (Building 52), Super HILAC Development (Building 53), and Heavy Ion Linear Accelerator (Building 71). Tritium and volatile organic chemicals are present in the groundwater beneath the Material Management and Purchasing mailroom (Building 69), Radioisotope Service, National Tritium Facility (Building 75), and Mechanical Shops (Building 77). The concentration of tritium in the groundwater at one of the hydraugers exceeds 30,100 pCi/L.

The Earth Sciences Division (ESD) of LBL has been responsible for some technical investigations related to hydrogeologic and contaminant assessments. ESD will also provide technical input to a site characterization project just beginning at LBL (see Inactive Waste Sites Overview, Section 3.5.8.1, for a detailed discussion of this project). ESD is also responsible for installation of monitoring wells, well maintenance, and well abandonment. The Environment and Safety Hazards Control Department is responsible for communication with regulatory agencies and reporting of data.

There has been only limited expansion of the groundwater monitoring network since the 1988 Environmental Survey. A comprehensive monitoring strategy and approved procedures and practices for sampling and analysis are not in place. The site is preparing a Quality Assurance Program Plan (QAPP) and a Health and Safety Plan for groundwater characterization. The site has addressed groundwater monitoring program requirements in the Environment Restoration and Waste Management FY 1992 Budget Request.

The lack of a comprehensive groundwater protection and monitoring program has precluded an accurate characterization of existing groundwater contamination as well as an assessment of sitewide hydrologic conditions. Responsibilities and objectives for implementing a program are not well coordinated. The current program cannot provide the data needed to evaluate groundwater conditions and satisfy regulatory requirements. The development and implementation of a comprehensive and well coordinated groundwater protection and monitoring program will be pivotal to a number of ongoing and future environmental monitoring and surveillance projects at LBL.

The groundwater assessment identified five compliance findings that relate to incomplete hydrogeologic characterization, lack of a comprehensive groundwater protection and monitoring program, known contamination of groundwater, lack of a program to maintain and abandon wells, and inadequacies in the underground storage tank monitoring wells. The site is aware of the issues related to hydrogeologic characterization, groundwater protection and monitoring programs, and known contamination through its self-assessment.

3.5.3.2 Compliance Findings

FINDING GW/CF-1: **Lack of a Comprehensive Groundwater Protection Management Program and Groundwater Monitoring Plan**

Performance Objective

DOE Order 5400.1, "General Environmental Protection Program," Chapter III, Section 4a requires that a Groundwater Protection Management Program Plan (GPMPP) be completed by May 1990. Elements of the GPMPP include documentation of the groundwater regime with respect to quantity and quality, design and implementation of a monitoring program, a management program for groundwater protection and remediation, a summary of areas that may be contaminated, strategies for controlling sources of these contaminants, a remedial action program that is part of the site Comprehensive Environmental Response, Compensation, and Liability Act (or Resource Conservation and Recovery Act) program, and decontamination and decommissioning and other remedial programs contained in DOE directives. Chapter IV, Section 9 requires that a Groundwater Monitoring Plan (GMP) be developed as a specific element of the groundwater protection management program by November 1991. The GMP must address regulations and requirements applicable to groundwater protection and monitoring sampling strategies, sampling and analysis plans, and data management.

Finding

A comprehensive, well coordinated Groundwater Protection Management Program Plan that meets the requirements of DOE Order 5400.1 is not in place at LBL.

Discussion

The plans and procedures for implementing a groundwater protection and monitoring program are incomplete. Key elements are summarized below:

- The hydrogeologic characterization of the site is incomplete (see Finding GW/CF-2). A complete hydrogeologic characterization serves as the basis for installing a groundwater monitoring network and addressing specific areas and sources of known contamination.
- A sitewide network of monitoring wells is not in place. Without such a system, it is impossible to assess and characterize the quantity and quality of the groundwater regime. Limited site groundwater investigations were conducted in 1986, 1988, 1989, and 1990. However, these relied on dewatering wells and slope indicators, as well as selected monitoring wells. The site is aware of the limitations of these studies. Planned future studies, including the current site characterization, are to be funded through the DOE Environmental Restoration and Waste Management Five-Year Plan funding, which only recently became available.
- There is an inadequate number of wells to characterize known areas of groundwater contamination. Tritium has been detected in

hydraugers below Buildings 75 and 69. Chlorinated hydrocarbons have been detected in wells below Building 75 and in hydraugers below Building 46. Polychlorinated biphenyls (PCBs) were identified in the sump below Building 51, which was apparently plumbed to a tiled subdrain system.

- The integrity of the sanitary sewer is questionable and represents a potential source of groundwater contamination (see Finding SW/CF-2). The nature and horizontal and vertical extent of contamination in these areas have not been characterized; therefore, LBL cannot demonstrate that contaminated groundwater is not moving offsite.
- LBL does not have a comprehensive coordinated monitoring strategy for the site. A monitoring strategy should address requirements and regulations, detection limits, decontamination methods, sampling and analysis methods, monitoring schedules, parameters, QA/QC elements, and data reduction, validation, reporting, and recordkeeping requirements.
- A groundwater monitoring Quality Assurance Project Plan has not been developed (see Finding QA/CF-1).
- There is no single document that coordinates the various elements of the groundwater monitoring program or describes the organizational structure for implementing the program.

The LBL Self-Assessment recognized the need for a sitewide hydrogeological assessment and monitoring program.

The causal factors of this finding appear to be lack of DOE policy and program implementation, failure to develop formal procedures, and lack of allocated resources.

FINDING GW/CF-2:

Incomplete Hydrogeologic Characterization of the Site

Performance Objective

Both the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP) (40 CFR 300.430) have guidelines for contamination assessments that state that groundwater regimes should be adequately characterized to understand flow path, source verification of contaminants, and other hydrogeologic features.

DOE Order 5400.4, "CERCLA Requirements," states that DOE shall respond to inactive waste sites in accordance with CERCLA and NCP.

Also, DOE Order 5400.1, "General Environmental Protection Program," requires groundwater monitoring as specified in the RCRA Groundwater Monitoring Technical Enforcement Guidance Document (OSWER Directive 9950.1) and the RCRA Comprehensive Groundwater Monitoring Evaluation Document (OSWER Directive 9950.2) and requires documentation of groundwater quality and quantity.

Finding

The hydrogeologic regime at LBL has not been adequately characterized to define aquifer relationships, subsurface stratigraphy, extent of contamination, background conditions, and local flow paths, in accordance with the DOE, RCRA, and CERCLA guidance and regulations.

Discussion

Although numerous, extensive geotechnical reports about the site geology and hydrogeology have been produced, the vertical extent of the upper-most aquifer has not been adequately characterized. The subsurface distributions of Moraga volcanics (volcanic tuff or andesite) and the Orinda sandstone have not been adequately characterized. The relationships of various water-producing formations, the horizontal and vertical flow regimes, and the influence of LBL activities such as dewatering, cannot be evaluated. Further, the potential presence of perched aquifers cannot be assessed. The following three items are among the factors that have not been sufficiently addressed:

- There are no hydrogeologic cross-sections that include vertical hydraulic gradients and/or flow diagrams.
- There are no geologic structural maps/geologic cross-sections for the bedrock horizons or subcrops other than those intended for slope stabilization and construction purposes.
- Isopleth maps of major contaminants have not been attempted.

At each area of known contamination, LBL has not established the localized flow direction paths or velocities to characterize the extent of contamination and migration potential. Plume maps based on groundwater monitoring programs have not been generated, and aquifer tests have not been conducted at sites. The groundwater contamination areas were discussed in the July 1988 DOE Environmental Survey Preliminary Report (0404); yet, the nature and extent of the groundwater contamination in those areas have not been adequately defined.

The overall monitoring well network currently at specific areas does not conform to the CERCLA 40 CFR 300.430(d) guidelines and will require further modifications and additional wells with properly placed screens, better maintenance, and more appropriate construction materials (see Finding GW/CF-1). Some of the newer wells, however, do conform to these guidelines.

An understanding of the subsurface conditions is essential to recognize and evaluate potential groundwater migration pathways. A three-dimensional conceptualization of contaminant migration is necessary to correctly evaluate exposure risks and select remedial alternatives that are effective in achieving this understanding.

This issue was identified in the LBL Self-Assessment.

The apparent causes for the inadequate characterization of the LBL hydrogeologic regimes appear to be personnel, resources, supervision, and review. LBL has no full-time staff to make and implement policy, coordinate and supervise the investigations of subcontractors, and provide a uniform and programmatic approach to the characterization of the hydrogeologic regime. As a result, the LBL approach to supervising the hydrogeologic assessment of the areas of concern has been fragmentary and loosely coordinated.

FINDING GW/CF-3:**LBL Operations Have Contaminated Groundwater****Performance Objective**

DOE Order 5400.1, "General Environmental Protection Program," paragraph 5, page 6 states that it is DOE's policy "to conduct the Department's operations in compliance with the letter and the spirit of applicable environmental statutes, regulations, and standards. In addition, DOE is committed to good environmental management of all its programs and at all its facilities to correct existing environmental problems to minimize risks to the environment and public health, and to anticipate and address potential environmental problems before they pose a threat to the quality of the environment or the public welfare."

Finding

Contaminated groundwater is present beneath the LBL site. Existing information cannot identify those operations which have resulted in this contamination.

Discussion

Review of LBL preliminary site investigations and interim sampling reports indicates that groundwater has been contaminated to levels above EPA maximum contaminant levels (MCLs) for several contaminants at various locations around the site. (The MCLs have been established for public drinking water standards. Although groundwater in the area of LBL is not used for drinking water, the MCLs are used here as a standard of reference only.) MCLs have been exceeded in the groundwater under the Electronic Store Shops (Building 7), Advanced Light Source, Accelerator Development (Building 46), Bevalac/Bevatron (Building 51), Magnetic Fusion Energy Development (Building 52), Super HILAC Development (Building 53), and Heavy Ion Linear Accelerator (Building 71). The groundwater sampling and analyses conducted in July 1990 detected several different organic compounds which are presented with maximum pollutant concentrations, including perchloroethylene (125 ppb), trichloroethylene (225 ppb), 1,1-dichloroethylene (75 ppb), and 1,2-dichloroethylene (10 ppb).

The groundwater beneath the Material Management & Purchasing mailroom (Building 69), Radioisotope Service, National Tritium Facility (Building 75), and Mechanical Shops (Building 77) vicinity were shown to be contaminated with tritium and volatile organic compounds. The concentration of tritium in the groundwater exceeds 30,100 pCi/L (I-GW-7).

The site is aware of the existing groundwater contamination and has proposed groundwater investigation plans at several areas (buildings). Proposed plans were developed with consultations from the California Regional Water Quality Control Board and in accordance with DOE Order 5400.1 to determine the presence, migration rate, and extent of contamination in the groundwater. In addition, the site has plans to implement a comprehensive, sitewide groundwater monitoring program. Determination of contamination at all past and current disposal sites and the extent of remediation will be conducted in accordance with 40 CFR 300.430.

Groundwater contamination was a finding of the 1988 DOE Environmental Survey. The findings identified during the survey are listed as findings in the LBL Self-Assessment.

The causal factor for this finding is lack of policy implementation in that LBL has not instituted DOE policy on environmental protection and management. Contributing factors are inadequate supervision by SAN and insufficient allocation of resources.

FINDING GW/CF-4:**Inadequate Placement of Monitoring Wells for Closure of Underground Storage Tanks****Performance Objective**

Article 7 of the California State Water Resources Control Board (CWRCB) regulations requires facilities with underground storage tanks (USTs) to install and maintain groundwater monitoring wells, establish and adhere to appropriate sampling schedules, and report the findings of their sampling activities as appropriate.

Finding

Presently, there are four groundwater monitoring wells at LBL that are used to monitor the conditions of three underground storage tanks located near Buildings 7 (Electronic Store Shop), 62 (Material and Chemical Science), and 76 (Craft and Maintenance Shop). The maintenance and sampling of these wells and the subsequent reporting of the results have not been performed in accordance with applicable CWRCB regulations.

Discussion

All three USTs have recently been removed in accordance with the requirements of their respective Site Closure Plans. During implementation of these Site Closure Plans, volatile organic contamination was discovered in the groundwater at all three locations.

The analytical data for samples recovered from monitoring well MW 7-1 shows the presence of perchloroethylene, trichloroethylene, dichloroethylene, and ethylene (November 1990 report). This monitoring well was finished at only 18 feet below ground level because the driller encountered refusal (0416). Because of this, the well has not produced sufficient groundwater to be sampled on a quarterly basis as required by CWRCB regulations. This may result from the well being installed at an insufficient depth or the improper screen placement. In addition, other information indicates that the subsurface region near Building 7 is contaminated with volatile organic compounds (i.e., perchloroethylene (125 ppb, maximum concentration), trichloroethylene (225 ppb, maximum concentration), 1,1-dichloroethylene (70 ppb, maximum concentration), and ethylene (465 ppb, maximum concentration)) not believed to have been released from the Building 7 UST. LBL Earth Sciences Division personnel have proposed that additional monitoring wells be installed near Building 7 to better characterize the extent and source of subsurface contamination.

Results of samples withdrawn from monitoring wells MW-62-1 and MW-62-2 during implementation of the Building 62 UST Site Closure Plan have shown total petroleum hydrocarbon (2.3 ppm) contamination, including benzene (0.0057 ppm), to exist in the groundwater. The post-closure report filed for the Building 62 UST in November 1987 recommended additional future groundwater monitoring in this location. UST monitoring well documentation requirements of CWRCB regulations have not been satisfied for these two wells.

Monitoring well MW-76-1 has been located in the roadbed of a high traffic area. The rain cover was damaged during reconstruction of the road in early December 1990, and the problem was not corrected immediately, in accordance to the CWRCB regulation. The integrity of this well is still questionable.

An inspection of these monitoring wells revealed the following additional deficiencies for all four:

- monitoring wells have not been labeled or otherwise marked to ensure proper identification; and
- the survey elevation or reference point was not identifiable on the cover.

LBL is aware of the deficiencies associated with these UST monitoring wells, but has not developed a plan for correcting these noted deficiencies. Although deficiencies of general site groundwater monitoring wells were identified by LBL in their self-assessment, deficiencies specific to UST monitoring wells were not noted.

The causal factors that may have contributed to this finding are inadequate policy implementation, personnel, and supervision. LBL did not properly implement the policy of establishing an effective groundwater monitoring program to comply with state regulations as well as best management practice.

FINDING GW/CF-5:

Lack of a Comprehensive Program to Inventory, Maintain, Inspect, and/or Abandon Wells and Boreholes

Performance Objective

California Department of Water Resources (CDWR) Bulletin 74-90, "California Well Standards," requires that wells be constructed, maintained, and abandoned in a manner that protects groundwater quality. The bulletin provides minimum guidance in these areas and requires that the owner assume ultimate responsibility for ensuring that a well does not constitute a significant pathway for the movement of pollutants, contaminants, or poor quality water. A well is considered permanently inactive if it has not been used for 1 year unless the owner demonstrates intention to use the well again. The well owner must properly maintain an inactive well, as evidence of intention of continued use, in such a way that

- the well has no defects that will allow degradation of the quality of water in strata penetrated by the well;
- the top of the well casing is provided with a watertight cover which cannot be removed except with equipment or tools. Covers must eliminate physical hazard to humans and animals. Any subsurface vault used to house the top of a well casing shall be maintained in a sound condition and shall be watertight;
- the well is marked so that it can be clearly seen and identified; and
- the area surrounding the well is kept clear of brush and debris.

Finding

LBL does not have a comprehensive program to inventory, maintain, and properly abandon groundwater monitoring wells as well as test wells, dewatering wells, production wells, and slope indicators, in a manner that protects groundwater quality.

Discussion

Several instances were observed where groundwater monitoring wells were not properly maintained and marked. An inspection of monitoring wells at Buildings 76 and 6 revealed the following:

- None of the monitoring wells were labeled or marked in a way which identified them.
- Two of the 10 wells were found to have surface seals damaged, including grout plugs and surface covers (monitoring wells MW 76-1 and MW 90-2). Damaged wells may be a source for infiltration of contaminated surface water.
- Two monitoring wells (MW 2-220 and MW 8-102) were virtually destroyed during the construction of Building 6. The exact location of these wells is unknown.

Monitoring wells must be inventoried, marked, maintained, and inspected to ensure the integrity of the monitoring system. Wells that are not protected can be damaged by vehicles and equipment. Cracked casing seals not only allow the casings to loosen, but also allow surface infiltration along the casing. Wells that are not labeled make field identification more difficult and increase the possibility of collecting a misleading sample. Wells that are not locked can be tampered with and can also increase the possibility of collecting a nonrepresentative sample.

In addition to groundwater monitoring wells, hundreds of soil borings, test wells, production wells, dewatering wells, and slope indicators have been drilled in the past 50 years at the LBL site. The locations, depths, and construction details of wells are known for the most part; however, the data are generally not available for all of the boreholes. A detailed map for the soil borings was updated on October 8, 1990, but the closure details are not well documented. A partial inventory and maintenance check is available as a result of the investigation conducted in 1990 to identify those wells that can provide locations for visually measuring groundwater levels. However, a comprehensive inventory of wells and boreholes and identification of the uses of each has not been completed. Wells and boreholes (even those used intermittently) must be maintained according to the CDWR standards as evidence of intended use. The exceptions to this requirement are the dewatering wells; however, it would be a best management practice to maintain, mark, and inspect these wells. The maintenance standards are designed to protect groundwater quality. Wells or boreholes that have no future use must be formally abandoned according to CDWR guidance.

This issue was not identified in the LBL Self-Assessment.

The causal factor for this finding is failure to develop procedures to implement DOE policy on groundwater protection and monitoring. A contributing factor is lack of allocated resources to properly manage the well network.

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3.5.4 Waste Management

3.5.4.1 Overview

The purpose of the waste management portion of the environmental assessment of LBL was to evaluate the site's activities related to hazardous, radioactive, radioactive mixed, and solid waste management. Activities evaluated included generation, treatment, storage, and disposal (TSD) of these various wastes.

The LBL waste management program was evaluated for compliance with applicable state and Federal regulations and DOE Orders listed in Table 3-6. In addition, the waste management program was also evaluated considering best management and engineering practices.

Regulatory Oversight

The California Department of Health Services (DHS) does not have primacy for the Resource Conservation and Recovery Act (RCRA). Therefore, both California and EPA exercise hazardous waste regulatory authority. In areas where the Federal and state requirements differ in stringency, the more stringent requirement applies. Generally, California has more stringent requirements, among which are the universe of wastes considered hazardous, land disposal restrictions, generator storage, waste minimization requirements, and facilities subject to RCRA permitting.

The universe of wastes considered hazardous in California is much broader than those considered hazardous by EPA. These "non-RCRA" hazardous wastes include non-RCRA solvents, asbestos-containing wastes, PCB waste, infectious waste and waste oils. In California, wastes can be toxic and, therefore, hazardous as a result of 1) exceeding thresholds listed for acute oral LD₅₀, acute dermal LD₅₀, acute inhalation LD₅₀, or acute aquatic 96-hour LC₅₀; 2) containing a concentration equal to or exceeding 0.001 percent by weight of any of a list of organics; and 3) containing one of a list of constituents exceeding soluble threshold limit concentration (STLC) or total threshold limit concentration (TTLC) values. These broader and much more complex criteria result in more wastes being considered hazardous. This, in turn, results in a heightened need for a comprehensive waste program characterization, including training of generators and waste handlers in hazardous waste characterization, and development of procedures for waste characterization. LBL does not have a well-developed waste characterization program, relative to procedures and training of generators (see Findings WM/CF-1, WM/CF-7, and WM/BMPF-3).

EPA hazardous waste land disposal restrictions are not currently a regulatory concern at LBL. Offsite treatment and/or destruction options are available for all hazardous wastes subject to land disposal restrictions. California has enacted its own land disposal restrictions for hazardous waste. These only differ for wastes which are California-only hazardous wastes and are thus not covered by EPA Land Disposal Restrictions. California has promulgated treatment standards for non-RCRA, metal-containing aqueous wastes and PCB wastes, both of which are generated at LBL. Treatment standards for other non-RCRA wastes, such as asbestos and infectious wastes, are being developed and will be promulgated. Non-RCRA wastes, for which California has not adopted treatment standards, are prohibited from land disposal if the waste contains a constituent-listed or a STLC constituent and the concentration is above the STLC limit.

**TABLE 3-6
LIST OF APPLICABLE WASTE MANAGEMENT
REGULATIONS/REQUIREMENTS/GUIDELINES**

<u>Regulations/ Requirements/ Guidelines</u>	<u>Sections/Title</u>	<u>Authority</u>
DOE Order 5400.1	General Environmental Protection Program	DOE
DOE Order 5400.3	Hazardous and Radioactive Mixed Waste Program	DOE
DOE Order 5482.1B	Environment, Safety and Health Appraisal Program	DOE
DOE Order 5480.4	Environmental Protection, Safety, and Health Protection Standards	DOE
DOE Order 5820.2A	Radioactive Waste Management	DOE
DOE Order 6430.1A	General Design Criteria	DOE
DOE Order 5480.19	Conduct of Operations for DOE Facilities	DOE
SEN-0-89	Secretary of Energy Notices	DOE
INPO-85-017	Guidelines for the Conduct of Operations at Nuclear Power Stations	INPO
Implementation Guidance	Implementation Guidance for DOE Order 5400.1	DOE
Implementation Guidance	Implementation Guidance for DOE Order 5820.2A	DOE
40 CFR Parts 260 through 280	Hazardous Waste Regulations	EPA
40 CFR Part 259	Standards for the Tracking and Management of Medical Waste	EPA
California Health and Safety Code, Chapter 6.5, Division 20	California Hazardous Waste Control Act	DHS
California Health and Safety Code, Chapter 6.7, Division 20	Underground Storage of Hazardous Materials	DHS

TABLE 3-6 (Continued)
LIST OF APPLICABLE WASTE MANAGEMENT
REGULATIONS/REQUIREMENTS/GUIDELINES

<u>Regulations/ Requirements/ Guidelines</u>	<u>Sections/Title</u>	<u>Authority</u>
CAC Title 22	California Hazardous Waste Management Regulations	DHS
CAC Title 23	California Underground Tank Regulations	DHS
CCR Title 14	California Solid Waste Management Regulations	DHS

The State of California has extensive regulatory requirements for hazardous waste minimization programs. Compared to Federal and DOE requirements, they are extremely prescriptive and detailed. Hazardous Waste Source Reduction Reviews and plans and a Hazardous Waste Management Performance report are to be prepared and submitted by September 1991. Detailed waste minimization plans are also required by DOE and the East Bay Municipal Utilities District (EBMUD). The waste minimization plan prepared by LBL and submitted to DOE in March 1990 in response to DOE Order 5400.1 lacked essential detail and was not in compliance with DOE requirements. The waste minimization plan required by EBMUD was not prepared at the time of the Tiger Team Assessment. Additionally, funds had not been allocated to prepare the plans required by California and to provide the essential detail for the DOE waste minimization plan.

RCRA Part B Permit

Although DHS has lost RCRA primacy, it is serving as a permitting agent for EPA, with EPA retaining responsibility for final approval authority related to permitting under the Federal program. Currently LBL is operating under the terms of an expired RCRA Part B permit, with the approval of EPA and DHS. LBL has submitted a renewal RCRA permit application to California for the Hazardous Waste Handling Facility (HWHF), including Buildings 75A, 75, and 69 and the yard areas. Included in the permit application is a proposed new hazardous waste treatment and storage facility to replace the Building 85 and associated yard areas. Also included in this application is a waste coolant treatment process located at Building 77. LBL has submitted a separate RCRA Part B permit application for the Building 77 Wastewater Pretreatment Unit, which is totally independent of the Building 77 waste coolant treatment process. Permitting of the units in Building 77 is required only under California hazardous waste regulations.

The permitting process for the LBL Part B permit has been ongoing since 1987. LBL has received three series of Notices of Deficiency (NODs) from DHS. The initial permit application and responses to NODs did not fully address permit information requirements and NOD information requests. However, recently the quality of NOD response has improved (I-WM-37). DHS has a policy whereby DHS has the right to terminate the application process and revoke permitted facility status after three or more series of NODs. This policy is applied where the DHS believes the applicant to be nonresponsive. If the permitted facility status of the HWHF were terminated, onsite storage for hazardous and mixed wastes would be limited to 90 days.

California currently anticipates issuing the RCRA permits during this calendar year (I-WM-37). This schedule is based on the assumption that issues surrounding corrective actions for solid waste management units (SWMUs) are resolved. Under EPA and California hazardous waste regulations, Part B applications must contain a list of SWMUs. Corrective actions for any releases from SWMUs are to be specified in the permit along with compliance schedules. LBL has not yet prepared a list of SWMUs at the site, but has been requested to prepare this list by California. In the normal process, California is responsible for conducting a RCRA facility assessment of LBL for SWMUs as part of the permitting process. However, California has told the site it is willing to accelerate the facility assessment process if LBL proposes a corrective action program for SWMUs meeting the objectives of EPA requirements. Such a program includes, at a minimum, the following: scope,

timetable, areas of investigation, sampling and analysis points (at least preliminary) and criteria for decisions. LBL is currently not able to supply this information.

Solid, Nonradioactive, and Nonhazardous Wastes

Solid, nonradioactive, and nonhazardous waste generated at LBL include sanitary wastes, laboratory and shop area trash, scrap metals, cafeteria waste, and construction and demolition debris.

LBL has a contract with UCB for pick-up and removal of the Laboratory's nonhazardous, nonradioactive, and solid wastes. Construction and demolition debris is handled by construction subcontractors. Solid wastes are collected at various locations throughout LBL in both 2-cubic-yard dumpsters and 20-cubic-yard boxes. Metal scrap generated from machining operations and unusable equipment with scrap metal value are collected in a central salvage yard and are sold as scrap. The UCB uses their own equipment to collect waste from the 2-cubic-yard dumpsters and transports it to Cojido Recycling Services where it is sorted. The trash yields at least 70 percent recyclables; the remaining 30 is percent sent to a landfill (I-WM-74). Oakland Scavenger, under contract to UCB, collects the trash from the 20-cubic-yard boxes and transports the waste to a sanitary landfill. UCB is currently developing an agreement with Cojido Recycling Services to accept trash from the 20-cubic-yard boxes for recycling. LBL's construction subcontractor, C. Overaa and Company, has a contract with Richmond Sanitary for disposal of construction wastes from the Advanced Light Source.

Hazardous Wastes

The laboratory research and development activities at LBL result in the generation of relatively small quantities (often lab-pack quantities) of a large variety of hazardous wastes. The Materials Chemistry and Science Division (MCSD), which conducts research on materials (e.g., plastics, metals, and ceramics), generates organic solvent wastes, chemical reagent wastes, ceramic materials, heavy metals, and other liquid and solid wastes. The Applied Sciences Division generates similar types of wastes. Particle accelerator facilities generate waste from cleaning solutions, organic solvents and solid chemical wastes. The Engineering Division operates shops that generate solid metallic (lead, chromium, and cadmium) wastes, waste oils, spent solvents and residual chemsol chemical (water-soluble machine lubricant), and oil/solvent-contaminated rags. The plating shop and circuit board manufacturing activities generate waste echants, acids, and solvents, which generate a hazardous waste sludge when treated. The Biological Sciences Division generates solvent wastes, solid chemical wastes, and infectious waste. Administrative Services generates solvents, waste machine oils, and motor oils from shops or motor pool activities.

Hazardous wastes at LBL are usually accumulated in satellite accumulation areas (SAAs), transferred to 90-day waste storage areas (WAAs), and then transported to the HWHF or directly from the SAAs to the HWHF. Compliance of generators with storage requirements is not good as evidenced by the findings on generator storage. LBL has retained a contractor, United States Pollution Control, Inc. (USPCI), to transport wastes from the generator to the HWHF and to package wastes for shipment to offsite commercial treatment and disposal facilities.

Activities taking place at HWHF consist of waste receipt, storage, treatment, packaging, and shipment. The existing facility consists of several indoor and outdoor handling and storage areas. Hazardous waste consolidation takes place at Building 75 and associated safety-type storage buildings located in the Building 75 yard. Laboratory packing and a bench scale hazardous waste treatment operation (Room 131) and mixed waste treatment (Room 127) also take place. Building 69 has a flammable and combustible waste container storage area and an adjacent underground storage tank (UST) holding waste oil. The HWHF yard is used for loading, unloading, and waste staging.

The existing HWHF will be replaced by a new facility (Building 85), which will consolidate hazardous waste handling activities into one building and associated yard. The first floor of Building 85 will have areas for storage, compaction, staging, and chemical treatment; the second floor will also have chemical treatment areas and space for mixed waste treatment. The Building 85 yard will be used for loading and unloading, hazardous waste storage, and waste oil storage in underground storage tanks.

Infectious wastes, which are California hazardous wastes, are subject to a special set of requirements and are generated at several biomedical research laboratories throughout the facility. Sharps are collected in special containers and infectious waste is autoclaved. LBL has a contract with Integrated Environmental Systems (IES) for disposal of infectious waste, including sharps and nonradioactive animal carcasses. IES collects the waste for incineration on a weekly basis. It should be noted that IES is allowed by regulations to collect the waste whether or not it has been autoclaved.

Radioactive Wastes

LBL generates low-level radioactive wastes, including absorbed tritium, scintillation vials, compactible solids, noncompactible solids, liquid wastes, induced metals, and animal carcasses. Liquid low-level wastes are generated primarily from the biological laboratories. Low-level solid wastes are generated at laboratories throughout LBL. Practically all tritium waste is generated by the National Tritium Labeling Facility (NTLF), with small quantities generated at the biomedical facilities.

Low-level wastes are moved to the HWHF for storage and treatment. Liquid wastes are analyzed for organics, heavy metals, and activity, and then solidified. Solid low-level wastes are compacted if less than 4" x 4" x 4" in size; although the compactor is currently not being operated until safety deficiencies are corrected. Scintillation vials are crushed in a vial crusher to separate the solids from the liquids. Liquids are collected in drums and shipped offsite for incineration if below 15 mCi/gram. The nonhazardous solids are disposed of as trash. Radioactive waste carcasses are kept in freezers until ready to be shipped to DOE's Hanford Site for disposal.

Induced metal waste (self-contained metals made radioactive by bombardment with neutrons or charged particles in accelerators) are volume-reduced at the HWHF prior to shipment to the Hanford Site for disposal. LBL uses the Hanford Site for disposal of low-level radioactive waste, but will not be able to ship any more low-level wastes there until a Low-Level Waste Certification Plan is prepared. Preparation of the plan is currently a low priority because LBL has no immediate need to ship wastes due to the low inventory of radioactive wastes in storage.

Mixed Wastes

LBL generates solid and liquid mixed wastes, all of which are sent to the HWHF for treatment and storage in Building 75A and Building 75, Room 127. Solid compactible mixed wastes consist of laboratory equipment contaminated with radioactive and hazardous substances. Solids of less than 4" x 4" x 4" in size are compacted. The compactor is currently out of use until ventilation and interlock deficiencies can be corrected. Noncompactible solid mixed wastes would typically be lead shielding, which is stored in Building 75A. Aqueous inorganic mixed wastes (usually corrosive and/or metal-containing) are treated at Building 75A by neutralization and/or precipitation, then solidified. Liquid organic mixed wastes are placed into 55-gallon drums with absorbent.

Currently, LBL only generates two to three drums of compactible solid, liquid, and organic mixed wastes annually. Larger quantities may at times be generated due to decontamination and decommissioning activities.

LBL currently has an inventory of 35 drums of mixed wastes in storage at Building 75A. Eighteen of these drums contain mixed waste scintillation organic solvents. These scintillation solvents are no longer generated since LBL now uses nonhazardous scintillation solvents. The remaining drums contain a variety of dry and liquid mixed wastes. The contents of these mixed waste drums have not been well characterized. To eventually ship these mixed wastes to disposal facilities, LBL will have to characterize them. EPA's land disposal restrictions prohibiting storage apply to the mixed waste scintillation solvents and possibly to the contents of some of the other mixed waste containers. However, since there is no treatment capacity available for these mixed waste solvents, LBL must continue to store them.

LBL generates small quantities of transuranic (TRU) wastes. Currently, only two drums representing 20 years of accumulation are in storage. The radioactive constituents are present in trace quantities. TRU wastes are stored as dry salt crystals and oxide solids, in laboratory glassware and metals capsules. The TRU wastes will be shipped to the Hanford Site for interim storage until final disposal at the Waste Isolation Pilot Plant (WIPP), once a Certification Plan is prepared.

Underground Storage Tanks

The LBL facility has 14 USTs that contain petroleum products (gasoline and diesel) and waste oil. Eight USTs are new double-walled tanks; six USTs are existing single-walled tanks. The Environment and Safety Hazards Control Department (ESHC), Construction and Maintenance Department (C&M), and the Plant Engineering Division share the responsibility for UST oversight. ESHC is responsible for obtaining local permits, submittal of quarterly reports to the City of Berkeley, and release reporting requirements. C&M responsibilities include sampling/monitoring of USTs and the corresponding documentation and repair work oversight. The Plant Engineering Division plans tank removals/closures and tank replacement/upgrading/repair work.

Waste Management Program Evaluation

Effective waste management programs have several key elements, including planning, procedures, training, and oversight. The waste management program at LBL is deficient in these key elements.

A formal program for developing, implementing, and controlling procedures governing the management of hazardous, radioactive, and mixed wastes from generation through final disposition is only partially in place. Waste generators have not been provided with comprehensive procedures for characterization and storage of wastes. Procedures for use in the HWHF are being drafted, but are not yet finalized.

The training program for generators and handlers of radioactive, hazardous, and mixed wastes at LBL is fragmented, uncoordinated, and not well documented. The site lacks a comprehensive program to identify personnel requiring training, establish training needs for these personnel, and ensure that effective training is received. Several training courses have been offered to hazardous waste generators on a voluntary basis. However, the contents of the courses are not adequate to effectively train generators in waste characterization and storage requirements. Radioactive waste training for generators is folded into regular radioactive (personnel protection) training. Training needs for handlers of hazardous, radioactive, and mixed waste have not been determined based on a job and task analysis. There is no ongoing program for training needs assessment in place to identify new training requirements as waste management requirements and practices change.

Effective oversight of waste management activities does not take place at LBL. The site has only recently established a group for conducting internal oversight within LBL. SAN oversight of LBL waste management activities at the generator level has not taken place.

Summary of Tiger Team Findings

Compliance findings at LBL were related to noncompliance with regulatory requirements for generator accumulation areas, land disposal restriction notifications and certifications not in compliance with requirements, noncompliance with land disposal restriction storage prohibitions, inadequate training of waste generators and handlers, inadequate waste characterization, deficiencies in inspections of hazardous waste facilities and forms, deficiencies in waste minimization programs, noncompliance with DOE Order 5820.2A requirements, lack of effective oversight by SAN and LBL, lack of laboratory closeout procedures, lack of a comprehensive waste tracking system, secondary containment deficiencies at HWHF, lack of underground storage tank response plans and hazardous waste contingency plans, and recordkeeping deficiencies.

Best management practice findings included failure to have unique labels for radioactive and mixed wastes, lack of documentation for oversight of commercial hazardous and radioactive waste management facilities, and lack of waste management procedures.

Self-Assessment Evaluation

The findings in the LBL Self-Assessment do not demonstrate that the site conducted a comprehensive self-assessment that resulted in a complete understanding of deficiencies in the waste management program at LBL. This is illustrated by the fact that only 7 of the 18 waste management compliance findings on LBL were fully addressed in the LBL Self-Assessment. Four findings on LBL were not addressed at all, while seven were partially addressed.

3.5.4.2 Compliance Findings

FINDING WM/CF-1: Inadequate Training for Generators and Handlers of Hazardous, Radioactive, and Mixed Wastes

Performance Objective

California Hazardous Waste Management Regulations, Title 22, Article 18, Section 67105 require hazardous waste facility personnel to complete a program of classroom instruction or on-the-job training (OJT) that teaches them to perform their duties in a way that ensures the facility's compliance with hazardous waste requirements.

40 CFR Section 262.34(a)(4) "Hazardous Waste Regulations," requires facility personnel responsible for 90-day storage areas to be trained to manage the facility in compliance with regulations.

Implementation Guidance for DOE Order 5400.1, "Waste Minimization Plan," requires that waste minimization training plans be instituted for all employees.

DOE Order 5480.19, "Conduct of Operations Requirements for DOE Facilities," requires OJT programs to identify specific items the trainee must accomplish, documentation of qualification programs, and completion and documentation of OJT requirements and tests.

OJT is a systematic approach to training that is based on tasks and the related knowledge and skills required for competent job performance. The trainee's knowledge and skills should be evaluated using checklists based on an analysis of the job and its tasks.

Finding

Generators and waste management personnel have not been adequately trained in characterization and management of hazardous, radioactive, and mixed wastes. Formal OJT programs based on job task analysis have not been established for Hazardous Waste Handling Facility personnel.

Discussion

Some training was made available to waste generators; however, it was voluntary (I-WM-114). As a result, many generators have not received the training. Job task analysis and development of performance-based checklists have not been conducted for personnel handling radioactive, mixed, and hazardous wastes at the hazardous and radioactive waste storage and treatment facilities at LBL.

The content of hazardous waste generator training that was provided was not adequate to enable generators to identify and manage hazardous wastes properly (0302, 0311, 0303, 0328, 0283, and 0304). The need for effective hazardous waste generator training was demonstrated by the overall lack of understanding and compliance with regulatory requirements for satellite and 90-day container storage areas (see Finding WM/CF-10).

Specific training for radioactive waste generators is not provided. Training for radioactive waste generators is included in general training on radioactivity. Documentation of the contents of the waste-related training given to generators of radioactive waste was not available (I-WM-122).

Personnel responsible for managing 90-day areas according to Federal regulations are required to be trained. LBL has identified fourteen 90-day storage areas (0283). Facility personnel responsible for these areas were not trained in accordance with RCRA requirements.

LBL ships its low-level waste to the Hanford Site for disposal. Currently, the Hanford Site is not accepting land disposal restricted mixed wastes. LBL must certify that low-level wastes are not land disposal restricted mixed wastes. Radioactive waste handlers making the certification rely on constituent information, provided by the generator, on the tag attached to each container. Radioactive waste generators are not trained to identify the California and Washington hazardous portions of mixed wastes (I-WM-122).

Detailed analysis of jobs, tasks, and related knowledge and skills required for OJT have not been conducted for jobs involving handling of radioactive and hazardous waste (I-WM-122). Performance-based checklists for evaluation of job skills have not been established. Currently, personnel handling hazardous and radioactive waste are experienced; however, in the event that any of the experienced personnel leave the department or additional personnel are brought into the program, formal OJT training programs are not yet established to train them (I-WM-122).

Also, LBL has not developed a comprehensive program that includes procedures for identifying personnel requiring training in hazardous, radioactive, and mixed waste characterization and handling, required training, and effective recordkeeping requirements.

The site was aware of this finding, and it was included in the LBL Self-Assessment.

The apparent causes of this finding are failure to implement policy, failure to provide adequate training, and lack of adequate resources.

FINDING WM/CF-2:**Lack of an Effective Waste Tracking System****Performance Objective**

EPA hazardous waste regulations in 40 CFR Sections 264.73 and 265.73 and California Hazardous Waste Management Regulations, Title 22, Article 21, Section 67163 require that interim status and permitted facilities have an operating record, including descriptions of the quantity of wastes received, methods and dates of storage and/or treatment, location and quantities of hazardous waste within the facility, and waste analysis records. DOE Order 5820.2A "Radioactive Waste Management," requires that generators of low-level radioactive waste develop auditable waste generation reduction programs and that records be maintained of all wastes entering and leaving low-level radioactive waste storage facilities.

Implementation guidance for DOE Order 5400.1, "Waste Minimization Plan," states that types, amounts, and hazardous and radioactive constituents of wastes should be tracked over time by a computerized waste tracking system. Such a system tracks waste generation, treatment, storage, and disposal data to track costs, generate shipping manifests, provide information in support of RCRA reporting requirements, and charge individual generators within the facility for costs of waste management.

Compliance with these requirements results in a need for a system that results in data being readily retrievable, available and auditable for waste from cradle to grave.

Finding

LBL lacks an effective waste tracking system to inventory and track wastes so that accurate records of their quantities, types, constituents, and locations of wastes are readily available.

Discussion

LBL currently uses a manual system for tracking all hazardous, radioactive, and mixed wastes, including those which are composited and/or compacted. This system is largely ineffective due to the variety, volume, and sources of generated wastes. In addition, the procedures for handling radioactive wastes make it difficult to track the point of generation. For example, generators prepare a tag for each container of radioactive waste. When waste handlers collect these containers, they often pour the contents from a generator container into a larger container. The tag for each container whose contents were placed into the larger container is retained in a plastic bag. A similar system is used for containers composited into one container for compaction or solidification. The plastic bags containing the tags for each composite container are stored in a cardboard box. This manual system does not allow easy retrieval of information by generation point to track waste minimization efforts or identify sources of any problems in composited containers. The process to generate and sort data is labor intensive.

Currently, the best information available on hazardous waste generation rates are hazardous waste tax returns. However, this information is not useful for identifying waste generation points.

An effective waste tracking system is also important to implement waste minimization programs. To measure the effectiveness of waste minimization activities, it would be necessary to document current volumes, types, and sources of waste and track the reduction levels as the program progresses. This type of information is required by DOE Headquarters, EPA, and the California Department of Health Services in various reports. The implementation guidance for DOE Order 5400.1 recommends using a computerized waste tracking system. Such a system would also facilitate establishing an auditable low-level waste reduction program as required in DOE Order 5820.2A, which LBL has not yet prepared.

LBL has requested DOE funding to develop a computerized waste tracking system.

The LBL Self-Assessment contains a finding on the need for tracking hazardous chemicals, but does not specifically address the need for tracking hazardous wastes.

The causal factors for this finding include failure to implement policy on effective waste tracking procedures and failure to allocate resources to develop an automated tracking system.

FINDING WM/CF-3:

Deficiencies in Hazardous Waste Inspections

Performance Objective

40 CFR Section 262.34 requires that waste accumulation areas (WAAs) holding containers of hazardous waste be inspected weekly. The California Hazardous Waste Control Act (California Health and Safety Code, Division 20, Chapter 6.5) Article 1, Subsection 25123.3(d)(5) requires that onsite container WAAs and long-term storage areas adhere to certain interim status container facility storage requirements as detailed in California Hazardous Waste Management Regulations, including requirements for weekly inspections of container storage areas and daily inspections of waste loading and unloading areas. California Hazardous Waste Regulations, Title 22, Article 18 outlines general inspection requirements for interim status and permitted facilities, including a checklist identifying types of problems, frequency, notation of problems, and the date and nature of remedial actions taken to correct problems. Similar requirements are contained in 40 CFR Sections 264.15 and 265.15, for permitted facilities and interim status facilities, respectively.

Finding

LBL does not conduct weekly inspections of 90-day container storage areas as required by hazardous waste regulations. Hazardous Waste Inspection Forms currently utilized at the Hazardous Waste Handling Facility (HWHF) do not have checklists of items specific to the particular facility being inspected. Inspection form checklists are not developed for each type of storage area at the HWHF.

Discussion

Ninety-day container storage areas at generator facilities are required to meet a variety of requirements, including weekly inspections. LBL has identified fourteen 90-day WAAs. None of these are being inspected weekly through a documented, formal inspection program.

LBL performs weekly inspections of container storage areas at HWHF; however, the inspection program has several deficiencies. Until January 1991, the inspection form used did not have a checklist of items to be inspected (0336). Thus, there was no evidence that a particular item had been evaluated. Additionally, the form did not contain space for documenting the date and method of correcting deficiencies observed during inspection deficiencies.

In January 1991, LBL switched to a new form for inspections at HWHF. The new checklist lists items to be inspected (0326). However, one form is used for evaluating all facilities at HWHF, and that form does not take into account different inspection requirements for the various facilities. For example, drums of flammable wastes stored in the flammable storage area are grounded. Inspections should include checking to ensure that grounding clips are properly secured to drums of flammables. In the staging area, containers holding liquids are usually placed in secondary containment because the staging area does not have secondary containment and has a cracked surface. A checklist item specific to this area would include checking to ensure that liquid containers are in secondary containment. The inspection checklist did not include these items.

One inspection record is kept for all the HWHF facilities. This form does not provide for any written documentation that all facilities had in fact been inspected. Nor are there any specific checklists for operations conducted by LBL's subcontractors handling hazardous waste, e.g., United States Pollution Control, Inc. Also, the form does not contain a space for describing deficiencies or the method and date of deficiency correction.

The site is also conducting daily inspections at the HWHF using a daily checklist form (0336). This form describes only limited items to be checked.

The site was partially aware of these findings, and the findings were partially addressed in the LBL Self-Assessment.

The causes of this finding are failure to be aware of regulatory requirements (training), failure of leadership at the division level, and failure to develop and implement procedures and policy.

FINDING WM/CF-4:**Deficiencies in Development and Implementation of Waste Minimization Plans****Performance Objective**

The California Hazardous Waste Control Act (CHWCA) (California Health and Safety Code, Division 20, Chapter 6.5), Article 11.9, Subsection 25244.19 requires hazardous waste generators to prepare a source reduction evaluation review and plan by September 1991. This plan must identify all routinely generated hazardous waste streams having a yearly volume exceeding 5 percent of the total annual waste volume; evaluate sources, viable source reduction techniques, and specification and rationale for source reduction measures to be taken by the generator for each waste stream; evaluate the effects of chosen source reduction methods on emissions to the environment, and include a timetable. A performance report for each waste stream, including the effects of hazardous waste management measures, generation rate estimates, factors effecting generation rate and waste management, is also due by September 1991 for 1990.

In the June 12, 1989 Federal Register (54 FR 25056) "Draft Guidance to Hazardous Waste Generators on the Elements of a Waste Minimization Program," EPA provides guidance on the form and content of an effective waste minimization program.

Implementation guidance for DOE Order 5400.1, "Waste Minimization Plan," states that the guidance applies to all radioactive (i.e., low-level, high-level, and transuranic), radioactive mixed, RCRA-regulated hazardous, and non-RCRA California hazardous waste generated by DOE facilities. DOE facilities were required to file waste minimization program plans containing program details in May 1990. The plan should include the following elements: (1) top management support; (2) employee training and awareness; (3) explicit program scopes, objectives, and numerical goals; (4) periodic waste minimization assessments and audits; (5) accurate cost accounting; (6) accurate waste accounting; (7) technology transfer; and (8) program evaluation.

The East Bay Municipal Utility District (EBMUD) requires as part of their permitting process that dischargers conduct waste minimization studies for facilities releasing industrial wastewater in sanitary lines.

Finding

LBL cannot meet the waste minimization requirements of CHWCA. LBL has not developed a waste minimization program plan to meet the requirements of the stated performance objectives.

Discussion

The State of California has stringent statutory requirements for the development and implementation of waste minimization plans. As described in the Performance Objective, detailed studies and evaluations of hazardous waste generation processes and source reduction technique evaluations must be made and a performance report prepared by September 1991 (CHWCA, Article 11.9, Subsection 25244.19). The funding requirement for this activity was identified in an Activity Data Sheet (ADS) prepared by LBL and submitted by SAN to DOE-Headquarters (0344). This project was identified as Priority 3

based on RCRA Part B permit and DOE Orders 5400.1 and 5820.2A requiring development and maintenance of an effective waste minimization program. The statutory requirements of Article 11.9, Subsection 25244.19, which would dictate a higher priority, were not discussed. Requested funding amounted to \$225,000; however, the funding provided was \$25,000. This funding is not adequate to allow LBL to comply with the California statutory requirements on waste minimization. LBL requested in a letter dated January 10, 1991, that DOE restore funding for waste minimization activities (0339); however, this letter did not specifically discuss the CHWCA deadline of September 1991.

EBMUD also adds to the regulatory burden of required waste minimization plans (0342). LBL is required to submit, by March 1, 1991, a Waste Minimization Opportunity Assessment Report containing an audit and plan for reducing pollutants released in discharges or emissions to wastewater, sludge, or air. This report is part of the wastewater discharge permit required by EBMUD, and, at a minimum, it must address measurable pollutants in the wastewater discharge.

DOE Order 5400.1 requires each DOE facility to have submitted a waste minimization/waste reduction program plan by May 1990. Implementation guidance was published by DOE directing DOE facilities in the preparation of these plans. LBL submitted a Waste Minimization Plan to DOE that was described as an interim plan, which they acknowledge to be incomplete, in response to SAN comments on the lack of essential detail (0063). LBL stated that it would develop a comprehensive plan by September 30, 1991 (0063).

During the inspection of Building 88, containers for low-level radioactive trash were present in areas when radioactive wastes were no longer generated (I-WM-112) and being used for nonradioactive waste. Once nonradioactive trash is placed in this container, it must be handled as radioactive waste, adding to rather than minimizing radioactive waste. During the assessment, LBL removed radioactive waste cans from all areas in Building 88 where radioactive waste is no longer generated (0312).

Machine shops generating metal shavings and turnings are located throughout LBL. The shavings and turnings were discarded as general trash in most of the satellite shops. In the machine shop where the largest volumes are generated, borings and turnings are generally recycled. However, LBL does not have a written procedure to require segregation and recycling of metal shavings and turnings on a sitewide basis.

Trash collected in 20-cubic-yard boxes is transported to a sanitary landfill for disposal, whereas trash collected in 2-cubic-yard dumpsters is transported to a recycler who recycles 70 percent of the trash. LBL intends to recycle the waste from these boxes in the future.

LBL does not have a comprehensive automated waste tracking system. The current manual tracking system is cumbersome, and it is difficult to track waste generation rates by generation point and/or activity (see Finding WM/CF-2).

Another key aspect of effective waste minimization programs identified by both DOE and EPA guidance is training of waste generators to characterize waste and to use waste minimization techniques. LBL does not adequately train

generators in characterizing wastes or waste minimization techniques (see Finding WM/CF-1).

Accurate cost accounting for each waste management activity is considered necessary to develop cost allocation charge-back systems for waste generators. In the absence of an efficient tracking system, it is difficult to accurately allocate costs of waste management.

The site was aware of these findings. However, they were only partially addressed in the LBL Self-Assessment. The requirements for California and EBMUD minimization plans were not covered.

The causes of this finding are failure to implement policy and requirements as described in DOE Orders and state regulations and lack of allocated resources.

FINDING WM/CF-5:**Lack of Generator Waste Certification Plans for Low-Level and Transuranic Radioactive Wastes****Performance Objective**

DOE Order 5820.2A, "Radioactive Waste Management," requires that DOE generators of transuranic (TRU), and low-level radioactive (including mixed) waste develop and implement Waste Certification Plans.

Finding

LBL has not developed and implemented low-level radioactive and mixed waste certification plans.

Discussion

To ship radioactive, mixed, TRU, and TRU-mixed wastes to offsite facilities, LBL is required both by DOE Orders and/or receiving facilities to develop certification plans. These plans are needed to ensure that the Waste Acceptance Criteria of the receiving facility are met. Generally, the goal of a certification plan is to ensure that physical and chemical parameters as well as the major radionuclides are known during all stages of the waste management process.

LBL ships its low-level radioactive wastes to the Hanford Site. The Hanford Site will not accept additional low-level wastes from LBL until LBL prepares a low-level waste certification plan. Preparation of the plan is currently a low priority at LBL due to manpower restrictions (I-WM-122). LBL currently has a low inventory of low-level radioactive wastes because all low-level radioactive wastes were shipped out last year prior Hanford informing LBL that low-level waste would not be accepted in the future until a certification plan was developed and approved. Due to the low priority of the certification plan preparation, the site cannot demonstrate that the plan will be prepared before the existing storage capacity is exceeded.

The site currently has an inventory of mixed waste drums which are not certified. It will be necessary to examine in detail the contents of each drum to determine the chemical and physical parameters and the major radionuclide content of each waste item contained in the drum.

LBL does not intend to prepare a TRU waste certification plan due to the small quantity of waste involved (two drums representing 20 years of accumulation). The Hanford Site has been requested by LBL to prepare a suitable plan for the current inventory of wastes. However, DOE has not yet decided if it will allow LBL to have a third party certify its wastes. SAN may require LBL to prepare its own plan.

Development and implementation of certification plans for mixed wastes will require training of generators in Washington State hazardous waste identification requirements. The universe of wastes considered hazardous by Washington is broader than that considered hazardous by EPA. Certification plans will have to ensure that wastes are properly characterized according to Washington State requirements from generation throughout the waste management process. This will result in training requirements for low-level waste

generators in waste characterization. Low-level waste generators are currently not trained in waste characterization (see Finding WM/CF-1).

The site was aware of this finding; however, it was not included in the LBL Self-Assessment.

The cause of this finding is failure to implement DOE policy, lack of training for waste generators, and failure to allocate necessary resources.

FINDING WM/CF-6:**Lack of Implementation of DOE Order 5820.2A Requirements****Performance Objective**

DOE Order 5820.2A, "Radioactive Waste Management," establishes policies, guidelines, and minimum requirements for the management of radioactive and mixed waste facilities. Specific requirements are spelled out for the management of high-level, low-level, and transuranic (TRU) waste as well as mixed wastes. Management of low-level waste containing naturally occurring and accelerator-produced radioactive material and materials from the decommissioning of radioactively contaminated facilities are also included in the Order. TRU and low-level wastes are subject to Resource Conservation and Recovery Act regulations if they contain hazardous wastes and/or constituents. DOE facilities are required to prepare an Implementation Plan describing the site's compliance status with regard to DOE Order 5820.2A requirements, including a schedule of compliance dates and estimated costs for compliance activities in an Implementation Summary Table that will be updated annually.

Finding

LBL is not in compliance with DOE Order 5820.2A requirements. The annual update to the Implementation Plan has not been completed. The Implementation Summary Table did not identify all deficiencies to DOE Order 5820.2A requirements.

Discussion

The Implementation Summary Table prepared by LBL identified the following deficiencies:

- There is no TRU Waste Certification Program at LBL.
- There is no TRU waste packaging program to meet Waste Isolation Pilot Plant (WIPP) requirements.
- The existing waste reduction program is not fully auditable.
- Waste certification activities are not clearly identified in existing waste management activities.
- Existing sampling programs do not meet requirements.
- Elements of required records are missing.

Other deficiencies identified by the Tiger Team regarding DOE Order 5820.2A include

- the Implementation Summary Table did not include a schedule for the management of low-level wastes accumulated at the time DOE Order 5820.2A became effective,
- technical and administrative controls are not adequate for reducing the gross volume of radioactive waste generated and/or the amount of radioactivity (see Finding WM/CF-4),

- a low-level waste certification plan has not been developed (see Finding WM/CF-5), and
- actual physical and chemical characteristics and major radionuclides concentrations are not known during all stages of the waste management process.

DOE facilities are required to prepare an annual update to the Implementation Plan. The first plan, issued in March 1989 (0057), has not been updated.

The site was partially aware of this finding; however, this finding was not discussed in the LBL Self-Assessment.

The causes of this finding are failure to follow procedures incorporated by reference to DOE Order 5820.2A and failure to implement DOE policy.

FINDING WM/CF-7:**Lack of a Comprehensive Waste Characterization Program****Performance Objective**

California Hazardous Waste Regulations, Title 22, Article 6, Section 66471 require that generators of solid waste determine if the generated waste is a listed hazardous waste and/or if the waste is a characteristic hazardous waste. 40 CFR 262.11 has the same requirements with an additional requirement that wastes that are determined to be hazardous must be evaluated for applicable land disposal restrictions.

DOE Order 5820.2A, "Radioactive Waste Management," potentially requires that low-level wastes be characterized so that the actual physical and chemical characteristics and major radionuclides content of wastes are known through all stages of waste management. Low-level waste certification programs are required to ensure that the waste acceptance criteria of receiving facilities are met.

Finding

LBL does not have a comprehensive waste characterization program in place to ensure that accurate and reliable information is being used to properly characterize the physical and chemical composition of radioactive, hazardous, and mixed wastes.

Discussion

Wastes at LBL are typically characterized for hazardous and radioactive constituents using process knowledge supplied by generators. However, the information supplied by generators may not always be adequate to fully characterize waste as required by the applicable Federal and state regulations and DOE Orders. The inability of the generator to properly characterize the waste is due to lack of guidance, procedures, training, documentation, and quality assurance procedures.

Examples of deficiencies in the waste characterization program at LBL include the following:

- No information was available to determine if the sandblasting wastes at the Building 77 Paint Shop had been characterized for hazardous constituents prior to being sent to a sanitary landfill offsite (I-WM-104).
- Organic waste materials are collected in various laboratories in cans labeled organic wastes. The actual constituents of the organic wastes were not identified, leading to the potential combining of hazardous and nonhazardous wastes.
- Solvent contaminated rags are handled as nonhazardous at Buildings 16 and 88.
- There are noncharacterized radioactive sludges in tanks at site ENV-74. If hazardous, these tanks are subject to interim status and permitting regulations.

- LBL currently has an inventory of mixed wastes which have not been adequately characterized for hazardous constituents in conformance with disposal site (Hanford Site) waste acceptance criteria.
- The Hazardous Waste Handling Facility (HWHF) will accept only containers properly labeled with information supplied by the generator on its contents. However, there is no program established to verify that the information supplied by generators is correct (e.g., sampling and analyses by HWHF).

The characterization of radioactive wastes is wholly dependent on the information provided by the generators on the labeled radioactive waste containers. However, LBL has not provided sitewide guidance to waste generators for adequately characterizing radioactive and hazardous constituents in wastes. In addition, training on identifying hazardous, mixed, and radioactive wastes has not been provided to generators. The complexity of California and Washington State hazardous waste characterization requirements increases the potential for mis-characterized wastes in the absence of guidance and training. (See Findings WM/CF-5 on certification, WM/CF-1 on training, and WM/BMPF-3 on procedures.)

The site was aware of this finding. It was included in the LBL Self-Assessment.

The causes of this finding are lack of policy implementation, lack of training to implement policy, and lack of procedures to implement policy.

FINDING WM/CF-8:

**Deficiencies in Secondary Containment of the
Hazardous Waste Handling Facility**

Performance Objective

40 CFR Section 264.175, "Hazardous Waste Regulations," and California Hazardous Waste Regulations, Title 22, Article 24, Section 67245 require that container storage areas in permitted facilities have a containment system, including a base underlying the container that is free of gaps or cracks and is sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed. The base should be designed to drain and to remove liquids resulting from leaks, spills, or precipitation.

Finding

The container staging area at the Hazardous Waste Handling Facility lacks a containment system. The surface is not impervious and has cracks, and a system is not in place to drain and remove liquids resulting from leaks, spills, or precipitation.

Discussion

Containers of hazardous waste, including containers holding liquids, are unloaded at a staging area before being moved to long-term storage areas or shipped to offsite facilities. Since the staging area lacks a containment system and the surface is not coated with impervious materials and has cracks, portable secondary containment must be used. However, portable secondary containment has not always been available; therefore, containers have occasionally been stored in the staging area on surfaces that are not impervious to spills without secondary containment. Additionally, there is no system in place at the staging area to drain and remove liquids resulting from leaks, spills, or precipitation.

Spills or leaks from this area might permeate through the cracks and contaminate the subsurface.

The site was aware of this deficiency, and the finding was included in the LBL Self-Assessment.

The causes of this finding are failure to provide proper barriers or controls and failure to consistently implement procedures.

FINDING WM/CF-9:**Lack of an Underground Storage Tank Response Plan****Performance Objective**

The California Underground Storage Tank Regulations (California Administrative Code, Title 23) require that a response plan be developed for new underground storage tanks (USTs) that contain hazardous substances and/or petroleum products. Specifically, Article 3, Subsection 2634(e) requires that a response plan be developed for new petroleum USTs that meet the volumetric requirements in Subsections 2631(e), (f), and (g) in accordance with Subsection 2632(d)(2). The response plan must demonstrate that released material will be removed from the secondary container within the shortest time possible and no longer than the time consistent with the ability of the secondary container to contain the hazardous substance. At a minimum, the response plan must include the following:

- a description of the proposed methods and equipment to be used for removing the hazardous substance, and
- the name(s) or title(s) of persons responsible for authorizing work to be performed.

Finding

LBL does not have an adequate response plan for new USTs that contain petroleum products and does not meet the volumetric requirements in Article 3, Subsection 2634(e).

Discussion

LBL has eight new USTs that contain petroleum products, all of which meet the volumetric requirements in Article 3, Subsections 2631(e), (f), and (g). The facility has a general response plan for hazardous material spills (0284) that addresses spill control methods such as containment, diking, and flushing. However, the plan does not address the specific items required by Subsection 2632(d), such as how the released material will be removed from the secondary UST container, and it does not contain the name(s) or title(s) of persons responsible for authorizing work to be performed.

The Environment and Safety Hazards Control, and the Construction and Maintenance Departments were unaware that such a requirement existed (I-WM-40 and I-WM-44). Plant Engineering recently became aware of the requirement for UST response plans (I-WM-62) and is currently developing a management plan which will include an UST response plan. This plan is expected to be completed within the next year (I-WM-62).

This finding did not appear in the LBL Self-Assessment.

Causes of this finding include lack of training in the applicable state regulations and failure of oversight by SAN and LBL. Lack of effective audits contributed by allowing this lack of knowledge by LBL to continue to the point of a potential noncompliance.

FINDING WM/CF-10:

**Inadequate Management of Generator Waste
Accumulation Areas and Satellite Accumulation
Areas**

Performance Objective

EPA Hazardous Waste Regulations 40 CFR Section 262.34(a) and California Hazardous Waste Regulations Title 22, Article 6, Subsection 66508(a) allow generators to store hazardous waste onsite for 90 days or less without a permit, provided certain requirements are met. The hazardous waste may be stored in areas called 90-day waste accumulation areas (WAAs), and the requirements for WAAs include the following:

- Waste is placed in containers or tanks, and the generator complies with the interim status requirements for containers or tanks. Interim status container requirements include: using containers that are in good condition, ensuring the compatibility of the waste with the container, keeping the container closed during storage except when it is necessary to add or remove waste, and conducting weekly inspections of container storage areas.
- The date each accumulation period begins is clearly marked and visible for inspection on each container.
- Each container or tank is labeled or marked clearly with the words "Hazardous Waste".
- The generator has in place a contingency plan and a preparedness and prevention plan, and facility personnel are trained in the proper handling of hazardous waste.

Both Federal and California regulations allow generators to store waste at an initial accumulation point which is at or near the area where the waste is generated and is under the control of the operator of the process generating the waste. These areas are called satellite accumulation areas (SAAs). The California Hazardous Waste Control Act (California Health and Safety Code, Division 20, Chapter 6.5, Subsection 25123.3(d)), being more stringent than the Federal regulations, requires the following:

- the generator can only accumulate a maximum of 55 gallons of hazardous waste, 1 quart of acutely hazardous waste, or 1 quart of extremely hazardous waste at the SAA;
- the waste is accumulated in containers, and the interim status container regulations are complied with;
- the generator does not hold the hazardous waste onsite for more than 1 year from the initial date of accumulation or 90 days from the date the 55-gallon/1-quart limit is exceeded; and
- within 3 days of reaching the quantity limit, the generator labels the container holding the accumulated hazardous waste with the date the quantity limitation was reached and either transports the waste offsite or complies with the regulations for training,

preparedness and prevention, contingency plans, and emergency procedures applicable to storage facilities.

40 CFR Section 262.34(d) and California Hazardous Waste Regulations Title 22, Article 6, Subsection 66508(a)(4) requires large-quantity generators to have in place a contingency plan for their 90-day WAAs. Contingency plans require the generator to develop action plans for emergency situations to minimize hazards to human health or the environment from fires, explosions, or releases of hazardous waste or hazardous waste constituents.

Finding

WAAs and SAAs are not managed in accordance with 40 CFR 262.34 or Title 22, Article 6, Subsection 66508(a). The 90-day generator WAAs inspected at LBL do not have contingency plans in place to meet the requirements in 40 CFR Section 262.34(d) and Title 22, Article 6, Subsection 66508(a)(4).

Note: The UCB WAAs are reported by UCB to have "Working Copy" contingency plans which are being revised by the City of Berkeley before finalization. However, the Tiger Team did not verify this assertion.

Discussion

LBL manages 14 WAAs in Buildings 16, 51, 53, 58, 62/66, 64, 71, 76 (3 WAAs), 77 (2 WAAs), 79, and 88 (0283). The Tiger Team inspected 10 of LBL's 14 WAAs; (those in Buildings 58, 62/66, and 64 were not inspected). All 10 WAAs were not in compliance with the regulations. In two WAAs, containers were stored in excess of 90 days. In Building 77, a drum was observed with the accumulation start date of August 1990; and in Building 51, two drums were observed with accumulation start dates of September 1990. In Building 16, drums in the WAAs were lacking an accumulation start date. Contingency plans were not developed for any of the WAAs. Additionally, none of the WAAs were in complete compliance with the weekly container inspection requirements in 40 CFR 265.174 and Title 22, Article 24, Subsection 67244. The containers were inspected in some of the WAAs; however, no documentation was maintained for these inspections. In other WAAs, weekly inspections were not conducted (see Finding WM/CF-3). At Building 77, two containers had spring-loaded lids that did not shut. Additionally, most of these generators responsible for 90-day areas lacked the training required by 40 CFR 262.34(a)(4) and Title 22, Article 24, Subsection 66508(a)(4) (see Finding WM/CF-1).

SAAs at LBL and UCB (Melvin Calvin and Donner Buildings) were inspected. Many containers without accumulation start dates were observed in SAAs. Examples of noncompliance include SAAs in Building 51 outside Room 17; the Building 88 Machine Shop; Building 74 Rooms 217, 3050, and 31K; and the Melvin Calvin Laboratory. Additionally, the containers in many SAAs were not properly labeled with the words "Hazardous Waste" or with words that identified the contents. Examples of noncompliance include SAAs in the Building 5 Laser Laboratory and in Building 88. At Building 77, containers had spring-loaded lids that did not shut. When employees at the Melvin Calvin Laboratory were questioned as to why a full container in an SAA did not have an accumulation start date, they responded that the container would be dated when the Environment and Safety Hazards Control Department (ESHC) picked it up (I-WM-32).

Contingency plans were not available at any of the WAAs inspected by the Tiger Team. When employees at the WAAs were questioned about emergency procedures, they were unaware that a contingency plan was required (I-WM-11). LBL has prepared a contingency plan (WM-2) for the permitted hazardous waste storage areas at Buildings 69 and 75 and the Building 75 yard. This plan does not mention contingency plan procedures for any of the generator WAAs at LBL. 40 CFR Section 265.52(b) and Title 22, Article 20, Subsection 67141(b) allow the generator to amend either an existing Spill Prevention Control and Countermeasures (SPCC) Plan or another emergency plan to incorporate hazardous waste management provisions for contingency plans. LBL has an SPCC Plan (0046); however, the plan has never been amended to include these additional hazardous waste management provisions.

Laboratory wastes, including solvents, corrosives, and chemicals, are generated in DOE laboratories at UCB. LBL has taken the position that UCB is responsible for environment, safety and health (ES&H) at DOE on the campus, other than the Donner and Melvin Calvin buildings, according to a Memorandum of Understanding (MOU) between LBL and UCB. UCB procedures do require that laboratory containers be labeled to identify their contents, but do not require the date of initial accumulation to be marked on laboratory containers. In addition, UCB does not consider laboratory wastes to be wastes until ESHC has determined that the materials cannot be used and/or recycled. Once a material is determined to be a waste by ESHC, the waste container is dated (I-WM-128).

This interpretation by UCB is contrary to California and EPA regulations whereby wastes are identified as hazardous wastes at the time of generation. As a result, the potential exists that wastes at UCB facilities where DOE activities take place will be accumulated in excess of applicable quantity and/or storage time limits at SAAs, subjecting these areas to the more extensive 90-day storage area requirements. However, LBL has identified the potential problem of laboratory material which could not be reused by the campus exceeding the 1-year satellite accumulation area time limit, and is instituting a tag system for laboratory containers which include of the date of initial accumulation. If containers are not properly labeled as to their contents, the potential exists that incompatible waste may be added to a container. Campus procedures require all chemical containers in laboratories to be labeled; however, the campus does not require laboratory containers used to consolidate chemical wastes (e.g., solvents) to be labeled "Waste." For example, containers must be labeled as solvents, (halogenated or nonhalogenated), etc., to prevent dissimilar materials from being consolidated. The College of Chemistry has recently placed containers in each laboratory for holding chemically-contaminated waste glassware and other material. All such laboratory containers observed were open. While procedures require the glassware to have no liquids, the potential exists for volatile components of hazardous chemicals to be released. The College of Chemistry and ESHC are looking into other stations for collecting laboratory materials.

The LBL Self-Assessment addressed the inadequate management of both the WAAs and SAAs. The failure to update the SPCC Plan was noted in both the SAN Functional Appraisal of LBL (December 1990) and in the LBL Self-Assessment in response to the Treatment, Storage, and Disposal Facility Contingency Plan. However, the LBL Self-Assessment did not address the lack of contingency plans

at generator areas and did not address the issues with waste-storage at the UCB.

Several causal factors contributed to this finding, including lack of training, lack of DOE/LBL oversight, and lack of implementation of policy and regulations. The cause of the finding at UCB DOE laboratories is the inability to implement DOE policy because of the terms of the MOU.

FINDING WM/CF-11:**Inadequate Land Disposal Restriction Notifications****Performance Objective**

The Land Disposal Restrictions (LDR) (40 CFR Part 268) require all offsite shipments of restricted wastes to be accompanied by proper records. If the restricted waste does not meet the applicable treatment standards, the generator (or treatment facility) must send a notification along with the manifest to the treatment facility as required by 40 CFR Section 268.7(a)(1). If the restricted waste does meet the applicable treatment standards, the generator (or treatment facility) must send both a notification and certification along with the manifest to the waste disposal facility as required by 40 CFR Section 268.7(a)(2). In either case, the notification must include corresponding treatment standards and applicable prohibitions (40 CFR Sections 268.7(a)(1)(ii) and 268.7(a)(2)(i)(B)). Prior to May 8, 1990, EPA required all applicable treatment standards to be listed on the notification form sent to the Treatment, Storage, and Disposal Facility (TSDF) (55 FR 22668). The LDR Third Third final rule changed this requirement and now allows the referencing of treatment standards on the notification. The reference must include the EPA hazardous waste number, the subcategory of the waste code, the treatability group, and the Code of Federal Regulation (CFR) sections and paragraphs where the applicable treatment standards appear. However, for wastes on the California list and solvent wastes (F001, F002, F003, F004, and F005), the notification still must list the complete treatment standards.

Finding

LBL land disposal restriction notifications and notifications/certifications required by 40 CFR Sections 268.7(a)(1) and 268.7(a)(2) did not contain the proper information and references.

Discussion

Several problems were observed with the notifications and notifications/certifications on hazardous waste manifests at LBL (WM-4). The Tiger Team reviewed 25 notifications and 2 notifications/certifications. Of the 25 notifications reviewed, only 7 were completed correctly. Of the notifications and notifications/certifications reviewed, the following items were noncompliant. Note that some manifests contained more than one problem.

- Five notifications reviewed were dated between May 8, 1990 and January 1991 and did not contain the information required by 40 CFR 268.7(a)(1)(ii) or 268.7(a)(2)(i)(B), including waste subcategory, treatability group, and CFR sections and paragraphs where treatment standards appear. This information was required on notifications that referenced treatment standards and that were prepared between May 8, 1990 and January 31, 1991. The January 31, 1991 Federal Register (56 FR 3864 has again amended the required information.
- Six manifests for restricted wastes were filed without the accompanying LDR notifications.

- Five notifications did not contain the required manifest number. A UCB shipping document was attached to four of the notifications; however, the required information must still be included in the notification.
- On two notifications, a check mark was not placed on the preprinted form referencing the citations for the wastes' corresponding treatment standards, as required by 40 CFR 268.7(a)(1)(ii).
- Two notifications were missing the EPA Hazardous Waste Number.
- One certification was for a shipment sent in April 1990. LBL did not attach the required notification/certification, but forwarded it to the TSDF in September 1990. The notification was for listed solvent wastes and stated only that the wastes were subject to treatment standards in 40 CFR 268. It listed the individual constituents on why the waste was regulated; however, the treatment standards for each of the solvent constituents were not included. Building 75 employees were not aware that treatment standards for solvent, and California-list wastes could not be referenced on the notification (I-WM-19). Additionally, employees were not aware that treatment standards could not be referenced before May 8, 1990 (I-WM-19).

Of the notifications/certifications reviewed, the following problems were discovered. While these are not compliance-related, they are incorrect and may lead to confusion.

- Two notifications were completed for toxicity characteristic organic wastes (D018, D022, D028, D035, and D038). These wastes are newly identified and are not subject to the land disposal restrictions (55 FR 22660 and 55 FR 22674) or the notification requirements. The purpose of the notification is to inform the TSDF of treatment standards for restricted wastes. These wastes are not yet restricted and do not yet have treatment standards. On one of the notifications, the five-letter incineration treatment code was referenced for D018, D035, and D028 wastes.
- One notification/certification was titled as follows: "Notification of RCRA Waste Subject to LDR" and "Certification of Restricted Wasted Not Meeting Treatment Standards." This is extremely confusing. The purpose of a certification is to document that a waste meets treatment standards and can be land disposed without further treatment. Since the treatment standards had not been met, only a notification should have been provided.

Occasionally, LBL prepares the notification/certification and other times United States Pollution Control, Inc. (USPCI) obtains the preprinted notification forms from the TSDF. In some cases, USPCI is also the TSDF if they transport the waste to their own facility. USPCI fills out the forms on behalf of LBL. LBL makes an effort to review the forms before each shipment, but time does not often permit a proper review (I-WM-63). In those instances, if the forms were inaccurately completed, LBL would not be aware. This is important since the ultimate responsibility for completing the

notification/certification rests with the generator (LBL). In addition, because Building 75 employees did not completely understand the notification/certification requirements, they were not able to ascertain whether USPCI filled out the forms correctly.

The finding was not addressed in the LBL Self-Assessment.

The causes of this finding can be attributed to both the lack of regulatory training provided to the employees and to lack of oversight (supervision) by both LBL and SAN.

FINDING WM/CF-12:**Solvent/Oil-Contaminated Rags****Performance Objective**

Rags contaminated with any solvent listed in 40 CFR Section 261.31, "Hazardous Waste Regulations," are to be managed as hazardous waste. Also, it is a best management practice to have two separate drums at the point where rags are generated--one for solvent-contaminated rags and one for oily rags.

Finding

Solvent-contaminated rags and wipes in Buildings 16 and 88 are not managed as hazardous waste in accordance with 40 CFR Section 261.31. In Buildings 51 and 77, solvent-contaminated rags are not effectively segregated from the oily rags, increasing the possibility of mismanagement of both the oily and solvent-contaminated rags.

Discussion

Solvent-contaminated rags are generated in several buildings at the LBL facility. The Tiger Team observed solvent-contaminated rag/wipes management practices at Buildings 16, 51, 76, and 88 and at several locations in Building 77. Solvents used in these buildings include alcohols, acetone, 1,1,1-trichloroethane, methyl ethyl ketone, and kerosene. Several different types of waste management problems were observed in these buildings, as follows:

- In Building 16, employees were using solvents on parts (either ethyl alcohol or acetone) and then wiping the parts with chem wipes. Afterward, the chem wipes were thrown in the trash and disposed of as a solid waste. This problem has since been corrected, and these wipes are being placed in containers and managed as hazardous waste (I-WM-67). This same problem was noticed in Building 88 where employees were not aware that chem wipes or solvent rags contaminated with 1,1,1-trichloroethane, acetone, or kerosene had to be managed as hazardous waste (I-WM-14). This situation has also been corrected, and the solvent wipes/rags are now being managed as hazardous waste (I-WM-68). Improper waste characterization by the generators resulted in the mismanagement and improper disposal of these wastes. The rags/wipes were not managed in accordance with 40 CFR Section 261.31 (i.e., hazardous wastes must be managed as such from "cradle to grave").
- Oil- and solvent-contaminated rags are generated at several locations throughout Building 51. Solvent-contaminated rags are generated by cleaning equipment; the solvents used include acetone, 1,1,1-trichloroethane, and alcohol. At each generation point, both oily and solvent-contaminated rags are put into pails (the solvent-contaminated rags are first put into plastic bags by solvent type and tagged). Pails are emptied into a drum outside the maintenance shop daily. At the end of the day, the oily rags are separated from the bagged solvent contaminated rags. Solvent-contaminated rags are managed as a hazardous waste and oily rags are sent to the laundry. By not segregating these rags, some

solvent-contaminated rags may be sent to the laundry, which is not authorized by the state to accept these wastes.

- Both solvent- and oil-contaminated rags are generated in Building 77. Again, the solvent-contaminated rags are managed as a hazardous waste and the oily rags are sent to a laundry. Solvents used in Building 77 include acetone, 1,1,1-trichloroethane, and stoddard solvent. Solvent-contaminated rags are generated as a result of machinery and parts cleaning. In all areas throughout Building 77 with the exception of the sheet metal areas, solvent-contaminated and oily rags were properly segregated. In the sheet metal area, there was a chance for these rags to be co-mingled.

The commingling of solvent- and oil-contaminated rags was addressed in the LBL Self-Assessment. Additionally, the LBL Self-Assessment documented that waste characterization by generators is inadequate.

The causes of this finding are lack of training, lack of LBL and SAN oversight, and lack of policy implementation.

FINDING WM/CF-13:**Lack of Autoclave Documentation****Performance Objective**

California Hazardous Waste Management Regulations, Title 22, Article 13, Subsection 66845(a)(4)(e) require that records be maintained for steam sterilizers. Records to be kept include written operating procedures, checks of recording and/or indicating thermometers during each complete cycle, annual thermometer calibration, and monthly use of the biological indicator *Bacillus stearothermophilus* to confirm attainment of adequate sterilization conditions.

Finding

LBL does not maintain all of the records for the steam sterilizer in Room 314 of the Melvin Calvin Laboratory, required by Title 22, Article 13, Subsection 66845(a)(4)(e).

Discussion

Written procedures for autoclave operation are posted on the autoclave. For each autoclave cycle run, LBL maintains records indicating the date, time, autoclave user, and a rough estimate of the quantity of infectious waste. However, records are not kept on recording and/or indicating thermometers during each complete cycle for thermometer calibration. Additionally, records are not maintained for the monthly biological indicator test. When questioned, LBL personnel were not aware that autoclave records were mandatory (I-WM-32).

The site was not aware of this finding, and it was not included in the LBL Self-Assessment.

Casual factors contributing to this finding include lack of implementation of DOE policy, lack of training, and lack of procedures.

FINDING WM/CF-14:

**Inadequate Treatment, Storage, and Disposal
Facility Operating Record**

Performance Objective

40 CFR Section 264.73 and California Hazardous Waste Management Regulations, Title 22, Article 21, Section 67163, require a Treatment, Storage, and Disposal Facility (TSDF) owner or operator to maintain a written operating record at the facility. The record must include the following information and be maintained until closure of the facility:

- a description and the quantity of each hazardous waste received, and the method(s) and date(s) of its treatment, storage, or disposal (40 CFR Part 264, Appendix I contains additional instructions for keeping the operating record); and
- the location and quantity of each hazardous waste in the facility.

Finding

Building 75, Building 75 yard, and Building 69 hazardous waste storage facilities do not maintain all operating records required by 40 CFR Section 264.73 and Title 22, Article 21, Section 67163.

Discussion

Recordkeeping requirements for TSDFs include that the owner or operator maintain an operating record to track the quantity and type of each waste received and records that indicate how the waste is handled (treatment, storage, and disposal). Additionally, the record must note the location and quantity of each hazardous waste in the facility. Interviews with LBL personnel indicate that an adequate waste tracking system is lacking (I-WM-6 and Finding WM/CF-2). The operating record maintained at Building 75 does not utilize the Appendix I handling codes for treatment and storage at the facility. Also, the location of each hazardous waste within the facility and the quantity at each location is not maintained in the operating record (I-WM-21).

The LBL Self-Assessment identified that recordkeeping requirements, including waste tracking, daily activities logs, and weekly safety inspections, at HWHF are not always met.

The causes of this finding include failure to implement DOE policy, lack of personnel training, and lack of procedures.

FINDING WM/CF-15:**Storage of Land Disposal Restricted Mixed Wastes****Performance Objective**

40 CFR Section 268.50 prohibits the storage of land disposal restricted (LDR) hazardous wastes unless storage is solely for the purpose of accumulation for recovery, treatment, and disposal, in which case storage is allowed. Storage of LDR waste for any other reason is prohibited. 40 CFR Section 268.35(d) grants a 2-year national capacity variance extension until May 8, 1992 for mixed wastes that are identified in 40 CFR Sections 268.10, 268.11, and 268.12 and, thus, not subject to LDR until that date. Mixed wastes containing solvents, dioxins, and California-listed wastes did not receive this national capacity variance and are subject to LDR and storage prohibitions.

Finding

LBL is storing mixed wastes containing solvents that are subject to LDRs and storage prohibitions.

Discussion

LBL currently has approximately 35 drums of mixed wastes in storage. Eighteen of these drums contain scintillation fluid, which is a hazardous waste solvent, as well as radioactive materials. These drums were placed into storage after the effective date of the LDR regulations. According to facility personnel, the drums containing scintillation fluid solvent have been in storage for over 1 year (I-WM-138), and some of the other drums may contain solvents (I-WM-138). However, the contents of these drums have not been completely characterized at this time (I-WM-138 and Finding WM/CF-7).

The site has not prepared an inventory of mixed waste containers that would identify the dates of storage and known contents (I-WM-138).

The site was aware of this finding, but it was not included in the LBL Self-Assessment.

The cause of this finding is failure to implement DOE policy.

FINDING WM/CF-16:**Lack of Effective DOE Oversight of LBL Waste Management Activities****Performance Objective**

DOE Order 5482.1B, "Environment, Safety, and Health Appraisal Program," states that it is DOE policy to ensure compliance with applicable statutory requirements affecting Federal facilities. Management of line organizations, including second line organization levels, are responsible for effective environment, safety, and health (ES&H) performance in these programs. Heads of Field Organizations (SAN) are responsible for carrying out functional appraisals to ensure effective ES&H performance.

Finding

The SAN Environment and Safety Hazards Control Department (ESHC) appraisal program has not been effective in ensuring compliance with applicable statutory and DOE requirements regarding environmental management. The functional appraisal program has not covered all applicable activities. A formal program for followup of corrective actions for findings resulting from oversight activities is not established at SAN.

Discussion

Responsibility for the oversight of environmental management activities at LBL is divided between SAN's Environmental Restoration and Waste Management (ERWM) and Energy Research (ER) Divisions.

SAN's oversight roles and responsibilities were not apparent to LBL management personnel, who were confused about SAN's responsibility for waste generator and other environmental activities (I-WM-137).

DOE's lack of effective oversight of environmental management activities at waste generator facilities is demonstrated by the lack of documentation showing that oversight activities, such as inspections and functional appraisals, have been conducted. It is also demonstrated by the various nonconformances with environmental regulations and DOE requirements reported in this Tiger Team Assessment.

SAN has not implemented a formal program for followup of oversight activities that are conducted. Followup of findings related to oversight activities is directed by the individual conducting the oversight. A database of findings and followup is not maintained (I-WM-111).

SAN has established an Onsite Office for LBL that is responsible for conducting and documenting functional appraisals. However, formal procedures for these activities have not been established.

This finding was addressed in the SAN Self-Assessment.

The cause of this finding is lack of policy implementation of DOE Orders by failing to develop procedures for conducting appraisals and failure to allocate resources necessary for these activities.

FINDING WM/CF-17:

Lack of Effective Oversight of Waste Management Activities by LBL

Performance Objective

DOE Order 5482.1B, "Environment, Safety, and Health Appraisal Program," states that it is DOE policy to ensure compliance with applicable statutory requirements affecting Federal facilities. Line management, including contractor organizations, are responsible for effective environment, safety, and health (ES&H) performance in their programs. Compliance is ensured in part by internal appraisals at the operating levels by persons not directly responsible for performance of the activities being appraised.

Section 7 of DOE Order 5482.1B gives detailed requirements as to the functions and elements of internal appraisals.

Finding

LBL has not developed and implemented an internal appraisal program for evaluating the compliance status of environmental management activities.

Discussion

LBL does not have an ongoing internal appraisal program. Inspections, audits, and appraisals of LBL environmental activities have been conducted by outside organizations (DOE, the California Department of Health Services, EPA, etc.) or in direct response to demands of outside organizations, audits, appraisals, or reviews. The lack of a LBL internal appraisal program has resulted in undetected nonconformance with applicable statutory and DOE requirements.

LBL has recently established an Independent Review and Assurance Department. This independent assessment office will perform the internal appraisals to evaluate installed ES&H systems and determine if they are functioning to ensure compliance with regulatory requirements (I-WM-121).

The lack of internal appraisals has contributed to most of the findings in the Environmental Assessment, particularly the many problems associated with waste management permitting and environmental monitoring.

The site was aware of this finding, and it was included in the LBL Self-Assessment.

The causes of this finding are lack of policy implementation for DOE Orders and failure to allocate adequate resources to develop procedures for performing the necessary appraisals.

FINDING WM/CF-18:

Laboratory Closeout Procedures

Performance Objective

The California Hazardous Waste Control Act, Article 1, Subsection 25123.3(d)(3) limits the storage of hazardous wastes at satellite accumulation areas to 1 year. California Hazardous Waste Regulations, Title 22, Article 6, Section 66508 requires that persons storing waste in excess of satellite area quantity limits longer than 90 days obtain RCRA storage permits. 40 CFR Section 268.50 prohibits storage of land disposal restricted wastes. 40 CFR Section 262.34 requires that storage of hazardous wastes for longer than 90 days be carried out in permitted storage facilities. Good management practices dictate that closed laboratories be promptly cleaned up to prevent hazards due to long-term storage of chemicals and potential mismanagement of wastes as a result of their being handled by persons other than the experimenter who is most familiar with them.

Finding

LBL lacks a Laboratory-wide closeout procedure to be implemented when individual experimenters leave or when laboratories and/or experiments are terminated.

Discussion

The research activities at LBL involve many experimenters and experiments. There is continual turnover of researchers, and experiments are continually being phased out. Often when a researcher leaves LBL, moves to another program, or the project is terminated or suspended, the used and unused chemicals, waste, and equipment are left behind at the laboratory. These chemicals, if not disposed of by the original researcher, sometimes remain for years. To comply with regulation requirements, it is necessary that equipment, materials, and wastes associated with departing personnel and terminated projects be promptly identified, decontaminated, treated, and disposed of by the generator.

Ultimately, facility management is responsible for ensuring the proper disposal of residual materials remaining after a laboratory/experiment is closed. However, this disposal must often be carried out by individuals who are unfamiliar with these materials. If this is the case, the disposal of residual chemicals is sometimes delayed, resulting in less potential for reuse/recycling of unused chemicals because they remain in storage past their expiration dates or the potential for reuse/recycling was not recognized, or the material may be inadvertently mishandled or disposed of improperly. In many cases, closeout of a laboratory is not carried out when the experimenter leaves or the experiment/laboratory is shut down, and hazardous, radioactive, and/or mixed wastes remain in the laboratory. This may result in wastes being stored in nonconformance with EPA, State of California, and/or DOE requirements regarding hazardous, radioactive, and mixed wastes. During the Tiger Team Assessment, LBL was completing a Laboratory-wide cleanup of old chemicals and materials. Some of these chemicals and materials had been left behind, or experimenters had left, and/or experiments in labs shutdown.

The site was aware of this finding, and it was included in the LBL Self-Assessment.

The cause of this finding is failure to establish procedures to provide administrative controls appropriate to the risk of laboratory management.

3.5.4.3 Best Management Practice Findings

FINDING WM/BMPF-1: Radioactive and Mixed Waste Tags

Performance Objective

Good management practices dictate that tags and labels for containers of hazardous, radioactive, and mixed wastes be separate and distinct to clearly differentiate between hazardous, radioactive, mixed, and nonhazardous/nonradioactive waste containers. Such practices reduce the potential for improper waste handling and disposal. Tags should also indicate the date on which a particular radionuclide was placed into a container since radiation is a time-dependent quantity.

Finding

Current labeling practices at LBL do not clearly differentiate between containers of hazardous, radioactive, mixed, and nonhazardous/nonradioactive waste. Spaces to write in the dates that radionuclides are placed into containers are not provided on the tags used for radioactive and mixed wastes.

Discussion

Currently, LBL has one label marked radioactive waste for both radioactive and mixed waste which is placed on top of containers. The generator may also write chemical constituent information on these labels.

It is not readily apparent, upon examining a container, whether a particular drum labeled with the currently used radioactive waste tag contains radioactive or mixed waste. Close inspection of the tag is required to determine if it is a mixed waste, and, even then, the "Radioactive Waste" notation at the top may cause confusion.

The need for distinct tags is increased since LBL does not have a consistent sitewide color coding system for drums. In general, yellow drums should only contain radioactive waste. However, radioactive waste can be found in drums of other colors, and yellow drums are occasionally used for nonradioactive waste (see Finding WM/CF-4).

The site was aware of this finding, and it was identified in the LBL Self-Assessment.

The causes of this finding are failure to adequately address the risk of confused waste designation and failure to prepare proper administrative controls.

FINDING WM/BMPF-2:**Lack of Documented Oversight of Commercial Treatment, Storage, and Disposal Facilities****Performance Objective**

It is a best management practice to formally evaluate the performance and management of commercial Treatment, Storage, and Disposal Facilities (TSDFs) used by DOE facilities. These evaluations should include checking the compliance status of the facility with cognizant regulatory agencies and onsite audits of the facility.

Finding

LBL has not carried out formal, documented oversight of commercial TSDFs used for the management of LBL wastes. LBL is therefore unable to demonstrate that the commercial facilities used are in compliance with regulatory requirements and that they employ sound management practices.

Discussion

LBL uses offsite commercial facilities for the TSD of hazardous and radioactive wastes. Among these facilities are Quadrex for treatment and disposal of scintillation fluids; United States Pollution Control, Inc. for laboratory packing, transportation, treatment, storage, and disposal of hazardous wastes; and IT Corporation for treatment and disposal of hazardous wastes.

Effective oversight of commercial facilities includes evaluations of facilities before use and periodic evaluation during use. The evaluation process should consist, at a minimum, of the following:

- access to validated audit information on the offsite facility;
- review of offsite facility permits, inspection reports, and other documents, which would reveal facility compliance status and permit status in regard to DOE facility wastes to be managed; and
- contacts with regulatory agencies to determine compliance status.

LBL has not implemented a formal program of visiting offsite commercial facilities to evaluate compliance status, nor has it documented permit reviews or contacts with regulatory agencies. Personnel stated that LBL's commercial facility oversight relies on the oversight program of Lawrence Livermore National Laboratory (LLNL) and telephone calls to regulatory agencies to determine the compliance status of commercial facilities (I-WM-118).

LBL relies on LLNL because LLNL has a formal commercial TSDF evaluation process, and facilities evaluated include those used by LBL (I-WM-118). Telephone calls are made to LLNL to discuss facilities which are used by LBL. In addition, periodic telephone calls are made to regulatory agencies to verify the compliance status of commercial facilities. However, LBL has not validated the audit procedures and program used by LLNL.

Documentation regarding these activities was not available for inspection by the Environmental Subteam. Thus, LBL is unable to demonstrate that the facilities being used are in compliance with regulatory requirements.

The site was aware of this finding, and it was identified in the LBL Self-Assessment.

The causes for this finding include failure to adequately assess the risks of hazardous waste management, failure to formulate a procedure to address risks, and failure to implement administrative controls.

FINDING WM/BMPF-3:

Lack of Adequate Waste Management Procedures

Performance Objective

INPO-85-017, "Guidelines for the Conduct of Operations," and DOE Order 5480.19, "Conduct of Operations for DOE Facilities," include formal, controlled procedures as a key element of programs supporting plant operations. Procedures should be developed and used in all aspects of the management of solid, hazardous, mixed, and radioactive wastes. Guidelines are included for procedure development, content, changes and revisions, approval, review, availability, and use. The Conduct of Operations Order does not require full compliance at this time, making this a best management practice performance objective.

Finding

LBL has not developed and implemented procedures for the management of radioactive, hazardous, and mixed waste at generator storage areas and for the storage and treatment of hazardous, radioactive, and mixed wastes at the Hazardous Waste Handling Facility (HWHF).

Discussion

Effective management of hazardous, radioactive, and mixed wastes from generation through final disposition in compliance with applicable regulations and Orders requires that waste management procedures be developed and implemented. LBL has not developed and implemented sitewide procedures for the characterization and handling of hazardous, radioactive, and mixed wastes by generators. This has resulted in lack of compliance with hazardous waste labeling and storage time requirements at satellite accumulation areas (SAAs) and lack of compliance at 90-day areas with hazardous waste labeling, storage time, contingency plan, training, and preparedness and prevention requirements (see Findings WM/CF-10 on generator waste accumulation areas and SAAs and WM/CF-1 on training).

Formal procedures have not been developed for management of hazardous waste at HWHF. Draft policies and procedures have been prepared for radioactive and mixed waste management at HWHF (0278). These draft procedures generally document the informal practices that are currently being followed at the facility (I-WM-122).

The site was aware of the lack of procedures for generators and HWHF waste handlers. The LBL Self-Assessment had a finding on the lack of generator procedures, but did not discuss lack of procedures at the HWHF.

Causes of this finding include failure to implement DOE policy, failure to analyze the risks associated with waste management, and failure to provide administrative controls for these risks.

3.5.5 Toxic and Chemical Materials

3.5.5.1 Overview

The purpose of the toxic and chemical materials assessment was to evaluate LBL compliance with the Toxic Substances Control Act (TSCA); Federal Insecticide, Fungicide and Rodenticide Act (FIFRA); DOE Orders, State of California regulations, LBL policies and administrative memoranda, and best management practices (BMPs). Table 3-7 lists regulations, requirements, and guidelines which apply to toxic and chemical materials at LBL.

The LBL Materials Management Department (MMD) has the responsibility for procurement, storage and transport of chemicals, including hazardous chemicals. MMD operates three facilities through which hazardous materials are handled, the Building 901 warehouse located offsite in Emeryville several miles west of LBL, and Buildings 69 and 7 on the site. LBL stocks only a limited supply of chemicals. The central chemical stores was eliminated in 1989 due to a loss of adequate storage space, recognition of the environmental hazards, and increased regulatory restrictions associated with the storage of chemicals (I-TCM-14).

ESHC is responsible for the majority of issues concerning toxic and chemical materials at the site, including SARA Title III reporting, tracking the use of hazardous materials in laboratories, PCBs and asbestos disposal, and hazard communication and MSDS distribution. ESHC also works with MMD in the development of procedures for the handling and storage of toxic and chemical materials at LBL.

The majority of chemicals used at LBL are purchased under a systems contract through an outside vendor. The contract covers chemicals which are routinely used in laboratories and/or maintenance shops. Listed extremely hazardous chemicals are not supplied under the terms of the vendor systems contract. Chemicals purchased are delivered to Building 7 or to Building 69 (for drum size quantities) and then distributed to the chemical users at LBL. Building 7 maintains a small stock (less than 100 gallons) of photochemicals. Building 69 receives and distributes hazardous gases, listed extremely hazardous chemicals (e.g., carcinogens and reactives) and drum-size quantities of chemicals. Building 69 also stores a limited amount (approximately 40 to 50 drums) of product solvents and lubricating oils. The 901 warehouse only stores gallon containers of 190- and 200-proof undenatured ethyl alcohol under control conditions specified by the State of California. The 901 warehouse receives but does not store chemicals which are purchased from sources other than the systems contract supplier. Personnel from MMD transport the ethyl alcohol and other chemicals to the main LBL facilities (I-TCM-5). In general, the protocols for the procurement, storage, handling, and transport of hazardous materials at LBL are well documented in written procedures developed by MMD (0297). The Environment and Safety Hazards Control Department (ESHC) has also participated in the development and oversight of chemical handling procedures for LBL.

In response to Tiger Team concerns, MMD has initiated a review of materials tracking and custody procedures at LBL (0297). The annual chemical inventory, begun in 1989 by ESHC in response to Business Plan preparation, has proven to

TABLE 3-7
LIST OF APPLICABLE TOXIC AND CHEMICAL MATERIALS
REGULATIONS/REQUIREMENTS/GUIDELINES

<u>Regulations/ Requirements/ Guidelines</u>	<u>Sections/Title</u>	<u>Authority</u>
DOE Order 5400.1	General Environmental Protection Program	DOE
DOE Order 5480.3	Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Waste	DOE
DOE Order 6430.1A	General Design Criteria	DOE
40 CFR Part 761	(TSCA) Polychlorinated Biphenyls (PCBs)-Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions	EPA
40 CFR Part 165	(FIFRA) Pesticide Storage/Disposal Regulations	EPA
40 CFR Part 300	National Oil and Hazardous Substances Pollution Contingency Plan	EPA
29 CFR Part 1910	Hazardous Materials Storage	OSHA
40 CFR Part 112	Oil Pollution Prevention (CWA)	EPA
40 CFR Part 171	Certification of Pesticide Application	EPA
49 CFR Parts 171, 173, 177, 178, and 397	Transportation of Hazardous Materials, Packaging, Marking, Spill Reporting, etc.	DOT
California Health and Safety Code, Sections 25500-25541	Hazardous Materials Disclosure and Safety Requirements	DHS
California Environmental Health Code	Treatment Standards for PCB Waste	California
California Food and Agriculture Code 3-6900	Pesticide Contamination Protection	California

TABLE 3-7 (Continued)
LIST OF APPLICABLE TOXIC AND CHEMICAL MATERIALS
REGULATIONS/REQUIREMENTS/GUIDELINES

<u>Regulations/ Requirements/ Guidelines</u>	<u>Sections/Title</u>	<u>Authority</u>
California Environmental Health Code 66504, 66508, and 66680	Asbestos Waste; 90-day Rule	California
PUB 3000	Laboratory Safety	LBL
PUB 3070	Hazardous Materials Training	LBL
Procedure 745	Draft Hazardous Waste Handling Facility Guidelines (January 1, 1991)	LBL
Procedures SP 10.01, SP 10.05, SP 11.01, SP 12.01, SP 16.02, and SP 17.01	Materials Handling Procedures	LBL

be a valuable self-education to users of chemicals at LBL (I-TCM-8 and I-TCM-27). The first comprehensive inventory brought to light many instances of unidentified chemicals in storage and chemicals which had passed expiration use dates, which were then gathered and disposed of as waste. Currently, there are no detailed written LBL procedures for, or oversight of, the maintenance of chemical inventories.

A considerable laboratory housekeeping effort had preceded the Tiger Team Assessment. In some areas there were many new, safety-approved storage cabinets for flammable and hazardous chemicals. Overall, chemical storage was good, however, there were several instances of improper chemical segregation and container/cabinet labeling. The quality of laboratory compliance with established procedures for safe chemical storage was strongly dependent upon the persons responsible for each individual laboratory/building. Neither LBL nor SAN perform routine oversight of laboratories for safety compliance, especially outside of the LBL "hill" (i.e., Donner, Calvin, and other laboratories at UCB) (see Safety and Health Concern 05.2-1).

The documentation of environmental hazards associated with hazardous/toxic chemicals through the use of Material Safety Data Sheets (MSDSs) was not consistent throughout LBL facilities. This problem may extend to the procurement and distribution of chemicals at the site. When chemicals are delivered to the individual user, the MSDS forms are not routinely provided to the user. The MSDSs, which are shipped with chemicals as they arrive at LBL, are usually sent for storage in a central file at ESHC, where they are available for dissemination if requested by a user. Presently, LBL is activating a system for chemical MSDSs that would be accessible to most online personal computers at the site (I-TCM-3). The system will have data for over 100,000 chemicals and will allow information to be printed from any online printer. The planned operational date for this system has not been determined.

The approved area for bulk chemical storage at LBL is the Drum Storage Area at Building 69. The area contains spill cleanup kits and an area-wide secondary containment/collection system for spilled materials.

While removing many horizontal drum storage racks from service and the recent general housekeeping upgrade of LBL facilities, drums had been temporarily placed in areas at LBL that were unsuitable for chemical storage. Upon construction of upgraded storage racks in 1991, the drums will be relocated to proper storage.

The storage of petroleum products in aboveground storage tanks (ASTs) and other vessels is regulated under 40 CFR 112. Regulatory guidance requires effective secondary containment to prevent possible contamination of "waters of the United States." There is no specific permit required for ASTs. There are 14 diesel fuel ASTs of more than 30 gallons capacity associated with fixed electrical generation units at certain LBL buildings (0288). The Construction and Maintenance Department (C&M) is responsible for the upkeep of ASTs at the site. Spill control from site ASTs should be addressed in the Spill Prevention Control and Countermeasures (SPCC) Plan required by the regulation. To date, LBL has not assembled an adequate SPCC Plan.

Asbestos-containing materials occur throughout LBL facilities in pipe insulation, floor tile, mastic, and transite siding. In 1989, LBL conducted a

survey of the location of asbestos-containing materials in 38 of 90 LBL buildings. Routine removal of asbestos is done by the LBL C&M which has personnel who are licensed by the State of California to remove small (up to 6 feet-length bags) of asbestos (I-TCM-16). Friable asbestos is considered a hazardous waste in California and must be packaged, labeled, and disposed of according to special regulations. Asbestos disposal guidelines are given in LBL Draft Procedures for the Hazardous Waste Handling Facility. According to LBL procedures, asbestos waste must be properly packaged and labeled by the generator prior to removal to the permitted waste management yard at Building 75 for offsite disposal. Asbestos disposal records are maintained by the Waste Disposal group of ESHC. Overall the disposal of asbestos waste is accomplished in accordance with applicable regulations.

Several different groups have responsibility for polychlorinated biphenyl (PCB) management at LBL. Project Engineering maintains PCB transformer inspection logs and contracts with outside vendors for the removal/retrofit of transformers and for the cleanup of all PCB spills, excluding minor and localized ones. Beginning in 1986, LBL initiated a program to retrofit and/or replace all of the large PCB transformers (generally transformers greater than 12 kVA) at the site. The last transformer containing PCB concentrations of between 50 and 500 ppb in the oil was removed from service in November 1990 according to the records maintained by Project Engineering (I-TCM-25). LBL is planning to initiate a new program in FY 1991 to identify and, ultimately, remove all large PCB capacitors at the site (I-TCM-25).

Project Engineering is currently overseeing a study on potential PCB contamination resulting from a 1971 PCB oil spill from a capacitor in the basement and sump areas of the Building 51 Bevatron. PCBs are disposed of through the hazardous waste facility under guidance from ESHC. The annual PCB report is prepared by ESHC.

LBL has not stored or applied large quantities of pesticides at the site for at least 10 years according to LBL (I-TCM-12). Small amounts (3 gallons or less) of herbicides are stored in a cabinet with secondary containment below Building 46. The selective application of herbicides is performed by two persons from C&M who periodically attend herbicide safety and application classes from the California Agriculture Extension Service. No special license is required to apply the small amounts of herbicides used at LBL under Title III of the California Food and Agricultural Code according to LBL (I-TCM-12 and I-TCM-52). Pesticides are applied by a California-licensed outside contractor. C&M maintains records on the date, location, and type of pesticide applied by the contractor.

Seven toxic and chemical materials findings were identified (four compliance findings and three best management practice findings), and were addressed in the LBL Self-Assessment or 1988 DOE Environmental Survey Preliminary Report. Compliance findings include Finding TCM/CF-1, which covers the lack of secondary containment at ASTs containing petroleum products; Finding TCM/CF-2, which addresses inadequate containment at areas where drum quantities of petroleum products and hazardous chemicals were stored; Finding TCM/CF-3, which addresses the lack of an LBL comprehensive program, including written procedures and employee training for asbestos wastes; and Finding TCM/CF-4, which covers the noncompliance of various LBL and LBL-used facilities at UCB with established LBL laboratory procedures for labeling and storage of toxic chemicals. BMP findings include Finding TCM/BMPF-1, which notes the lack of

central LBL organization to manage PCB wastes; Finding TCM/BMPF-2 which discusses inadequate procedures for tracking and custody of potentially hazardous materials at LBL; and Finding TCM/BMPF-3, which discusses problems with adequate containment of the inline chemical delivery system at the Building 77 wastewater treatment system.

Overall, toxic and chemical materials management at LBL has been good in that there have been no significant, recorded releases of toxic chemicals to the environment. Most of the LBL personnel who work closely with hazardous chemicals are aware of the personal safety and environmental risks associated with the materials and are aware of the basic safety procedures required by LBL.

In general, ESHC has been effective in toxic and chemical materials management; however, the majority of ESHC's effort in chemical management is handled by three supervisory personnel with an additional three to five persons providing assistance with waste disposal. In the effort to stay abreast of routine toxic and chemical materials issues, the development of written procedures and the continued training of persons (ESHC and non-ESHC) has received inadequate attention within ESHC and LBL.

3.5.5.2 Compliance Findings

FINDING TCM/CF-1: Lack of Secondary Containment at Aboveground Storage Tanks Containing Petroleum Products

Performance Objective

Secondary containment for aboveground storage tanks (ASTs) containing petroleum products is required by the Clean Water Act as listed under 40 CFR Part 112, to prevent spills of petroleum products from contaminating waters of the United States.

Finding

There are nine ASTs containing diesel fuel that do not have secondary containment at LBL.

Discussion

The nine ASTs reviewed by the Tiger Team ranged in volume from approximately 50 gallons (one drum) to 250 gallons and are associated with fixed electric generation units. One tank, a 225-gallon steel, single-wall diesel tank, which feeds the EG-12 generator at the Building 51 Bevatron, contains no secondary containment and sits directly above the storm drain grates on the east side of the building. Diesel fuel escaping from this tank would travel via storm drains into waters of the United States.

LBL personnel indicated that there are nine ASTs at LBL which lack secondary containment and, thus, could also release petroleum products to the environment (I-TCM-44) (0288). These ASTs are listed in Table 3-8. Tiger Team review of two of the tanks confirmed the absence of secondary containment.

The site was aware of this concern, and it was included in the LBL Self-Assessment as Finding LBL-WM.5-11.

Causal factors for this finding include failure to implement DOE policy of complying with regulations, inadequate assessment of risk associated with storage of hazardous materials, and failure to provide proper barriers or controls.

TABLE 3-8
ABOVEGROUND STORAGE TANKS AT LBL LACKING SECONDARY CONTAINMENT

Equipment	Building	Size
EG-12*	51	225 Gallons
EG-32	71	75 Gallons
EG-35*	76	40 Gallons
EG-44	70	50 Gallons
EG-66	10	50 Gallons
EG-76	934	48 Gallons
EG-79	50A	250 Gallons
EG-80	10A	55 Gallons
EG-81	62B	55 Gallons

*Tanks inspected by Tiger Team.

**FINDING TCM/CF-2: Inadequate Containment at Bulk Storage Areas for
Petroleum Products and Hazardous Chemicals**

Performance Objective

Secondary containment for vessels which contain petroleum products is required by 40 CFR 112. In addition, it is good management practice to provide proper hazard labeling, spill cleanup equipment, and effective containment at any hazardous chemical storage area to prevent contamination of sensitive environmental areas. The site should have adequate storage space to properly store bulk quantities of petroleum products and hazardous chemicals.

Finding

Several bulk storage locations at LBL do not have adequate secondary containment or other management provisions to prevent the release of petroleum products and hazardous chemicals to the environment.

Discussion

Examples of storage areas without proper secondary containment or other provisions to prevent chemical and petroleum product migration include the following:

- The concrete floor in the storage area at Building 69 housing 30 to 40 drums containing petroleum products and hazardous materials had a series of long cracks, large enough to allow chemicals to migrate into the subsurface in the event of a chemical spill within the storage area. Soon after the Tiger Team pointed out the condition and the risks involved (I-TCM-17), LBL employees corrected the situation by sealing the cracks with fresh grout.
- A makeshift drum storage area south of Building 71 that contained chemicals, including chlorinated solvents, petroleum products, and freon, had no berms or other forms of secondary containment. The area contained approximately twenty 55-gallon drums which sat on pallets and were partially covered with a plastic tarp. Drum storage was immediately adjacent to a steeply sloped asphalt driveway which could serve as a sheet flow conduit for spilled chemicals. The only information about this storage area consisted of a handwritten label indicating "Product Storage."
- Outside Building 25, a 55-gallon drum of Vanflouron TES solvent was stored in an area lacking secondary containment.
- Outside Building 62, drum racks are of the horizontal design and contain 55-gallon drums of TCE, acetone, and heptane. One of the drum racks is located on a concrete pad that lacks secondary curbing. Should a drum leak, contaminants could enter stormwater drains around the drum racks or flow over a hillside.
- In Building 77, tanks containing non-petroleum quenching oil (Room 123) and solvents (Room 161) are located near floor drains that discharge to the sanitary sewer. These tanks lack secondary containment.

- Outside of Building 88, drum racks are of the horizontal design and contain 55-gallon drums of TCE, alcohol, and fire quell. Should a spill occur during loading and unloading operations, contaminants would enter stormwater drains near the drum racks.

The housekeeping activities which preceded the Tiger Team Assessment resulted in removal of many chemical drums from inadequate storage areas. Drums were temporarily consolidated into undesignated locations around LBL. Approximately 20 drums stored at Building 71 represent the accumulation of drums removed from several horizontal drum storage racks near Building 71, according to LBL (I-TCM-24).

The general issue of improper bulk storage of drum quantities of hazardous chemicals and petroleum products was addressed as SW.3-1 in the LBL Self-Assessment. The drum rack storage problems were also addressed in the LBL Self-Assessment and the DOE 1988 Environmental Survey Preliminary Report.

The causal factors for this finding are 1) inadequate policy implementation in not preparing comprehensive sitewide procedures for the siting and/or upkeep of storage areas, 2) failure to assess risks of chemical storage, and 3) failure to provide proper barriers and spill containment controls at the storage areas.

FINDING TCM/CF-3:

Asbestos Management Program is Not Fully Developed

Performance Objective

Friable asbestos is a California hazardous waste and is subject to the storage and disposal requirements (including the 90-day accumulation period limit for unpermitted hazardous waste storage) as listed in the California Environmental Health Code Section 66508. In addition, Procedure 745 in the Draft Procedures for the Hazardous Waste Handling Facility (January 4, 1991) requires that asbestos waste be packaged by the operator according to the following criteria:

- material must be wet,
- sealed in a double bag, and
- identified with an approved asbestos label.

Finding

LBL does have comprehensive asbestos management program based on the requirements of the California Environmental Health Code Section 66508 and does not have a complete inventory of asbestos at LBL and LBL-staffed facilities at UCB.

Discussion

A complete inventory of asbestos has not yet been performed for the site. The initial asbestos survey, completed in 1989, covered 38 of 90 site buildings and concentrated on the older buildings at LBL, which were believed to contain asbestos materials. There is no central authority for all asbestos matters at LBL with responsibilities spread among two groups. The records for asbestos disposal are maintained by Environment and Safety Hazards Control Department (ESHC) in Building 75; asbestos inventory logs are kept by ESHC in Building 26 and Construction and Maintenance (C&M) in Building 76.

One bag of friable asbestos waste was discovered in a trash can at Building 77. The asbestos was double bagged and sealed, but was not properly labeled at the time of discovery. The asbestos was not wet. Personnel at Building 77 were not certain as to the exact source or the collection date of the asbestos, but did indicate that it probably had remained unaccounted for at least 2 or 3 years (I-TCM-35).

Asbestos issues at UCB buildings where DOE has ES&H responsibilities are not managed by LBL. All asbestos-related concerns at the Donner and Calvin DOE facilities on the UCB campus are the responsibility of the UCB Environmental Health and Safety Department. However, the communication between UCB and LBL is not adequate to keep information about asbestos current and available to LBL; staff at Donner could not document the exact location of asbestos within the building even though UCB had reportedly assembled an asbestos inventory for the building since 1988. Also, Donner personnel recalled that UCB had conducted some asbestos remediation at the building in recent years, but only had minimal documentation of the nature and results of such action (I-TCM-8)

(0295). LBL staff at ESHC and C&M indicated that they, as well, had no record of UCB activities at the Donner Building.

This concern was identified in the LBL Self-Assessment in LBL-WS.3-3 and LBL-WS.3-4.

The causal factor for this finding is a lack of procedures to consolidate all asbestos management activities at LBL and to coordinate contact with LBL facilities at the UCB campus.

FINDING TCM/CF-4:

Inadequate Storage and Labeling of Toxic/Hazardous Materials in Laboratories

Performance Objective

According to the LBL Health and Safety Manual (PUB 3000), all containers for toxic/hazardous materials must be clearly labeled as to contents and environmental hazard. Storage cabinets that contain hazardous chemicals should be designed to safely contain the hazardous chemicals and be properly labeled to identify contents and safety precautions. Chemically incompatible materials should not be stored in common cabinets or in such a manner that inadvertent mixing of chemicals could release hazardous materials to the environment.

Finding

The storage and labeling of chemicals at certain LBL and LBL-used UCB facilities are not in conformance with requirements in the LBL Health and Safety Manual (PUB 3000) and are inadequate to prevent the potential release of hazardous materials to the environment. The application of sound chemical storage practices is not consistent throughout LBL-operated facilities.

Discussion

The Tiger Team inspected chemical storage areas in approximately 30 production areas, laboratories, and laboratory buildings used by LBL. Of these, at least six contained examples of inadequate chemical storage and labeling including but not limited to the following:

- Building 3, Melvin Calvin Laboratory--An oxidizing chemical, sodium perchlorate, was stored in the same cabinet with flammable materials including solvents. An oxidizer can react with flammable materials causing fire and possible release of hazardous materials to the environment.
- Building 77--In Room 160, the toxic chemical and experimental carcinogen methylene dianiline (MDA) is stored in an unapproved container and without proper warning labels. The MDA is stored as a solid block of approximately 25 pounds wrapped in a plastic bag and kept in a steel, garden-variety trash can. The only visible data on the contents of the trash can is a handwritten label: "Keep closed, TONOX, contains MDA Health Hazard." This is inadequate storage for a material listed as a Harmful Carcinogen by the European Economic Community and as a Target Organs Carcinogen by OSHA (data from MSDS for MDA contained in Room 160).
- Latimer Hall, UCB campus, Room 504--Containers for "spent" or waste chemical solvents were not labeled with proper hazard identification; 1-gallon plastic bottles were hand labeled either as "halogenated solvents" or "non-halogenated solvents." While there was no written indication on the containers that the receptacles were for waste chemicals, laboratory personnel verbally acknowledged that the bottles contained materials which were spent and destined for removal from the laboratory (I-TCM-39). Also, in Room 504 and in other chemical laboratories used by

LBL, the secondary containers used for dispensing chemicals, such as solvents, were not marked with labels resistant to degradation from the solvents stored therein. The plastic squeeze bottles were only marked by hand with marker ink and, in many cases, the ink had faded from the bottle surface. If labels become indecipherable, the contents of the bottles are questionable, thereby increasing the potential for inadvertent mixing or misuse of a chemical, possibly resulting in an unexpected reaction and/or release of chemicals to sinks and, eventually, to the environment. The concern regarding the integrity of container labeling also applies to the waste receptacles previously described. If labels were removed or lost, there is a potential for improper disposition or use of the materials in the containers.

- Room 505, Latimer Building--A cabinet used for the storage of flammable materials also contained acrylonitrile a listed carcinogen and pyridine, a suspected carcinogen. These chemicals were not segregated from the other chemicals stored in the cabinet. Also, there were no hazard communication labels for flammable materials or carcinogens posted on the outside of the cabinet even though the cabinet was of a design proper for the storage of flammable chemicals. PUB 3000 identifies listed carcinogens and certain suspected carcinogens and describes hazards associated with these materials, but lacks procedures on storage of these materials.
- Giauque Building, UCB campus, Room DG30--Chemical reagents and waste receptacles were stored in the same cabinets. As in previously noted laboratory situations, the waste receptacles were not adequately labeled as to contents, disposal, and safety hazards.

LBL conducts operations in well over 150 laboratories, both at LBL and in UCB buildings. Inspection of representative laboratories revealed inconsistencies in the storage and labeling of hazardous chemicals. For example, reagent chemicals and solvents were stored in proper cabinets specifically designed for the particular type of chemical storage (e.g., red or yellow steel containment cabinets with passive or active ventilation for flammables). However, labeling to identify container contents and safety/environmental hazards was not conducted in a consistent manner. The diamond-type hazard communication placards were present only at selected cabinets at the LBL site; such labels were not found at LBL-used laboratories at the UCB campus. Also, special hazard labels (e.g., carcinogenic; oxidizer) were used at only a few locations. In addition, certain chemicals were handled differently depending on the laboratory. For example, a suspect carcinogen, pyridine was segregated and stored with double containment and under "carcinogen" labels at a laboratory in Donner (Building 1); at Latimer Hall, Room 505 (described above), the same chemical was not treated with any special storage precautions. Some facilities (e.g., Building 55, Research Medicine) maintained especially good chemical storage protocols, including substantially complete MSDSs, written procedures for chemical storage, handling and usage, and well-labeled storage containers (I-TCM-27).

Laboratory managers and safety committee personnel indicated that the LBL guidance for laboratory procedures in PUB 3000 is a good background document

which contains general laboratory safety procedures. However, some laboratory personnel were unsure as to how laboratory-specific concerns about hazardous chemicals should be addressed by LBL. Personnel from ESHC are aware that some laboratory concerns may require special environmental safety protocol but limited resources decrease the ability of ESHC to accomplish this task (I-TCM-28). Those facilities that were found to have good chemical storage and use practices (e.g., Building 55) were proactive in seeking out relevant data from state or Federal regulations and in contacting LBL personnel from ESHC (I-TCM-27).

The issues of incompatible chemical storage and inadequate hazards labeling, including Findings WM.5-7 and WM.5-12, were included as findings in the LBL Self-Assessment.

Overall, the inconsistency in the application of proper chemical storage and labeling procedures is due to the lack of adequate LBL or SAN oversight for compliance with written procedures in PUB 3000, which details chemical use in laboratories, lack of training, and lack of adequate procedures for management of carcinogens and suspected carcinogens.

3.5.5.3 Best Management Practice Findings

FINDING TCM/BMPF-1: Inadequate Organization of Polychlorinated Biphenyl Management Program

Performance Objective

It is a good management practice that the site have a comprehensive program for polychlorinated biphenyl (PCB) management, including written procedures for labeling, handling, transporting, and disposing of PCBs, and a documented training program for employees who may work with PCBs. Such a program would designate the management responsibilities for administration and operational coordination of PCB-related activities at the facility.

Finding

LBL does not have a comprehensive, written program for the management of PCBs that includes written procedures and documented training.

Discussion

The LBL responsibility for managing PCBs in accordance with the requirements of 40 CFR 761 is shared by four different groups. The Construction and Maintenance Department, through the Electrical Department, conducts periodic inspections of transformers and maintains unofficial transformer inspection logs. Project Engineering maintains the official, complete transformer data sheets and tests logs, and also contracts for the removal of large PCB equipment or cleanup of PCB spills. The Environment and Safety Hazards Control Department (ESHC) maintains applicable PCB-related regulations, some of the original copies for results of PCB testing at LBL, and is responsible for the cleanup oversight for small PCB spills. The ESHC Waste Management Group stores PCB waste destined for offsite disposal and maintains the original records of PCB waste shipment manifests and some test results of PCB waste. No single group is a repository for all PCB-related records at LBL. The ESHC person who will function as the PCB coordinator will have the responsibility to be a focal point for the various groups, collecting selected data for the preparation of the annual PCB logs. There has been no formal designation of a PCB coordinator within LBL nor are there any written descriptions defining the responsibilities of that position.

Two examples of inadequate PCB management were noted by the Tiger Team. Two drums of PCB waste at Building 71 contained several PCB capacitors and rags and spent protective clothing used during the removal of the capacitors from service (I-TCM-23). The drums were in temporary storage at Building 71 because the approved PCB storage areas at LBL were full (I-TCM-23). The drums were in compliance with the storage guidelines in 40 CFR 671, however, the location for the temporary drum storage was not adequate because there was no secondary containment and the drums were in a vehicle traffic area.

A 75-cubic-yard pile of soil, labeled as "PCB Waste" was covered with a tarp and stored without secondary containment on an asphalt parking lot outside Building 31. This storage is inadequate because of the lack of secondary containment and proximity to a storm drain (approximately 50 feet) which could provide a conduit for PCB contaminant migration. The soil pile had been stored at the location since November 9, 1990. According to site personnel,

the pile had been tested and found to contain only 0.27 ppm of PCBs (I-TCM-23), which implies that the waste is not a PCB waste according to California requirements. However, ESHC was not able to provide the Tiger Team with the documented test results and the sampling protocol used in the assessment of this soil pile. If the test results are valid according to commonly accepted standards for sample representation, then the PCB labels should be removed from the material to reduce confusion about the waste. LBL has not yet determined the proper disposal for this material.

This finding has not been identified in the LBL Self-Assessment.

The causal factors for this finding are 1) the site has not assessed the risk of not having central PCB management authority and the possibility that this action may result in lost data important to PCB compliance and 2) upper management at LBL has not developed a written procedure delegating central authority for PCB management.

FINDING TCM/BMPF-2: Inadequate Procedures for Tracking Potentially Hazardous Materials at LBL Warehouse Facilities

Performance Objective

Good management practice requires that all items that contain hazardous/toxic materials be clearly labeled and managed in a way to ensure proper control and oversight. Proper materials documentation and tracking procedures are important elements in any program designed to prevent the release or disposition of hazardous/toxic chemicals to the environment.

Finding

The LBL procedures for tracking items in warehouse storage and maintaining proper custody of materials are inadequate.

Discussion

The two instances of inadequate materials tracking noted below are examples of how potentially hazardous materials could remain unaccounted for under the Materiel Management Department procedures:

- A large capacitor was staged near the loading dock of the Building 901 warehouse, but no written documentation was available to verify the contents, status, or origin of the item (capacitors could contain regulated quantities of polychlorinated biphenyls (PCBs)).
- A small, packaged container of a SARA-listed hazardous compound, benzoyl chloride, was observed by the Tiger Team to be unattended in a common area of the Building 69 shipping dock.

The large (approximately 5 feet in height) oil-filled capacitor at Building 901 was found by the Tiger Team on January 16, 1991. The capacitor had been brought out of warehouse storage several months earlier and was staged for removal from Building 901 to the LBL salvage yard (I-TCM-5). The capacitor had no readily identifiable identification except for a faded, handwritten piece of masking tape marked "<1 ppm tested 8-7-80." A reasonable assumption is that the testing probably refers to the concentration of PCB in the capacitor fluid; however, this could not be verified by any other information obtainable by the Tiger Team. Personnel at Building 901 could not produce any written documentation about the origin, PCB concentration, or status of the fluid in this item. According to procedures used at Building 901, once an item is cleared for removal from storage, the item is staged at the shipping dock for transport to LBL. At that time, the identification label is removed from the item and the written documentation associated with the item is taken from the active files and stored in an inactive file drawer. Essentially at that point, the item is no longer considered the tracking responsibility of Building 901 personnel. Inadequate identification of hazardous materials could lead to poor containment and handling procedures with a potential for the release of toxic materials to the environment.

The package of benzoyl chloride found on the dock at Building 69 was destined for pickup. Apparently, the package was placed, unattended, on the dock for at least 5 hours (I-TCM-17). There were no procedures in effect at Building

69 to ensure that proper custody, delivery, and storage of the material was effected.

The issues in this finding were not addressed in the LBL Self-Assessment.

The causal factors for this finding are the lack of understanding of the risks associated with improper chemical tracking and the lack of written procedures to track hazardous materials.

FINDING TCM/BMPF-3:

**Improper Containment of Inline Chemical
Transport Pipes at the Building 77 Wastewater
Treatment Facility**

Performance Objective

DOE Order 6430, "General Design Criteria," under Sections 1300-1.4, 1300-3 and 1300-3.3, directs that facilities should be designed with sufficient confinement to prevent release of hazardous constituents.

Best management practice dictates that pipes that contain incompatible chemicals should be located and/or provided with secondary containment such that the inadvertent mixing of potentially reactive chemicals is prevented.

Finding

The plating wastewater treatment system at Building 77 is designed in such a way that under operating conditions, two parallel pipes, one containing acid solutions and another containing cyanide liquids, are located in close proximity to one another (for at least 50 feet) without any secondary pipe containment. If pipe integrity were compromised, there would be no secondary containment to prevent chemicals from mixing with the subsequent potential for generation and release of a toxic gas.

Discussion

The pipes that are designed to transport the liquid wastes from the plating tanks inside of Building 77 to the newly constructed wastewater treatment facility south of Building 77 are single-wall polyvinyl chloride conduit. In at least one location, a section of pipe was cracked in half as a result of cold weather in December 1990. The treatment system and pipes are located outdoors; however, LBL indicated that there are plans to enclose the facility (I-TCM-50). If such a pipe failure were to occur when the system was full of chemicals and acid solutions came in contact with cyanide-containing liquid, the generation and release of gaseous hydrogen cyanide would be an immediate environmental and serious health threat to persons onsite, and possibly offsite. As of February 1991, the system is not operational; although, a trial run was accomplished in the fall of 1989 according to LBL (I-TCM-51). LBL is aware of the design deficiencies and is working to retrofit and/or redesign the piping system to include secondary containment (I-TCM-50 and I-TCM-51).

This issue was noted as a design deficiency problem in Finding LBL-SW.3-3 in the LBL Self-Assessment.

The causal factor for this finding is failure to provide adequate engineered barriers to preclude human error from resulting in a potential release of toxic chemicals to the environment.

3.5.6 Quality Assurance

3.5.6.1 Overview

The purpose of the quality assurance (QA) portion of the LBL environmental assessment was to evaluate the QA in the environmental programs, including environmental protection, environmental restoration, and waste management programs and projects at the LBL site. QA activities of LBL and SAN were reviewed for compliance with regulatory agency requirements and permits, DOE Orders, site requirements, and SAN Management Directives (MDs) and for adherence to best management practices (BMPs) (see Table 3-9).

The general approach to the QA assessment for the environmental programs at LBL included interviews with LBL and SAN staffs responsible for assuring the quality of the programs (e.g., LBL and SAN management, division directors, department heads, section leaders, group leaders, field samplers, and laboratory analysts). The assessment also included reviews of documents (e.g., DOE Orders, SAN MDs, QA plans, sampling and analysis methods, and procedures) and audits of onsite sample and analysis laboratories and offsite contractor analysis laboratories.

The assessment of QA for LBL's environmental programs was coordinated with the other Environmental Subteam specialists to ensure that all potential QA issues were identified, reviewed, and addressed, if necessary.

The environmental monitoring programs at the LBL consist of groundwater, surface water, air, meteorological, and radiological monitoring. Generally, these programs address radiological analyses; although, some chemical analyses, mainly for volatile organic compounds, are conducted. The types of samples collected include air and water. The LBL Environmental Monitoring Section's analytical laboratory is responsible for the radiological analyses of these samples. The site's groundwater environmental monitoring program primarily includes the analysis of hydrauger samples for radionuclides and volatile organic compounds. The Earth Sciences Division laboratory provides the volatile organic analyses for these samples.

The site's environmental surveillance program, which consists of groundwater and site characterizations has recently been initiated. Preliminary investigations for the groundwater characterization have been conducted by the Earth Sciences Division.

LBL's environmental compliance program currently consists of the wastewater discharge project, which includes requirements designated in the site's East Bay Municipal Utility District (EBMUD) Wastewater Discharge Permit. This permit includes (1) specified sampling and analysis and (2) a self-monitoring program, both of which are carried out by LBL. In addition, EBMUD periodically collects samples from the site's discharge locations. Analyses for this program are nonradiological. All nonradiological assays for contaminants in the wastewater samples are performed by two offsite contracted water testing laboratories.

The Environmental Monitoring Section's laboratory participates in the Quality Assurance Program (QAP) for radiological analysis. This program is administered by DOE's Environmental Measurements Laboratory (EML). Both of the LBL contractor laboratories that perform compliance monitoring and waste

TABLE 3-9
LIST OF APPLICABLE QUALITY ASSURANCE
REGULATIONS/REQUIREMENTS/GUIDELINES

<u>Regulations/ Requirements/ Guidelines</u>	<u>Sections/Title</u>	<u>Authority</u>
DOE Order 5400.1	General Environmental Protection Program	DOE
DOE Order 5700.6B	Quality Assurance	DOE
SAN MD 5700.6B	Quality Assurance	SAN
NQA-1	Quality Assurance Program Requirements for Nuclear Power Plants	ANSI/ASME
QAMS-005/80	Interim Guidelines and Specifications for Preparing a Quality Assurance Project Plan	EPA
SW-846	Test Methods for Evaluating Solid Waste-Physical/Chemical Methods	EPA
NEIC*	NEIC Policies and Procedures Manual	EPA
40 CFR Part 136	Guidelines Establishing Test Procedures for the Analysis of Pollutants	EPA

*NEIC - National Enforcement Investigation Center, EPA Office of Enforcement

sample analysis for inorganics and organics participate in the EPA's Water Pollution Study as required by the California Department of Health Services (DHS) and are certified by DHS for the analysis of drinking water samples. Overall, these laboratories have performed satisfactorily with regard to successfully analyzing check samples; although, the laboratory performing the waste sample analyses was being investigated by the EPA in 1990 for fraud.

It is the consensus of the Environmental Subteam that, in general, the sitewide application of QA is inadequate to demonstrate that LBL's environmental programs are being implemented in accordance with applicable DOE Orders and regulatory agency requirements.

LBL does not have an effective sitewide mechanism for implementing environmental program QA at all organizational levels. There is an LBL Institutional Quality Assurance Plan (IQAP) and, as required in the IQAP, LBL's divisions have Quality Assurance Program Plans (QAPPs), but they do not satisfy the requirements of DOE Order 5700.6B.

DOE Order 5700.6B specifies NQA-1 requirements for internal audits and there requirements are not included in the QAPPs. There is an Office of Quality Assurance that reports to the Deputy Laboratory Director, but future plans call for a QA support group in the Environmental Protection, Health, and Safety Division. Oversight will be administered by the Office of Planning and Assurance. Although QA Plan Implementation Guidelines exist, the guidelines do not ensure that QA requirements are implemented on a sitewide basis. In addition, laboratory divisions have Quality Assurance Representatives, but they do not conduct internal audits or reviews, so there are no reviews at the divisional level especially of environmental programs activities. In addition, the Office of Quality Assurance did not conduct audits of environmental programs.

Eight QA findings (seven compliance findings and one BMP finding) were identified. The compliance findings covered the following issues: lack of QA program and project plans, lack of divisional QA plans, lack of analytical QA plans, lack of internal reviews, and lack of oversight of contracted services. The BMP finding addressed deficiencies in good laboratory practices.

None of the findings were fully addressed in the LBL Self-Assessment; although, LBL has generally identified the lack of QA plans and other QA-related activities for its environmental programs in the LBL Self-Assessment.

There was one environmental QA finding in the DOE 1988 Environmental Survey Preliminary Report, Inadequate QAP for Environmental Monitoring, and the Tiger Team verified that this finding has not been corrected. There is an equivalent Tiger Team Assessment finding.

The key findings in the environmental QA area are the lack of QA plans (Finding QA/CF-1) and the lack of internal review (Finding QA/CF-6) for LBL's environmental protection, environmental restoration, and waste management programs and projects.

LBL is working to develop a new framework for QA at the site. In addition, LBL plans to establish a QA Office in the Environmental Protection, Health, and Safety Division to support the development of QA activities. It has established an Office of Independent Review and Assurance in the Office of

Planning and Assurance which will have the review of LBL environmental program activities as one of its key tasks. These QA program activities are either still in the planning stage or have just recently been implemented; therefore, it is difficult to assess their impact on future QA activities of LBL's environmental programs.

3.5.6.2 Compliance Findings

FINDING QA/CF-1: Lack of Quality Assurance Plans for Environmental Protection, Environmental Restoration, and Waste Management Programs and Projects at LBL

Performance Objective

DOE Order 5700.6B, "Quality Assurance," establishes DOE policy on quality assurance (QA). Section 9b of this Order states: "The quality assurance plan and actions required to implement the stated policy shall be defined for each program/ project/activity, as appropriate."

DOE SAN MD 5700.6B, "Quality Assurance," Section 7.e.1 states that SAN's contractor organizations "shall develop, implement, and maintain quality assurance and reliability programs responsive to DOE Order 5700.6B and this directive."

DOE Order 5400.1, Chapter IV, "General Environmental Protection Programs, Environmental Monitoring Requirements" states that "a quality assurance program consistent with DOE Order 5700.6B be established covering each element of environmental monitoring and surveillance programs commensurate with its nature and complexity."

Finding

Quality assurance plans for LBL's environmental protection, environmental restoration, and waste management programs and projects do not exist.

Discussion

Documented and approved QA plans do not exist for the LBL environmental protection program environmental monitoring activities, which include the following:

- effluent monitoring (e.g., groundwater, surface water, air, meteorological, and radiological monitoring);
- environmental surveillance (e.g., groundwater, surface water and atmospheric release characterization); and
- environmental compliance (e.g., wastewater discharge monitoring).

Environmental restoration programs, such as the Site Characterization, do not have documented QA plans. The Hazardous Waste Handling Facility has prepared a QA plan for its low-level waste (LLW) operation, which is approved at LBL, to ensure that the wastes generated meet the Westinghouse Hanford Company (WHC) waste acceptance criteria. This QA plan is scheduled for WHC review in April 1991. This plan must be approved prior to shipment of LLW to the Hanford Site.

Potential impacts of operating without QA plans include use and reporting of data of questionable validity to support management decisions, operation of

programs and projects which do not achieve the intended objectives, and ineffective expenditure of funds and resources.

Portions of this finding, such as the need for QA plans to cover effluent monitoring and environmental characterization, were noted in the LBL Self-Assessment, but findings addressing environmental restoration and waste management QA documents were not noted.

The causes of this finding are failure to implement DOE policy and failure to provide appropriate levels of quality assurance.

FINDING QA/CF-2:**Inadequate Divisional Quality Assurance Plans****Performance Objective**

The LBL Institutional Quality Assurance (QA) Program Plan, Section IV.D requires each division to have a written QA Program Plan. DOE Order 5700.6B, "Quality Assurance," defines a QA plan as a document that references the QA elements and describes how conformance with such requirements is to be assured. Section 9f of this Order states that quality assurance activities and the requirements for those activities shall be identified in program plans. In accordance with Federal and DOE standards policies, national consensus standards, such as NQA-1 are to be applied where suitable ones are available. The judicious and selective application of elements of appropriate, recognized standards is encouraged.

Finding

The divisional quality assurance plans within the LBL divisions where environmental protection programs reside, including the Environmental Protection, Health, and Safety Division; the Earth Sciences Division; and the Administration Division, do not conform to the requirements of DOE Order 5700.6B.

Discussion

Current divisional QA plans for the Environmental Protection, Health and Safety Division, the Earth Sciences Division, and the Administration Division do not conform to the requirements of NQA-1 and the judicious and selective application of the elements of NQA-1 is not evident.

An example of deficiencies in the divisional QA plans is the lack of requirement for the performance of internal audits and the reporting of the results of such audits to management. As a result, lower tier QA plans and documents, such as program or project QA plans, do not require internal QA audits to be performed.

This finding was partially addressed in the LBL Self-Assessment.

The causes of this finding are failure to implement DOE policy and failure to provide adequate quality assurance.

FINDING QA/CF-3:

Lack of Quality Assurance Procedures for the Procurement and Audits of Contracted Services for Environmental Protection, Environmental Restoration, and Waste Management Programs

Performance Objective

DOE Order 5700.6B, "Quality Assurance," establishes DOE policy on quality assurance (QA). Section 9d of this Order states: "Quality assurance activities shall be implemented by DOE organizations and contractors using written procedures and instructions appropriate to the activities to be performed," and Section 9g states: "Confirmation of quality attainment and quality assurance program effectiveness may be accomplished by various means, such as program reviews, and surveillance of special activities or results of technical significance."

The LBL procurement contract for environmental services states: "Sellers must hold certification by the Department of Health Services and accreditation from the American Industrial Hygiene Association during the term of this Order. All subcontractors used under this office must meet the above for any tests."

Finding

LBL's procurement program does not provide formal policies or written procedures to ensure that services obtained from offsite contractors and subcontractors are governed by quality assurance/quality control programs consistent with DOE Order 5700.6B and regulatory requirements.

Discussion

Where DOE operations secure the support of outside contractor laboratories, this work shall be conducted by appropriately certified laboratories. The LBL Procurement Guide, Policy Issuance No. 3, states: "Quality/quality assurance provisions required for specific procurement are determined by the requisitioner."

LBL's Environmental Protection, Environmental Restoration, and Waste Management Programs do not have formal policies to confirm quality attainment and quality assurance program effectiveness of offsite subcontractors.

Both the Wastewater Discharge Permit (East Bay Municipal Utility District) and the Resource Conservation and Recovery Act interim status requirements (State of California) at LBL require that chemical characterizations be performed by California Department of Health Services (DHS)-certified analytical laboratories. The LBL contract for these services states: the "Seller must hold certification by the Department of Health Services and accreditation from the American Industrial Hygiene Association during the term of this Order. All subcontractors used under this offer must meet the above for any tests." While the site currently utilizes DHS-certified laboratories, documented procedures to ensure that this policy is implemented for all contracts do not exist.

The site contracts with two analytical laboratories for the analysis of wastewater discharge samples and one laboratory for the analysis of hazardous waste samples. Not all of the primary contractor laboratory QA plans and

California DHS certificates that pertain to these were available at the LBL office responsible for maintaining these contracts. During the Tiger Team Assessment, the site did obtain the appropriate primary contractor QA plan and DHS certificates. In addition, at least one of the primary contractor laboratories has been subcontracted to perform selected analysis for the site's wastewater discharge permit program. Site personnel are aware of this arrangement, but the site has no records to indicate that this subcontracted laboratory meets the LBL procurement requirements.

Also, these vendor laboratories have not been evaluated or audited either prior to contract award or service contract award by LBL personnel for compliance with contract QA requirements.

It should be noted that one of the analytical laboratories contracted by LBL was under investigation by EPA. There are records that document a SAN request for LBL (0247) to determine if any of the commercial analytical laboratories that were either under investigation or had been suspended by EPA were contracted by LBL. The request also asked the site to provide SAN with a report on their findings and actions. The records do not include a documented response from LBL.

In addition, there are no contract provisions to ensure that the analytical data received from these contracted laboratories are consistent in quality as well as technically valid and defensible. In addition, the contracts do not require that quality control data on the requested analysis be generated and reported to LBL and/or SAN (0170 and 0397).

This finding was not addressed in the LBL Self-Assessment, but site personnel were aware of these issues.

The cause of this finding is failure to implement DOE policy and failure to provide documented QA requirements, including oversight.

FINDING QA/CF-4:

**Lack of Quality Assurance Plans for
Environmental Analytical Laboratories**

Performance Objective

DOE Order 5700.6B, "Quality Assurance," establishes DOE policy on quality assurance (QA). Section 9d of this Order states: "Quality Assurance activities shall be implemented by DOE organizations and contractors using written procedures and instructions appropriate to the activities to be performed."

Finding

The Environmental Monitoring and the Earth Sciences Division Analytical Laboratories do not have documented and approved quality assurance plans.

Discussion

The Environmental Monitoring Laboratory performs all of the radiological analyses for LBL's Annual Environmental Monitoring Report. The Earth Sciences Division Analytical Laboratory has performed some of the volatile organic compound determinations for the LBL Preliminary Site Investigations. Neither analytical laboratory has a formal, approved QA plan. Written QA plans which are necessary for environmental analytical laboratories to ensure data accuracy, precision, verification, and traceability do not exist. Without documented QA plans, the validity and defensibility of the data generated can be challenged.

The site was aware of this finding, but it did not appear in the LBL Self-Assessment.

The causes of this finding are failure to implement DOE policy by providing inappropriate documented levels of quality assurance and quality control.

FINDING QA/CF-5:

**Lack of Quality Assurance Plans for SAN
Environmental Protection, Environmental
Restoration, and Waste Management Programs**

Performance Objective

DOE Order 5700.6B, "Quality Assurance," establishes DOE policy on quality assurance (QA). Section 9f of this Order states, "Quality assurance activities and the requirements for those activities shall be identified in program plans. In accordance with Federal and DOE standards policies, national consensus standards are to be applied where suitable ones are available. The judicious and selective application of elements of appropriate, recognized standards are encouraged."

SAN MD 5700.6B establishes the SAN Quality Assurance Program in compliance with DOE Order 5700.6B and is intended to apply to all activities that could affect the quality of DOE and other governmental agency-sponsored projects and programs which are conducted in facilities or, as a result of contract requirements, that are within the purview of the Manager, SAN.

Finding

Quality assurance plans for the SAN Environmental Protection, Environmental Restoration, and Waste Management Programs are not available.

Discussion

The lack of program QA plans can impact the effective implementation of QA activities and requirements within the Environmental Protection, Environmental Restoration, and Waste Management Programs administered by SAN. In addition, implementation of these QA plans can provide an important level of uniformity and consistency in contractor programs. It should be noted that SAN has prepared a draft Environmental Restoration and Waste Management Quality Assurance Program document.

SAN was aware of this finding, but it did not appear in the SAN Self-Assessment.

The cause of this finding is failure to implement DOE policy by not providing appropriate quality assurance.

FINDING QA/CF-6:

Lack of LBL Internal Reviews of Quality Assurance in Environmental Protection, Environmental Restoration, and Waste Management Programs and Projects

Performance Objective

DOE Order 5700.6B, "Quality Assurance," establishes DOE policy on quality assurance (QA). Section 9h of this Order states: "Internal quality assurance audits shall be performed as a primary activity by any organization that implements quality assurance criteria or requirements, such as DOE laboratories, energy technology centers, power administrations, and DOE contractors."

Finding

Routine internal quality assurance reviews (audits) at the program and project level of LBL's Environmental Protection, Environmental Restoration, and Waste Management Programs and Projects activities have not been performed.

Discussion

Internal and external audits of environmental programs at LBL are not required by the Institutional Quality Assurance Plan (IQAP) for LBL. Additionally, there is a lack of internal and external audit procedures by which these audits would be performed. As a consequence, LBL has no knowledge of the degree of compliance with IQAP requirements for environmental activities in the Environmental Protection, Environmental Restoration, and Waste Management Programs.

This finding was not addressed in the LBL Self-Assessment.

The cause of this finding is failure to implement DOE policy by not performing audits.

FINDING QA/CF-7:**Deficiencies in SAN's Oversight of Quality Assurance in LBL's Environmental Protection, Environmental Restoration, and Waste Management Programs****Performance Objective**

DOE Order 5700.6B, "Quality Assurance," establishes DOE policy on quality assurance (QA). Section 9i of the Order states: "Field organizations and project offices shall perform external quality assurance audits of DOE laboratories and contractors under their direction, supported by other DOE organizations and consultants, as necessary"; Section 9j states, "Causes of significant deficiencies shall be identified and corrected to prevent recurrence."

Finding

SAN has not performed the 1990 scheduled periodic quality assurance appraisals or audits of the LBL Environmental Protection, Environmental Restoration, and Waste Management Programs and/or their associated divisions. Followup to previously performed quality assurance appraisals is not evident.

Discussion

SAN has not performed a QA appraisal of LBL within the last year. The appraisal conducted in December 1989 addressed the following specific activities:

- Occurrence Reporting
- QA Training
- Internal QA Audits
- Earth Sciences Division QAPP Implementation
- Quality Assurance Records
- Control of Nonconforming Items

Several of these activities, such as the occurrence reporting, QA training, internal QA audits, Earth Sciences Division QAPP implementation, and quality assurance records, have implications on the site's environmental protection, environmental restoration, and waste management programs.

More important is that two of the three key findings in this appraisal were also observed in the Tiger Team Assessment. They are:

- internal audits do not verify division compliance with established procedures, and
- division QAPPs are not implemented.

Although the SAN appraisal was conducted in December 1989, similar deficiencies were observed during the Tiger Team Assessment. Satisfactory

closure of these findings has not been achieved because there is no effective program at SAN for oversight of control actions at SAN sites. In addition, documented evidence that SAN has followed up on the lack of corrective actions by LBL does not exist.

This finding was addressed in the SAN Self-Assessment.

The causes of this finding are ineffective appraisals and audits, and inadequate DOE oversight and lack of resources.

3.5.6.3 Best Management Practice Findings

FINDING QA/BMPF-1: Deficiencies in Good Laboratory Practices

Performance Objective

Good laboratory practice guidelines have been established by EPA in several guidance documents and procedure manuals such as QAMs-005/80 and SW-846 to help ensure the generation of quality environmental analytical data.

Finding

There are deficiencies in LBL's environmental sampling and analysis activities that can affect the technical validity and legal defensibility of data generated in support of the site's environmental protection programs.

Discussion

Deficiencies observed in the sampling and analysis activities include the following observations:

- Field logbooks are not always available during sampling. Records of deviations are not maintained.
- The bottle caps for surface water discharge samples, rather than the sample bottles, are labeled with the sample number. Bottle caps can be easily exchanged or lost, thus invalidating the sample(s).
- The LBL Environmental Monitoring Laboratory does not have standard operating procedures (SOPs) for its routine environmental analysis activities.
- The LBL Environmental Monitoring Laboratory does not have maintenance logs for all of its analytical instrumentation.
- Calibration is not regularly performed and is not documented when it is performed.
- Some site sampling locations for air and surface water sampling are clearly identified or secured.
- Chain-of-custody (COC) procedures are not being used for LBL site radiological effluent monitoring samples.
- Refrigerated sample storage temperatures are not monitored and recorded.

The COC procedure and SOPs deficiencies, were noted in the LBL Self-Assessment. LBL was aware of several of the other deficiencies, including the field logbooks, the instrument maintenance logbooks, and lack of calibration records, but they were not addressed in the self-assessment. The remainder of these deficiencies were not noted by LBL.

The cause of this finding is inadequate personnel training in implementing QA practices and a lack of audits, appraisals, and reviews to identify these deficiencies.

3.5.7 Radiation

3.5.7.1 Overview

The purpose of the radiation section of the environmental assessment of LBL was to evaluate the radiological aspects of dose assessment methodologies and environmental radiation protection activities. These areas were assessed to determine compliance with applicable Federal regulations, DOE Orders, and LBL policies and procedures. The programs were also reviewed against commonly accepted industry performance standards.

The general approach to the radiation assessment included site document review of dose calculation methodologies, radiological procedures, and the emergency preparedness plan. Interviews with LBL personnel and field observations of current environmental radiation protection practices were also conducted during this assessment. In addition, reviews with other team specialists were coordinated to ensure that all potential environmental radiation issues were evaluated in sufficient detail.

The regulations, requirements, and guidelines that were used in the assessment are listed in Table 3-10.

The Environment and Safety Hazards Control Department (ESHC) of the Environmental Protection, Health and Safety Division is composed of five groups. These groups are Engineering Services and Occupational Safety, Environmental Protection, Health Physics, Industrial Hygiene, and Operations. The group responsible for radiological environmental issues is the Environmental Protection group. The Environmental Protection group radiological environmental responsibilities include the environmental monitoring program and dose assessment.

The major effluent release point at LBL is the National Tritium Labeling Facility (NTLF) stack. About 88 percent of the population dose attributed to LBL operations in 1989 was due to tritium discharges from the NTLF stack. Other release points are laboratory hood exhausts, building vents, creeks, and sewer outfalls. The remaining 12 percent of the population dose was due to releases from other LBL stacks and vents, LBL sewers, and 88-inch cyclotron operations. Radiological dose assessments are performed at LBL to determine the offsite consequences of site programs and activities. The dose assessments are conducted to demonstrate compliance with DOE Order 5400.5, "Radiation Protection of the Public and the Environment," and the release limits and dose standards in other DOE, Federal, and state requirements including 40 CFR Part 61, "National Emission Standards for Hazardous Air Pollutants."

The environmental radiation protection activities include monitoring, sampling, and analyzing various media, including air, rain, drinking water, groundwater, and surface water, and to characterize the impact to the environment from LBL site operations. Environmental radiation protection activities are conducted to meet the requirements of DOE Order 5400.5, other Federal, and state requirements, such as the Safe Drinking Water Act. LBL releases relatively small amounts (500 Ci of tritium in 1989) of radioactive material in atmospheric and liquid discharges.

TABLE 3-10
LIST OF APPLICABLE RADIATION
REGULATIONS/REQUIREMENTS/GUIDELINES

<u>Regulations/ Requirements/ Guidelines</u>	<u>Sections/Title</u>	<u>Authority</u>
DOE Order 5400.1	General Environmental Protection Plan	DOE
DOE Order 5400.4	Comprehensive Environmental Response, Compensation, and Liability Act Program	DOE
DOE Order 5400.5	Radiation Protection of the Public and the Environment	DOE
Draft DOE Order 5400.xy	Radiological Effluent Monitoring and Environmental Surveillance	DOE
DOE Order 5482.1B	Environment, Safety and Health Appraisal Program	DOE
DOE Order 5484.1	Environmental Protection, Safety, and Health Protection Information Reporting Requirements	DOE
DOE Order 5500.3	Emergency Planning	DOE
DOE Order 5820.2A	Radioactive Waste Management	DOE
40 CFR Part 61	National Emission Standards for Hazardous Air Pollutants	EPA
DOE/EH-0070	External Dose-Rate Conversion Factors for Calculation of Dose to the Public	DOE
DOE/EH-0071	Internal Dose Conversion Factors for Calculation of Dose to the Public	DOE
PNL 6577/UC-610	A Guide to Reducing Radiation Exposure to As Low As Reasonably Achievable	DOE
10 CFR Part 20	Standards for Protection Against Radiation	NRC
40 CFR Part 141	Safe Drinking Water Act	EPA

The existing programs at LBL are generally adequate to protect the public and the environment except as noted in the findings. Radiation issues in the LBL Self-Assessment were found in the soil, sediment, and biota; air; quality assurance; environmental monitoring; and radiation sections of the report. The LBL Self-Assessment provides an adequate identification of deficiencies, but the discussion and initial response portions of the report lack sufficient depth to assess the adequacy of proposed corrective actions.

Five radiation findings were developed: four compliance findings and one best management practice finding. The compliance findings address deficient dose assessment practices, lack of an environmental as low as reasonably achievable (ALARA) program, deficient decontamination and decommissioning activities, and the lack of a formal monitoring equipment calibration schedule. The best management practice finding address inadequate emergency response activities. The compliance finding discussing the lack of an environmental ALARA program is the only finding that represents a potential for serious environmental impact due to the direct discharge of tritiated water to the environment.

The outlook for the LBL radiological environmental protection program is good. LBL staff members are aware of deficiencies in the current program and are striving to strengthen areas needing improvement, while maintaining existing good practices. The State of California will be formulating radiological regulations in the future which may impact the Laboratory. Current California regulations require LBL to meet existing Federal requirements.

3.5.7.2 Compliance Findings

FINDING RAD/CF-1: Deficiencies in Radiological Dose Assessment Practices

Performance Objective

DOE Order 5400.5, "Radiation Protection of the Public and the Environment," Section 6.b(1) states: "Analytical models used for dose evaluations shall be appropriate for characteristics of emissions, modes of releases, environmental transport medium, and exposure pathway. Information on dispersion in the environment, demography, land use, food supplies, and exposure pathways used in the dose calculations shall be appropriate to evaluate the actual and potential doses in the environs of DOE facilities. Such information shall be updated as necessary to document significant changes that could affect dose evaluations."

Draft DOE Order 5400.xy, "Radiological Effluent Monitoring and Environmental Surveillance," contains best management practice information which should serve as guidelines for achieving the compliance requirements of DOE Order 5400.5. This DOE Order, Section 2.a states: "The information used in dose assessments shall be as accurate and realistic as possible. Complete documentation of assessments of the radiation dose resulting from the operation of DOE-controlled facilities shall be provided in a manner supporting the annual site environmental monitoring report, Environmental Monitoring Plan, or other application, and show the models used; computer programs used; and input data and data source assumptions made." Section 3 states: "The correct operation of computer programs selected for performing the transport calculations for all environmental dose assessments should be verified on a specific computer system. This verification can be done by comparing the program results for sample problems against either documented sample problem results or against hand calculations."

Finding

Formal documentation does not exist for some of the parameters used in dose assessments of LBL. Written procedures and training on the use and verification of the computer codes used at LBL do not exist.

Discussion

Data on dispersion in the environment, demography, land use, food supplies, and exposure pathways used in the dose calculations are not adequately documented in a manner allowing independent verification. A land use census is not routinely performed to verify existing dose assessments or identify exposure pathway changes.

The computer codes used by LBL (AIRDOS-PC and MICROAIRDOS) are operated and maintained by only one LBL staff member (I-R-8). LBL relies on the knowledge of this staff member to perform dose assessments, and written procedures and training for operation of these codes have not been developed. Additionally, these codes are not periodically checked against well-defined and documented bench mark problems to verify the accuracy and proper functioning of the codes.

Furthermore, a detailed pathway analysis that is based on a maximum expected site radiological inventory (source term) and relative concentration/deposition (Chi/Q and D/Q) meteorological data is needed for each major emission source to perform realistic radiological dose assessment.

It should be noted that the calculated doses attributed to site activities are well below regulatory limits, but the current conduct of the dose assessment program does not meet DOE requirements.

The LBL Self-Assessment partially addressed this finding by identifying several items needed to ensure National Emission Standards for Hazardous Air Pollutants compliance.

The causes of this finding appear to be lack of policy implementation, procedures, and resources. The implementation of DOE requirements into current site practices has not occurred. Formal procedures and documentation for the LBL dose assessment methodology do not exist. A contributing cause to this finding is the lack of resources for the environmental protection staff.

FINDING RAD/CF-2:

**Lack of a Formal, Documented Environmental As
Low as Reasonable Achievable Program**

Performance Objective

DOE Order 5400.5, "Radiation Protection of the Public and the Environment," paragraph 6.b states: "In addition to providing protection to members of the public, it is DOE's objective to protect the environment from radioactive contamination to the extent practical." Chapter I, Section 5.a of this Order requires that "additional controls on the release of liquid wastes are adopted to reduce the potential for radiological contamination of natural resources such as land, ground and surface water, and ecosystems." Chapter II, Section 3.a(1) of this Order states: "Although there is no known practicable method for removing tritium from liquid waste streams, facilities and operations are to be designed and operated so that tritium sources and releases are considered in the ALARA process." The Order also requires contractors to implement the as low as reasonable achievable (ALARA) process for all DOE activities and that the basis for ALARA judgments should be documented.

Finding

LBL has not established a formal, documented environmental ALARA program to ensure that radiation exposures to the public and the environment remain as low as reasonably achievable.

Discussion

Procedures to implement the environmental ALARA process at LBL have not been established. Although the site has taken steps to reduce annual atmospheric tritium emissions, no formalized documentation of ALARA goals for environmental ALARA issues are available. An example of this deficiency is the direct discharge of groundwater containing elevated levels of tritium. LBL currently collects groundwater samples from a series of hydraugers onsite. These samples are analyzed for gross alpha, gross beta, and tritium content. The hydraugers discharge directly to the ground and are not contained. One hydrauger (77 12H) discharged groundwater that averaged 29,000 pCi/L of tritium in 1989 (R-1). The EPA drinking water standard for tritium during this time was 20,000 pCi/L. The LBL practice of directly discharging groundwater containing consistently elevated levels of tritium does not meet the ALARA review and documentation requirements listed in the performance objective.

The LBL Self-Assessment did not address this finding.

The causes of this finding appear to be policy, procedures, and review. There is currently no documented environmental ALARA policy in place at LBL. Procedures that address the environmental ALARA process do not exist. In addition, it appears that site operations do not receive documented ALARA reviews of their impacts to the environment.

FINDING RAD/CF-3:

Deficiencies Associated with Decontamination and Decommissioning Activities

Performance Objective

DOE Order 5820.2A, "Radioactive Waste Management," Section 3.a(2) states: "Operational records (e.g., facility design drawings and modifications, characterization data on contamination levels, prior decontamination activities, and incident reports required by DOE Orders) for all contaminated facilities shall be maintained by the cognizant field organization for use in preparing decommissioning plans." Section 3.d(5) states: "After decommissioning operations have been completed, a final radiological and chemical survey report (or an independent verification survey report at remote sites) and a project final report shall be prepared. The final report shall include a description of the project, the final status of the property, and the lessons learned from the project."

Finding

LBL has not characterized known uranium contamination remaining underground from decontamination and decommissioning (D&D) activities associated with the 184-inch Cyclotron. In addition, a formal report on the D&D activities for the outdoor waste storage area adjacent to Building 5 has not been prepared.

Discussion

The decommissioning of the 184-inch Cyclotron began in October 1987 and was completed in September 1988 (R-9). An area of uranium contamination was discovered through environmental monitoring performed during the decommissioning project; this contamination was traced to a sump which drained to an underground pipe. The contaminated pipe was left buried without being characterized for the quantity of contamination in the pipe or the migration of contamination in the surrounding soils (I-R-14). There are also no operational records, final radiological and chemical reports, or final project reports for this activity.

In 1985, LBL identified radioactive contamination in the subsurface soils under a former outdoor waste storage area adjacent to Building 5. LBL undertook D&D of this area. The only written record of the D&D activities at Building 5 are the field logbook notes of the environmental health and safety staff member who directed the investigation. No formal report has been prepared, as required by the DOE Order listed in the performance objective.

Neither of these D&D projects considered the potential for chemical contamination (see Finding IWS/CF-3).

This finding was not addressed in the LBL Self-Assessment.

The causes for this finding appear to be policy, risk, and review. The site policy for D&D activities does not appear to meet the requirements listed in the performance objective. The site failed to consider chemical risks in the D&D projects. Reviews of D&D activities have not been performed for regulatory compliance.

FINDING RAD/CF-4:**Lack of a Formal Calibration Schedule for
Radiological Environmental Monitoring Equipment****Performance Objective**

The LBL Environmental Monitoring Group Procedure number 13 addresses perimeter and in-accelerator penetrating radiation measurements. This procedure states, "the radiation detectors are calibrated annually, and the calibration data is to be entered in the register log."

Draft DOE Order 5400.xy, "Radiological Effluent Monitoring and Environmental Surveillance," sets forth calibration requirements for sampling and monitoring equipment. The Order states that sampling and monitoring systems shall be calibrated before use and shall be recalibrated any time maintenance or modification occurs. In addition, this equipment shall be recalibrated at least annually and routinely checked with known sources to verify proper functioning.

Finding

The calibration of the neutron detection system and environmental air sampling system is not performed on an annual basis, as required by draft DOE Order 5400.xy and the LBL Site Procedure for Perimeter and In-Accelerator Penetrating Radiation Measurements.

Discussion

These systems are not routinely checked with known sources as part of the normal surveillance activities for the monitoring network (I-R-4). Formal documentation does not exist for calibrations that are performed or for routine checks of environmental sampling or monitoring systems. Informal calibration of the neutron detection system is attempted annually, but was not performed last year (I-R-6).

Interviews with LBL personnel indicated that calibrations are performed before installation of equipment and after maintenance of equipment, but there are no formalized annual calibrations.

This finding was identified in the LBL Self-Assessment.

The causes of this finding appear to be lack of policy, procedures, and documentation. The implementation of policies which reflect draft DOE requirements has not occurred. Formal procedures and quality assurance documentation for these activities does not exist at LBL.

3.5.7.3 Best Management Practice Findings

FINDING RAD/BMPF-1: Inadequate Staffing Levels, Training, and Procedures for Emergency Response

Performance Objective

DOE Order 5500.3, "Reactor and Nonreactor Nuclear Facility Emergency Planning, Preparedness and Response Program for Department of Energy Operations," Attachment 1 requires DOE facilities to implement emergency response training programs to provide qualified replacement personnel for emergency operations. Procedures to ensure an adequate number of trained replacement personnel for all key emergency response positions should be implemented at each facility. The training programs should provide instruction in the application of these procedures. Training exercises and drills must be conducted on an annual basis to maintain an adequate emergency response capability.

Although DOE has classified LBL as a non-nuclear facility, the radiological and nonradiological hazards on the site warrant conformance with the performance objective as a best management practice.

Finding

The LBL emergency response organization does not have adequate staffing, training, or procedures in place to perform emergency response actions in accordance with accepted best management practices.

Discussion

The radiological environmental aspects of the LBL emergency response organization are staffed by senior monitoring personnel. Backup personnel are listed on a call-out sheet; however, some of these personnel receive no training and do not participate in emergency response exercises or drills (I-R-13). The LBL emergency response dose assessment capability is limited to one staff member who performs emergency dose calculations by hand (I-R-8). In addition, some of the personnel who work on the emergency monitoring teams also make up the building inspection teams.

The LBL Self-Assessment identified the lack of periodic training exercises aspect of this finding, but did not address the other aspects of it.

The causes of this finding appear to be lack of policy, procedures, and resources. The implementation of accepted best management practices for emergency response into site policy has not occurred at LBL. Procedures for radiological environmental emergency response activities are not adequate to provide instruction in the event of emergency response actions. The lack of available resources for the emergency response program is also a contributing cause to this finding.

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3.5.8 Inactive Waste Sites

3.5.8.1 Overview

The inactive waste sites portion of the Environmental Subteam assessment of LBL evaluated the compliance status of LBL 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 3-11).

Issues assessed included the appropriateness, timeliness, and adequacy of responses to inactive wastes sites and hazardous substance releases. In addition, because a comprehensive evaluation of the LBL site for CERCLA-regulated releases is in the planning and early implementation stages, this assessment also involved evaluating the LBL Conceptual Design Report for Environmental Monitoring and Remediation Facilities, Phase I (0025), hereafter referred to as the Site Characterization Project, which provides the impetus and framework for site characterization activities. Specifically, this evaluation involved determining the appropriateness and comprehensiveness of the technical scope of work for proposed site characterization activities, the compatibility of the proposed work with applicable CERCLA and RCRA Corrective Action guidances and regulations, and the adequacy of the management structure established to accomplish the desired comprehensive inactive waste site responses.

In its self-assessment, LBL concluded that there were no inactive waste sites on the LBL site. This conclusion was based on LBL's definition of "inactive waste sites" as those areas where purposeful and deliberate land disposals or land filling of waste materials have occurred. Interviews with past and present LBL employees and reviews of historical information support the conclusion that there have been no formally designated disposal sites on LBL. Although the term "inactive waste sites" is not based in either CERCLA or the NCP, it is used in the Tiger Team Assessment process to focus on past disposal sites as well as "releases." Both CERCLA and the NCP define "release" as "...any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment..." (CERCLA, Section 101(22)).

Despite LBL's narrow interpretation of the term "inactive waste sites" for the purpose of their self-assessment, it does not appear to have precluded actions by LBL to adhere to DOE Orders and CERCLA provisions. In addition, LBL's evaluations of their performance of CERCLA-related activities are contained in the Surface Water and Groundwater sections of the LBL Self-Assessment. It is important to note, however, that there is no evidence of LBL's consideration of the potential for releases of hazardous constituents to the environment from any facility or from past waste disposal practices of the UCB campus.

LBL is not listed on the National Priorities List (NPL), although it is listed on the Federal Agency Hazardous Waste Compliance Docket (see 53 FR 4280). The Docket listing provides a mechanism for delivering information to the

TABLE 3-11
LIST OF APPLICABLE INACTIVE WASTE SITES
REGULATIONS/REQUIREMENTS/GUIDELINES

<u>Regulations/ Requirements/ Guidelines</u>	<u>Sections/Title</u>	<u>Authority</u>
Public Law 96-510	Comprehensive Environmental Response, Compensation, and Liability Act	EPA
Public Law 99-499	Superfund Amendments and Reauthorization Act	EPA
29 CFR Part 1910	Part 1910.120 Occupational Safety and Health Standards - Hazardous Waste Operations and Emergency Response	OSHA
40 CFR Part 300	National Oil and Hazardous Substances Contingency Plan (NCP)	EPA
40 CFR Part 302	Designation, Reportable DOE- Headquarters Quantities, and Notification	EPA
40 CFR Part 264	RCRA Subpart F, Corrective Action	EPA
40 CFR Part 355	Emergency Planning and Notification	EPA
40 CFR Part 370	Hazardous Chemical Reporting: Community Right-To-Know Act	EPA
40 CFR Part 372	Toxic Chemical Release Reporting	EPA
43 CFR Part 11	Natural Resource Damage Assessment	DOI
DOE Order 5400.1	General Environmental Protection Program	DOE
DOE Order 5400.4	CERCLA Requirements	DOE
DOE Order 5484.1	Environmental Protection, Safety, and Health Protection Information Reporting Requirements	DOE
DOE Order 5500.2A	Emergency Notification, Reporting and Response Levels	DOE
DOE Order 5820.2, superceded by DOE Order 5820.2A	Radioactive Waste Management	DOE

TABLE 3-11 (Continued)
LIST OF APPLICABLE INACTIVE WASTE SITES
REGULATIONS/REQUIREMENTS/GUIDELINES

<u>Regulations/ Requirements/ Guidelines</u>	<u>Sections/Title</u>	<u>Authority</u>
OSWER Directive 9355.3-01	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA	EPA
OSWER Directive 9345.0-01	Preliminary Assessment Guidance for FY 1988	EPA
OSWER Directive 9345.1-02	Expanded Site Inspection Transitional Guidance for FY 1988	EPA
California Health and Safety Code, Chapter 6.95, Division 19	Hazardous Materials Business Plan	California Office of Emergency Services
California Health and Safety Code, Chapter 6.8, Division 20	Section 25319.5/Preliminary Endangerment Assessment	DHS

public on the status of Federal facilities at which hazardous wastes are generated or handled or at which releases of hazardous substances to the environment may have occurred. However, the Docket listing may be inappropriate because one requirement for Federal facility listing is that the land be Federally owned; LBL is on UC land. There are currently no Interagency Agreements, Compliance Agreements, Consent Orders, or Compliance Decrees from Federal, state, or local authorities involving any actual or potential inactive waste sites on LBL. However, LBL was recently informed by the California Department of Health Services (DHS) that the planned characterizations and possible remediation of potential inactive waste sites at LBL may need to proceed under the auspices of a RCRA 3004(u) Corrective Action Order (or at least in a manner not inconsistent with the protocols, methods, and intent of the RCRA Corrective Action Program), as a result of LBL's RCRA Part B application (Natera, January 1991).

CERCLA activities at LBL are in the early stages of the NCP process. Through a private consultant, LBL has developed a "Potential Hazardous Waste Site Preliminary Assessment Part 1-Site Information and Assessment" report (EPA Form 2070-12). The information supplied on the form was further supplemented by a narrative report, prepared by LBL (CERCLA Assessment Report-Phase I, not dated). This preliminary assessment (PA) report was submitted to EPA Region 9 in February 1988, in satisfaction of the requirements of CERCLA Section 120(d) (Thomas, February 29, 1988). EPA has not provided written acknowledgement of their receipt of the notice, nor any indication as to whether further action (e.g., a site inspection) is necessary. The CERCLA Preliminary Assessment Phase I report was also submitted to DOE Headquarters for its independent review and in satisfaction of DOE requirements (Krebs, April 15, 1986).

LBL developed a Site Characterization Project in 1989 as the basis for a comprehensive evaluation of past releases at the site. Overall responsibility for management of this project rests with the Head of the Environment and Safety Hazards Control Department (ESHC). Program Director responsibilities also reside in ESHC, and the Project Manager is located in the Plant Engineering Division. However, since the Program Director position within ESHC is presently vacant, the Project Manager is acting in this regard as well. Technical, administrative, and functional support is provided to the Project Manager by LBL personnel from the Earth Sciences and Plant Engineering Divisions and by the Architectural and Engineering (A&E) contractor for this project (not yet assigned). Finally, policy support for project decisions is provided by a Policy Advisory Board, comprised of LBL individuals from the Planning and Administration, Plant Engineering, and Earth Sciences Divisions, ESHC, and the Program Director. A representative from SAN has also been acting as an *ad hoc* member to this board. Discussions at board meetings and minutes of those meetings, prepared by Plant Engineering staff, have provided the primary vehicles of communication between LBL and SAN regarding the Site Characterization Project. A draft Project Plan has been developed that more precisely defines roles and responsibilities.

While waiting for project-specific funds to be secured for implementation of the Site Characterization Project, LBL has undertaken two additional site characterization efforts using available overhead funds. One, conducted in 1988 by an outside contractor, confirmed the presence of contamination being released from hydraugers near Building 51 (0272) (see Finding GW/CF-1). The second, completed in 1990 by LBL personnel from the Earth Sciences Division, was more extensive in scope and involved sampling hydrauger outflows

throughout the site, using existing inclinometers and boreholes to collect groundwater samples and installing and sampling groundwater monitoring wells. Both of these interim studies have provided supporting analytical data to existing anecdotal information and confirm the presence of contamination as a result of past releases. Because of limited budgets, both studies used existing hydraugers, boreholes, and wells, none of which had been installed with adequate quality control and documentation. In addition, the hydraugers, previously installed for slope stabilization, may not have been in appropriate locations for the purpose of site environmental characterizations. LBL is using results from hydrauger sampling as screening tools only, however, and not as the basis for conclusions regarding sources, migration pathways, or levels of contaminants.

LBL has undertaken some remedial actions in the form of decontamination and decommissioning (D&D) at Building 5. However, these activities have proceeded with consideration for radioactive contamination, but not chemical contamination.

There are currently no provisions for community relations activities in LBL inactive waste site response activities. Although community relations planning is not required for the Site Characterization Project, a Community Relations Plan must be in place if the next phase of the NCP process, the Remedial Investigation/Feasibility Study (RI/FS), is required. It is not clear from the Site Characterization Project that this requirement is understood by LBL officials. Until the RI/FS phase is reached, SAN has advised LBL that notice to the regulatory authorities will suffice in satisfying community relations plan requirements. However, the potential applicability of RCRA 3004(u) Corrective Action Authority and the integration of CERCLA characterizations with the RCRA Part B permit application may require a revised strategy regarding community relations plans.

With respect to EPCRA requirements, LBL has prepared annual reports on the storage of hazardous chemicals which identified locations and quantities of specific chemicals in storage, as required by SARA Sections 311 and 312. The reporting requirements of SARA Sections 311 and 312 are currently met by preparing and submitting the Annual Business Plan to the City of Berkeley as specified by California law. The Annual Business Plan is an inventory of chemical storage at LBL prepared by ESHC. LBL persons responsible for chemical storage or usage at the site have prepared individual chemical inventories for 1989 and 1990, which are used for business plan submission. According to the City of Berkeley Environmental Health Division, LBL is currently in compliance with applicable hazardous chemical report requirements. The Annual Business Plan is currently prepared as a hard-copy, multi-volume document, but the City of Berkeley plans to require that the data be assembled in an electronic database.

In summary, five compliance findings and four best management practice findings were identified. The compliance findings relate to an inadequate PA, inadequate notification and reporting of contamination and associated D&D, inadequate regulatory compliance strategies, failure to carry out natural resources trustee responsibilities, and lack of adequate oversight by SAN. The best management practice findings relate to an inadequate program to prevent inadvertent movement of soils, a lack of formal health and safety plans for field work involving studies of potential inactive waste sites,

inadequate planning of the Site Characterization Project, and lack of a determination of the applicability of EPCRA Section 313 to LBL.

3.5.8.2 Compliance Findings

FINDING IWS/CF-1: Inadequate Preliminary Assessment

Performance Objective

DOE Order 5400.4, CERCLA Requirements, states that DOE shall respond to releases of hazardous substances from its facilities in accordance with the requirements of CERCLA, as well as those of the NCP and Executive Order 12580. DOE's responses shall include both removal and/or remedial actions, as appropriate, regardless of whether the facility is on the National Priorities List. 40 CFR 300.410 and 300.420 of the NCP require that lead agencies conduct Preliminary Assessments (PAs) to inventory sites where releases of hazardous substances may have occurred, identify sources of contamination, including a history of waste handling, and evaluate site conditions. The conduct of PAs is to include a documented collection or review of data such as site management practices, information from generators, analysis of historical photographs, literature reviews, and interviews. Current EPA guidance for conducting PAs is published in OSWER Directive 9345.1-01.

Finding

LBL has not developed a PA report of sufficient scope and detail to satisfy the requirements of DOE Order 5400.4, 40 CFR 300.410, 40 CFR 300.420, and EPA PA guidance (OSWER Directive 9345.1-01).

Discussion

LBL prepared a PA Form 2070-12 and submitted it to EPA Region 9 in February 1988. LBL also developed a DOE CERCLA Phase I PA report in satisfaction of DOE requirements and submitted that report to DOE and EPA. However, a review of the DOE CERCLA PA Phase I Report and the EPA Form 2070-12 by DOE Headquarters revealed the following deficiencies: information provided in the report was not developed to a sufficient level of specificity to allow independent validation, sources of information were not listed as required by EPA's PA guidance, and the report findings and conclusions were insufficiently supported by documentation. In addition, DOE indicated that the identification of hazardous substances used at the facility and hazardous wastes generated at the facility needed to be more quantitatively documented.

The DOE Environmental Survey conducted at LBL in 1988 identified additional sites on LBL that should have also been considered for inclusion in the PA report, including former salvage yards, unbermed transformer pads, unbermed and unprotected hazardous material storage areas, a lead storage area, and inactive underground storage tanks (USTs), some of which are known to have leaked. In addition, historical information suggests that chemical contamination may have been released from certain areas of the Old Town area of LBL, especially from the former waste accumulation area adjacent to Building 5. Although decontamination and decommissioning (D&D) occurred in 1985 to remove radioactive contamination from beneath this former storage area, no chemical characterization had been performed.

Little has been done from February 1988 to the present to address identified PA deficiencies. There is no record as to whether LBL responded to DOE Headquarters review comments, described above, and no record of a subsequent

submission of a revised PA to EPA to include sites identified in the DOE Environmental Survey. In addition, the record does not show that interactions had occurred between LBL and SAN in an effort to remove PA deficiencies. The existing deficiencies of the PA were not addressed in the LBL Self-Assessment.

The causal factors that may have contributed to this finding include an inadequate understanding by LBL of the scope and applicability of a PA evaluation due to a lack of training of personnel in charge, failure to identify and use appropriate EPA guidance, inadequate policy implementation by LBL, inadequate program oversight by SAN, and failure to appreciate the importance of a comprehensive and well-documented PA in supporting decisions for the need for SIs. It is important to note that LBL intends to eliminate the current PA deficiencies as a first step in implementing its Site Characterization Project for Environmental Monitoring and Remediation Facilities, Phase I study (0025).

FINDING IWS/CF-2:

Unreported Releases of Radioactive Contamination into the Environment

Performance Objective

DOE Order 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements," Chapter I, Section 1q (issued February 24, 1980) requires that immediate notification be made to DOE Headquarters for any discovery of significant radioactive or nonradioactive contamination in the onsite or offsite environment attributable to current or past DOE operations. DOE Order 5484.1, Chapter II requires the submittal of reports written in response to follow-up investigations of occurrences such as discovery of onsite or offsite contamination. Similarly, Chapter 5, Section 3, Item 5 of DOE Order 5820.2, "Radioactive Waste Management," issued in 1984, requires that a final report be prepared and forwarded to DOE Headquarters. The report must include a facility description and final radiation survey. DOE Order 5820.2A, Chapter 5 Section 3(a)(2), issued in 1988 as a replacement for DOE Order 5820.2, requires that after completion of decommissioning, a final radiological and chemical survey report and project final report be prepared and kept in the facility's permanent record.

Finding

LBL has not notified DOE Headquarters of contamination discovered in the subsurface soils near Building 5 in 1985. LBL has also not prepared and submitted a formal report to DOE of the decommissioning of radioactive contamination in the subsurface soils near Building 5 completed in 1985.

Discussion

In 1985, LBL identified radioactive contamination in the subsurface soils in a former outdoor waste storage area adjacent to Building 5. Historical records revealed that this area had been used in the past as an accumulation area for radioactive waste materials generated at LBL. LBL undertook decontamination and decommissioning (D&D) of the area. Field measurements identified that radioactive contamination existed not only in the concrete pavement, but also in soils under the concrete. There was also an indication that some migration of radioactive contamination had taken place in the subsurface soils. All radioactive-contaminated concrete and soils were removed for disposal in appropriate offsite disposal facilities.

However, the only written record of D&D efforts at Building 5 are the field logbook notes of the Environment and Safety Hazard Control Department staff person directing the investigation. No formal report has been filed, in accordance with the provisions of DOE Order 5820.2, as superseded by 5820.2A.

Finally, it should be noted that historical information which detailed the former use of the contaminated area also suggest that the contamination released to the environment may have included chemical as well as radiological constituents. However, the D&D activities characterized (and removed) contaminated materials and soils based on radioactive contamination only. No characterization of the area for chemical contamination has ever been performed.

This issue was not addressed in the LBL Self-Assessment (see Finding R/CF-4).

The possible causal factors of this finding include inadequate implementation of DOE Order requirements, inadequate oversight by SAN to ensure that appropriate reports were submitted in a timely manner, and a lack of integration of LBL environmental characterization activities with respect to chemical and radioactive constituents.

FINDING IWS/CF-3:**Inadequate Strategy for Identifying and Meeting Applicable Regulatory Requirements****Performance Objective**

DOE Order 5400.1, "General Environmental Management Program," provides that DOE facilities are responsible for conducting their environmental monitoring and characterization activities in compliance with all applicable DOE Orders and applicable EPA, OSHA, state, and local regulations and guidances. This Order further requires that Heads of Field Organizations engage in discussions and interactions with relevant authorities or otherwise perform indepth regulatory analyses to determine the precise requirements that apply to its ongoing or planned activities. SAN is responsible for ensuring that actions undertaken at facilities for which it is responsible are in full compliance with all applicable regulations and requirements.

Finding

SAN and LBL do not have a formal program in place to identify applicable regulatory requirements at the early stages of project development. As a result, all applicable regulations and requirements pertaining to the planned site activities of the Site Characterization Project have not been identified.

Discussion

A sitewide strategy for the Site Characterization Project (and for other environmental activities ongoing at LBL, including pursuit of the Resource Conservation and Recovery Act (RCRA) Part B permit) has not been developed. Such a strategy would address interacting with regulatory authorities, determining applicable regulatory requirements, anticipating likely future actions and requirements of regulatory authorities (including consideration of draft rules and emerging guidances), establishing a list of performance objectives that satisfy all known or anticipated regulatory requirements (including prescriptive regulatory or statutory deadlines), developing a schedule of continuing interactions with regulatory authorities (if only to deliver milestones or other forms of progress reports), and developing a project schedule (together with contingencies) that satisfies all known requirements. The minutes of the Site Characterization Project's Policy Advisory Board meeting indicate that SAN and LBL's Planning and Oversight Division intend to develop a strategy for regulatory agency interactions, but a written strategic plan does not exist.

The Site Characterization Project's Conceptual Design Report for Environmental Monitoring and Remediation Facilities, Phase I (0025) lists a considerable number of Federal and state statutes, regulations, and guidances that will potentially apply to implementation of the Site Characterization Project. However, the majority of standards and guidances listed pertain to construction aspects of the Site Characterization Project. This list is not comprehensive with respect to environmental regulations, standards, and DOE and EPA policies and guidances. It is important to note that the following regulations, which are not listed in the report, may be applicable to this project: RCRA Corrective Action requirements (40 CFR Part 264, Subpart F); Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Preliminary Assessment (PA) guidance (OSWER Directive 9345.0-01, CERCLA Site Investigation (SI) guidance (OSWER Directives 9345.1-01 and 9345.1-02); the

revised Hazard Rating Score final rule (55 FR 51532); the National Contingency Plan (NCP) final rule (55 FR 8666); proposed rule "Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities" (55 FR 30798); "RCRA Corrective Action at Federal Facilities" (OSWER Directive 9502.00-2); EPA Memorandum "Enforcement Actions Under RCRA and CERCLA at Federal Facilities" (January 25, 1988); and the recently issued California Interim Guidance for Preparation of Preliminary Endangerment Assessment Report (0273). Also, no indepth regulatory analyses have been performed for the Site Characterization Project, based on a review of documents and interviews conducted during the Tiger Team Assessment.

As an example of inadequate communications with regulatory agencies, SAN initiated a meeting with Federal and state regulatory officials at SAN offices on January 9, 1991. However, since this meeting, neither SAN nor LBL has initiated written correspondence with any of the regulatory officials in attendance, outlining LBL's understanding of the decisions or conclusions that were reached in that meeting. LBL has what it believes to be an agreement with EPA Region 9 that EPA will provide it with all necessary guidances, although the EPA official in attendance does not admit to making such a commitment, or believe that she has any explicit responsibility to provide guidance to LBL (I-IWS-39).

The California Department of Health Services (DHS) indicated at the January 9, 1991 meeting that RCRA 3004(u) Corrective Action authority may be applied to the CERCLA investigations outline in the Site Characterization Project and has provided written confirmation (Natera, January 16, 1991) of that possibility, along with a recommendation that Site Characterization Project activities be conducted in a manner not inconsistent with RCRA Corrective Action program guidances (40 CFR 264, Subpart F). (It is important to note that such a recommendation is not legally binding on DHS in the future exercise of its RCRA authority.) There is no evidence in the Site Characterization Project or in the minutes of Policy Advisory Board meetings before the January 9, 1991 meeting that LBL had any previous recognition of the possible applicability of RCRA Corrective Action authority to the Site Characterization Project.

DOE Headquarters is reported to have recommended to SAN that some formal letter of agreement be established between SAN, LBL, and all relevant regulatory authorities to outline the applicability of various Federal, state, or local regulations to Site Characterization Project activities (I-IWS-33). However, SAN considers such an agreement unnecessary at this time, but possibly appropriate when results of the site characterization are available. The primary determinant in SAN's decision appears to be the desire to avoid specific schedules that may be imposed in any manner of formal agreement. This indicates that the strategy for the Site Characterization Report may be driven by considerations other than compliance with regulatory and DOE requirements.

This deficiency was not addressed in the LBL Self-Assessment, but LBL has taken steps to ensure performance objectives are defined for the Site Characterization Project.

The possible causal factors of this finding include inadequate implementation of DOE policy concurrent with technical project objectives, a lack of LBL oversight with respect to interactions with regulatory authorities, a lack of procedures concerning all matters relating to environmental management and

regulatory compliance, a failure to maintain current knowledge of Federal and state regulations, and a lack of an indepth regulatory analysis in support of the Site Characterization Project.

FINDING IWS/CF-4:

Inadequate SAN Oversight

Performance Objective

DOE Order 5400.1, "General Environmental Protection Program," requires that DOE field organizations ensure that the facilities under their responsibility comply with applicable requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Contingency Plan (NCP), and applicable DOE policies, guidelines, requirements, and procedures. To guarantee adequate and consistent SAN oversight, formal lines of communication and vehicles of interaction should be established. Effective interactions with DOE installations should extend to providing applicable regulations and guidances in a timely manner.

Finding

SAN oversight of responses to releases of hazardous substances and wastes at LBL has been ineffective. DOE cannot demonstrate with written documentation its timely conveyance of critical regulations and guidances to LBL.

Discussion

Currently, the Site Characterization Project table of organization provides for input from the LBL Policy Advisory Board to the Program Director. (Because the Program Director position is currently vacant, the Project Manager is receiving this input.) The SAN representative to LBL with respect to environmental restoration activities has participated in meetings of this board and, in essence, considers himself to be an *ad hoc* member of the Policy Advisory Board. However, this role has not been formally defined and documented. The biweekly meetings of the Policy Advisory Board provide SAN with important, detailed information regarding the progress of the Site Characterization Project, as well as other projects relating to environmental evaluations underway at LBL (e.g., investigation of PCB contamination problems encountered in the Bevatron sump, Building 51). It also provides the most direct route for SAN's delivery of guidance and input to LBL regarding the Site Characterization Project and related activities. To date, with the exception of minutes of the board meetings compiled by LBL, there is no written correspondence reflecting SAN's involvement in the Site Characterization Project or a written record of the guidance to LBL regarding specific project requirements.

Nondelivery to LBL of the draft and the recently finalized revised Hazard Ranking Score (HRS) guidance is an example of SAN's failure to convey critical guidance in a timely manner. DOE Office of Environmental Guidance has provided timely notices to Operations Offices of both the Advanced Notice of Proposed Rule Making and Notice of Proposed Rule Making Federal Register notices, sought comments from the Operations Offices, and emphasized that the revised HRS will have a significant impact on DOE's remedial action programs under CERCLA. DOE Headquarters also provided SAN information on orientation courses scheduled by EPA for the revised HRS. However, there is no written record that SAN has conveyed this information to LBL. SAN has not yet conveyed to LBL the revised HRS guidance (December 14, 1990 Federal Register), although the SAN representative to LBL has briefed the LBL Policy Advisory Board on revised HRS impacts. At a January 9, 1991 meeting with regulatory officials, the EPA Region 9 representative indicated that the revised HRS was

indeed published in final form and that EPA Region 9 would use the provisions of the revised HRS to evaluate results of LBL SIs and to assign an HRS score to the LBL site. It is important, therefore, that implementation of the Site Characterization Project be done in such a manner that the assembled data will satisfy the revised HRS information requirements.

It is important to point out that the site characterization work at LBL may also need to proceed in compliance with RCRA Corrective Action guidances. EPA issued specific guidance in 1988 entitled "Enforcement Actions Under RCRA and CERCLA at Federal Facilities." This guidance was subsequently distributed to DOE field offices in February 1988, but there is no record of SAN providing this guidance to LBL. The application of RCRA Corrective Action authority does not necessarily preempt the applicability of the revised HRS in determining the overall risks to the public and the environment represented by the LBL site. SAN's lack of actions in this regard in no way lessens LBL's responsibility to maintain current knowledge regarding CERCLA and RCRA requirements.

Other examples of SAN oversight deficiencies include failure to require expeditious correction by LBL of noted PA deficiencies, failure to provide guidance to LBL regarding applicability of RCRA and CERCLA authorities to planned site characterization activities, failure to ensure timely followup on DOE Environmental Survey findings (see Finding EOR/CF-3), and failure to advise LBL to prepare quality assurance and health and safety plans prior to commencement of field investigations.

SAN did not specifically identify deficiencies in its oversight of site characterization project activities. However, SAN has identified weaknesses in its quality assurance and environmental health and safety oversight of DOE facilities for which it is responsible, including its failure to document SAN/LBL interactions and to explicitly define the roles and structure of its oversight of LBL. SAN has identified potential for inconsistency in its transmittals of applicable and appropriate rules and guidances. SAN has recognized that its interactions with regulatory authorities have been sporadic and limited and that it has performed a less than comprehensive analysis and appraisal of contractor environmental programs.

The possible causal factors of this finding include a lack of explicitly defined roles for SAN and LBL personnel, lack of staff resources for SAN and LBL, SAN's failure to explicitly define its oversight roles and interactions with LBL, and SAN's lack of recognition of possible compromise of its oversight responsibilities regarding LBL's inactive waste sites and releases activities.

FINDING IWS/CF-5:**Inadequate Conduct of Natural Resource Trustee Responsibilities****Performance Objective**

DOE Order 5400.4, "Comprehensive Environmental Response, Compensation, and Liability Act Requirements," mandates DOE to respond to releases and potentially imminent releases of hazardous substances from sources under DOE custody or control in accordance with the provisions of CERCLA, as amended, the NCP, and Executive Order 12580, regardless of whether the facility is listed on the National Priorities List. CERCLA Section 104(b)(2) and NCP Section 300.135(j) require that DOE as a lead agency, notify and coordinate with other cognizant state and Federal Natural Resource Trustees when DOE discovers a release or a threat of release as a hazardous substance, pollutant or contaminant from a DOE facility. NCP Section 300.135(j) provides the general response action procedure for a lead agency to "promptly" notify natural resource trustees of threats or potential threats to their trust resources. NCP Section 300.410(g) states that "the lead agency shall seek to coordinate necessary assessments, evaluations, investigations and planning with such state and Federal trustees."

Finding

SAN has not identified the appropriate natural resource co-trustees, nor has it formally notified them of past hazardous substance releases, groundwater contamination, and corrective actions planned or underway at LBL.

Discussion

Environmental studies, monitoring, and assessments conducted by LBL and SAN indicate that the groundwater, soil, sediment, and biota at LBL have been contaminated with organic and radioactive substances due to past spills, leaks, accidents or waste handling practices at LBL. For example:

- data from a 1986 study show that trichloroethylene (13 ppb) and tetrachloroethylene (94 ppb) are present in groundwater near Building 51 in concentrations higher than EPA-established maximum contaminant levels (MCLs) and California Department of Health Services (DHS) recommended action levels;
- groundwater samples collected from well 13130 indicate the presence of elevated levels of tritium (2,600 pCi/L). Additionally, water samples collected from Hydrauger 75/77 in 1986 and 1988 were found to contain elevated levels (2,000 pCi/L) of tritium; and
- past underground storage tank leaks have contaminated surrounding soil and possibly groundwater with hydrocarbons and polychlorinated biphenyls (0404).

During an interview with DHS personnel (I-IWS-102) it was indicated that the state considers itself a co-trustee for groundwater resource and believes it should have been formally notified of the groundwater contamination at LBL. SAN Environmental Restoration and Waste Management (ERWM) personnel indicated that they were not aware of the natural resource trustee responsibility and

have not received guidance from DOE Headquarters on the subject (I-IWS-100). DOE Headquarters Office of Environmental Guidance agreed that the only guidance provided to SAN regarding trustee responsibility was a two-page factsheet addressing DOE Natural Resource Trusteeship under CERCLA, transmitted on December 15, 1989 (I-IWS-101).

This issue was not identified in the SAN Self-Assessment, and SAN was not aware of the deficiency.

The possible causal factors that may have contributed to this finding include inadequate training of personnel who are not knowledgeable regarding environmental regulations and failure of DOE Headquarters to prepare procedures for complying with the regulation.

3.5.8.3 Best Management Practice Findings

FINDING IWS/BMPF-1: Inadvertent Disturbances of Potentially Contaminated Soils

Performance Objective

Until the full extent of soil contamination at LBL is well defined and contaminated soil is evaluated with respect to hazardous waste regulations (particularly land disposal restrictions), movement of soils throughout the site should be carefully controlled to avoid possible Resource Conservation and Recovery Act (RCRA) violations and the unnecessary spread of contamination.

Finding

LBL has not established a program to prevent the inadvertent movement of potentially contaminated soils throughout the site.

Discussion

Field studies have identified areas of soil contamination at LBL. In some instances, the levels of contamination exceeded action levels specified in California regulations as potential performance targets for successful remedial actions. Additional soil contamination may result from discharges of contaminated groundwater from hydraugers located throughout the site.

Because of the unique topographic features at LBL and the inherent instability of steep hillsides throughout the site, LBL is constantly engaged in activities intended to reduce the potential for landslides. Also, construction projects are frequent. Both construction and slope stabilization activities often involve the movement and redistribution of surface soils believed to be in particularly precarious positions. However, while these hillside stabilization activities are conducted under the direction of Plant Engineering, there is no specific element in this soil relocation program addressing the possible chemical or radioactive contamination existing in the soils being moved. Although there is no record or other evidence to suggest that contaminated soils have been unknowingly moved to other locations on the site, the lack of a specific program designed to verify the absence of soil contamination offers no guarantee that such movements did not occur in the past or would not occur in the future. If contamination levels in relocated soils have reached levels whereby the soil would be categorized as a hazardous waste (specifically, failing the Toxicity Characteristic Leaching Procedure (TCLP) leaching test (40 CFR 261.24)), such soil relocations would be in violation of RCRA land disposal restriction regulations. Such movements may also not be in accordance with requirements of possible CERCLA removal or remedial actions or RCRA corrective actions. Although the probability that contaminated soils exist on LBL in excess of RCRA hazardous waste regulatory levels is quite low, a characterization program would confirm site conditions.

The LBL Self-Assessment has not specifically identified the lack of a program to control soil relocations as a deficiency. However, LBL has identified the need to better characterize its soils as a way of anticipating the need, costs, and priority for future slope stabilization activities, albeit without specific reference to chemical contamination and its potential influence on such projects (see LBL-SB.2-2). LBL has also noted that the lack of a

comprehensive environmental monitoring plan may impact LBL's ability to characterize environmental impacts of ongoing activities or demonstrate compliance with applicable regulations (see LBL-EM.11-3).

The possible causal factors contributing to this finding appear to be failure to properly analyze the risks associated with operating a facility with known or suspected soil and ground water contamination, failure to establish barriers or controls appropriate for those risks, lack of a coordinated environmental management program, and failure to integrate environmental regulatory concerns with other engineering activities at LBL.

FINDING IWS/BMPF-2:

Deficient Health and Safety Plans

Performance Objective

29 CFR 1910.120 sets occupational safety and health standards for hazardous waste operations and emergency response. 29 CFR 1910.120(a)(1)(i) and (b)(4) require that health and safety plans be developed and implemented for initial investigations of government identified uncontrolled hazardous waste sites. Health and safety plans are required to address the safety and health hazards of each phase of site operations and to include the requirements and procedures for employee protection. Although LBL is not a government identified site (i.e., one in which a governmental agency has required some type of response or corrective action), it is a best management practice that health and safety plans be prepared in accordance with 29 CFR 1910.120 for any type of field activity involving the investigation of hazardous substance contamination.

Finding

A draft health and safety plan that was developed for the Site Characterization Project inadequately identifies and evaluates the entire array of potential hazards expected to be encountered during field investigations. In addition, LBL did not develop formal health and safety plans for field investigations of potential hazardous waste sites.

Discussion

A draft health and safety plan has been developed by a contractor for the Site Characterization Project and is presently undergoing review by the Site Characterization Project's Policy Advisory Board. However, the draft health and safety plan is deficient in that it does not consider the potential for exposure to radioactive contamination. Furthermore, two studies were conducted at LBL in 1988 and 1990, and some preliminary activities associated with the Site Characterization Project (soil gas surveys and monitoring well installation) have already proceeded under the direction of LBL Earth Sciences personnel. None of these activities have been conducted under a formal health and safety plan. The minutes of the Policy Advisory Board indicate that the board was aware of the need to develop and adhere to a formal health and safety plan, but the responsibility to ensure that an adequate plan was developed was not assigned to anyone.

No specific procedure is in place to ensure that formal health and safety plans (that satisfy the requirements of 29 CFR 1910.120) are developed before field investigations begin.

The LBL Self-Assessment identified four issues that relate to personnel protection (i.e., LBL-PP.1.1, LBL-00.5.2., LBL-WS.3.4, and LBL-WS.5.1). However, it did not identify the analogous requirements to be contained in health and safety plans for field activities as specified in 29 CFR 1910.120.

The possible causal factors for this finding appear to be training, in that there is a lack of understanding of the minimum elements to be included in a health and safety plan, as well as a commitment of resources on LBL's part to move the Site Characterization Project ahead as expeditiously as possible. Additional casual factors include an inadequate implementation of LBL and DOE

policies, unfamiliarity with the applicability of OSHA requirements for pre-remedial activities, inadequate training, inadequate procedures for developing health and safety plans, failure to recognize the risks associated with field activities, and inadequate coordination among LBL divisions and individuals involved in field investigations.

FINDING IWS/BMPF-3:**Inadequate Planning for Site Characterization Project Preliminary Work****Performance Objective**

DOE Order 5400.4, CERCLA Requirements, states that DOE shall respond to releases of hazardous substances from its facilities in accordance with the requirements of CERCLA, as well as those of the National Contingency Plan (NCP) and Executive Order 12580. DOE's responses shall include both removal and/or remedial actions, as appropriate, regardless of whether the facility is on the National Priorities List. 40 CFR 300.420(c) and 300.430(b) of the NCP require that the lead agency prepare field sampling plans and quality assurance project plans prior to conducting field activities associated with remedial site inspections and remedial investigations. It is a best management practice that sampling plans and quality assurance project plans as well as project management plans be developed prior to conducting field studies whose purposes are similar to SIs and RIs (i.e., investigations of hazardous substance releases).

Finding

LBL has not prepared project management plans, quality assurance project plans, and sampling and analysis plans prior to conducting field activities associated with the investigation of hazardous substance releases.

Discussion

LBL has conducted several preliminary studies associated with environmental contamination and is presently developing and implementing portions of the Site Characterization Project. These projects are designed to begin characterizing the extent of contamination at the facility, although they are not formally site inspections or remedial investigations. They have been conducted without project management plans, quality assurance project plans, and sampling and analysis plans.

With respect to the Site Characterization Project, a draft Quality Assurance Guidance Document has been developed by a contractor and is presently undergoing review by the project's Policy Advisory Board. However, some preliminary work (soil gas surveys and monitoring well installation) has already proceeded under the direction of LBL Earth Sciences Division personnel. It was reported in the December 21, 1990, minutes of the Policy Advisory Board that the Earth Sciences Division is developing its own procedures for laboratory analyses. However, a contractor had also been assigned to develop a project plan, which would include laboratory activities. It is not clear how incompatibilities between these plans will be resolved, or even why two plans are necessary.

The absence of a final project management plan for the Site Characterization Project has resulted in some confusion among principal LBL participants regarding their specific roles and responsibilities. However, LBL has recently developed a draft project management plan which contains explicit roles and responsibilities. A detailed sampling and analysis plan will be completed. The Architectural and Engineering (A&E) contractor to the project will complete development based on their assessment of the entirety of the available and relevant information.

LBL has recognized deficiencies in its quality assurance program plans for effluent monitoring and environmental surveillance activities, but it has not specifically identified deficiencies in the quality assurance project plan for the Site Characterization Project. LBL has, however, recognized the need to develop a detailed quality assurance project plan, project management plan, and sampling and analysis plan for the Site Characterization Project.

The possible causal factors of this finding appear to be lack of overall Site Characterization Project coordination, failure to assign roles and responsibilities to ensure that requirements are met, and failure to establish appropriate procedures to prevent field activities from proceeding without the necessary management and quality controls. Delays in establishing the subcontractor and a lack of allocated resources necessary to move the project forward as expeditiously as possible may have also contributed to this finding.

FINDING IWS/BMPF-4:**Undetermined Need for SARA Title III, Section 313 Reporting****Performance Objective**

DOE guidance as contained in "Compliance With The Requirements of the Superfund Amendments and Reauthorization Act" (SARA) Title III (December 13, 1989) state that DOE facilities and contractors must "comply with both the letter and spirit of Title III." 40 CFR 372.22(b) and a DOE memorandum of July 22, 1988, state the criteria that a facility must meet to be within Standard Industrial Classification (SIC) codes 20 through 39 and, therefore, required to comply with SARA Title III, Section 313, reporting. As a DOE contract facility, LBL should evaluate these criteria to determine whether Section 313 reporting is necessary.

Finding

LBL has not determined the need for SARA Title III, Section 313 annual reporting using the criteria stated in 40 CFR 372.22(b) and DOE memorandums.

Discussion

A DOE contractor-operated facility must provide SARA Title III, Section 313, reports if it meets the requirements for number of employees (10 or more), SIC codes (20 through 39) and/or chemical throughput amounts codified in 40 CFR 372.25 and the criteria in a DOE Distribution Memorandum of July 22, 1988 entitled "Clarification of the Applicability of SARA Title III." This memorandum outlines specific tests by which DOE facilities can determine operations' equivalence to applicable SIC codes (0285). LBL has more than 9 employees and site records indicate that at least one listed chemical, 1,1,1-trichloromethane, has been used at LBL in quantities above the SARA Section 313 threshold limits given in 40 CFR 372.25. In addition, LBL produces labeled tritium compounds which may place it in SIC code 2835, In Vitro and In Vivo Diagnostic Substances. However, a determination has not been made as to whether this is the Laboratory's primary SIC code as an establishment of the UCB, and whether the value of this product is greater than 50 percent of all products and services shipped and provided. If LBL meets these latter two criteria, then it would be required to provide SARA Title III, Section 313, reports.

LBL has not submitted the Section 313 report based on a directive by the LBL Laboratory Counsel dated May 19, 1988, that states the position of UCB as that it (the University) is not required to comply with SARA Title III, Section 313. The implication is that since UCB is not subject to Section 313 reporting, then neither is LBL. This line of reasoning is insufficient to address the possibility that LBL may have its own establishment SIC code of 20 through 39.

The written documentation about this issue indicates no involvement by SAN in the decisions related to SARA Title III, Section 313, reporting at LBL. This issue was not addressed in the LBL Self-Assessment.

The possible causal factors for this finding are failure of DOE Headquarters to provide unambiguous guidance and direction to field offices, as well as failure of LBL to follow DOE Headquarters recommendations.

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3.5.9 National Environmental Policy Act

3.5.9.1 Overview

The purpose of the National Environmental Policy Act (NEPA) assessment of LBL was to (1) evaluate NEPA management structure and NEPA review processes at LBL and, as related to LBL, at SAN and the DOE Site Office; (2) identify inappropriate procedures, guidance, and inadequate NEPA documentation; (3) evaluate compliance with NEPA, Council on Environmental Quality (CEQ) regulations, and DOE NEPA guidelines, Orders, and memoranda (see Table 3-12); and (4) assess the integration of the California Environmental Quality Act (CEQA) and NEPA.

The scope of this assessment included interviews with staff members responsible for NEPA compliance at LBL, the DOE Offsite Office, and SAN; review of NEPA guidance and NEPA review and tracking procedures; review of the adequacy of documentation prepared for NEPA compliance related to ongoing and proposed actions; and review of procedures for the integration of NEPA with CEQA. The 1976 Omnibus Environmental Assessment, the 1989 1-2 GeV Synchrotron Radiation Source Environmental Assessment, and the 1989 Draft Hazardous Waste Handling Facility Environmental Assessment were reviewed. The use of categorical exclusions, Memoranda-to-File (MTFs), action description memoranda (ADMs), and environmental evaluations was evaluated for consistency with DOE NEPA requirements. CEQA documents were not reviewed.

For the last several years, LBL has made a genuine effort to develop procedures for compliance with NEPA despite the lack of guidance from SAN. Until the DOE Offsite Office was established in September 1990, LBL sent its requests for NEPA determinations directly to SAN. The DOE Offsite Office now acts as the central point for all NEPA documentation and has the responsibility of channeling the documents to the appropriate SAN personnel for review and processing. SAN has been delegated authority by the Director of the Office of Energy Research (ER), but not by the Director of the Office of Environmental Restoration and Waste Management (EM), to make decisions regarding the appropriate level of NEPA documentation for those categories of actions specifically listed in Section D of the DOE NEPA guidelines. Therefore, all EM actions must be signed by the Secretarial Officer (Program Senior Official).

In general, both SAN and LBL NEPA review, guidance, documentation, and coordination are in-place, but contain deficiencies. Although LBL's understanding of the NEPA review process is improving, it is still incomplete (e.g., at the time of the Tiger Team Assessment, LBL did not realize that all proposed LBL actions are subject to NEPA review and determination by DOE). SAN has not formally transmitted guidance to LBL. However, draft SAN NEPA Management Directives (MDs) and the Assistant Secretary for Environment, Safety and Health (EH-1) NEPA guidance have been informally transmitted to LBL. A revised SAN MD reflecting Secretary of Energy Notice (SEN)-15-90 has been prepared. Both SAN and DOE Headquarters oversight of LBL NEPA procedures have been inadequate. None of the LBL NEPA assessment findings was a complete surprise to LBL or SAN. Each had recently completed a self-assessment and had undertaken personnel and procedural changes to improve their operations. In response to findings identified during their self-assessment, LBL has

TABLE 3-12
LIST OF APPLICABLE NATIONAL ENVIRONMENTAL POLICY ACT
REGULATIONS/REQUIREMENTS/GUIDELINES

<u>Regulations/ Requirements/ Guidelines</u>	<u>Sections/Title</u>	<u>Authority</u>
P.L. 91-190 (January 1, 1970) as amended	National Environmental Policy Act	U.S. Congress
40 CFR Parts 1500 through 1508	Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act	CEQ
DOE Order 4700.1 (March 6, 1987)	Project Management System	DOE
DOE Order 5400.4 (October 2, 1989)	Comprehensive Environmental Response, Compensation, and Liability Act Requirements	DOE
DOE Order 5440.1C (April 9, 1985)	National Environmental Policy Act	DOE
52 FR 47662-47670 (December 15, 1987), 55 FR 37174-37179 (September 7, 1990)	Department of Energy Compliance with the National Environmental Policy Act; Amendments to the DOE NEPA Guidelines	DOE
SEN-15-90 (February 5, 1990)	National Environmental Policy Act	DOE
	Interim Procedural Guidance for Implementation of SEN-15-90. March 2, 1990; September 20, 1990	DOE

- drafted guidelines for compliance with NEPA and CEQA (review in progress),
- drafted a plan for NEPA-CEQA training (not yet implemented),
- participated in DOE NEPA training, and
- established a database to track NEPA review for construction projects, although, the database does not currently track other projects.

LBL has instituted a system to ensure the review and tracking of construction projects, which are the projects at the site with the greatest potential for environmental impact. However, LBL, as a DOE contractor, continues to make *de facto* NEPA determinations because it is not submitting all proposed actions to SAN for NEPA review. In particular, nonconstruction projects, DOE-funded research, and Work For Others projects are not submitted to DOE for NEPA review and determination. In addition, forms currently being used for NEPA evaluation are not consistent with DOE requirements, e.g., the Environmental Impact and Safety Analysis Classification Document. Other forms (e.g., Request for Approval of Sponsored Work) do not include an indication of the status of NEPA review for proposed actions.

In response to its self-assessment, SAN

- appointed a NEPA Compliance Officer (NCO),
- established a DOE Offsite Office at LBL,
- wrote draft NEPA guidance, and
- initiated the process for an integrated NEPA-CEQA sitewide document.

However, deficiencies still exist (e.g., incomplete central files, lack of a coordinated NEPA tracking system, incomplete review of all LBL proposed actions, lack of a NEPA training program, and incomplete assumption of NCO responsibilities as outlined in NEPA draft DOE Order 5400.1D), which result in inadequate NEPA leadership at SAN, inadequate NEPA guidance to LBL, and inadequate NEPA guidance within SAN.

The NEPA portion of the LBL Tiger Team Assessment resulted in six compliance findings. These findings relate to inconsistent NEPA guidance, inadequate NEPA review, lack of NEPA review prior to decisionmaking or project start, inadequate recordkeeping, inadequate NEPA documents, and incomplete implementation of SEN-15-90.

3.5.9.2 Compliance Findings

FINDING NEPA/CF-1: LBL and SAN National Environmental Policy Act Guidance Inconsistent with DOE Headquarters Guidance

Performance Objective

Secretary of Energy Notice (SEN)-15-90 (February 5, 1990), DOE Order 5440.1C, National Environmental Policy Act (NEPA) DOE Order 4700.1 Project Management, the DOE NEPA Guidelines (52 FR 47662), the DOE NEPA Compliance Guide (Draft), and the Interim Procedural Guidance for Implementation of SEN-15-90 (March 2, 1990 and September 20, 1990) establish requirements/guidance for compliance with NEPA and Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508). Taken together, these documents establish a procedural framework to ensure compliance with NEPA.

Finding

There has been no NEPA guidance issued at LBL until recently (January 11, 1990). The draft Guidelines for Compliance with NEPA and the California Environmental Quality Act (CEQA) at LBL (0222) are inconsistent with the DOE Headquarters guidance regarding NEPA.

Discussion

Although LBL has initiated an admirable effort to provide guidance and establish procedures for NEPA compliance, that guidance, the draft Guidelines for Compliance with NEPA and CEQA at LBL (0222), has several shortcomings. In order of their appearance in the document, the shortcomings are:

- Preparation of an ADM for non-section D proposed actions is not discussed.
- The text does not mandate the review of all proposed actions for NEPA compliance.
- A procedure for identifying both nondocumented and documented categorical exclusions (CXs) has not been described or incorporated.
- LBL guidance does not state that to tier from an existing document, the document must be adequate.
- The guidance does not require all environmental assessments (EAs) to be brief and concise, as described in the CEQ regulations.
- The CEQ regulations and the NEPA Compliance Guide are not completely followed, e.g., in the content of EAs.
- The discussion of Environmental Impact Statements Implementation Plans does not state that these documents are required to be made available to the public.

- The requirements of a Mitigation Action Plan for Findings of No Significant Impact (FONSI), when the FONSI is based in significant part on mitigation, are unclear. Further, the LBL NEPA guidance does not include a discussion of the required annual status report on Mitigation Action Plans to DOE.
- The Environmental Impact and Safety Analysis Classification Document includes "Category 3" CXs and Memoranda-to-File, both of which DOE has since eliminated, but does not include documented and nondocumented CXs.
- The Environmental Checklist Form does not specifically include eligibility criteria for CXs.
- The Office of Sponsored Research Administration Request for Approval of Sponsored Work does not indicate that all DOE actions must receive a NEPA review, although some may be identified as nondocumented CXs. Further, this form does not state that all determinations are to be made by DOE, not LBL. However, LBL has recently created an additional form to address this issue.

Both the LBL (0225) and SAN (0221) Self-Assessments fully addressed this finding. The focus of this finding is on LBL, rather than on SAN (see Finding NEPA/CF-6). The awareness level of LBL is illustrated by the deficiencies in the draft LBL NEPA guidelines, as noted above.

The causal factors that contributed to this finding are the lack of adequate written LBL and SAN procedures and inadequate guidance from SAN, Secretarial Officers (Program Senior Officials), and the Office of Environment, Safety and Health. The site has also been reluctant to accept the concept that NEPA applies to all DOE proposed actions, which indicates a lack of training.

FINDING NEPA/CF-2:**Inadequate National Environmental Policy Act Review, and Inappropriate National Environmental Policy Act Determination of Ongoing and Proposed Actions****Performance Objective**

Secretary of Energy Notice (SEN)-15-90 (February 5, 1990), DOE Order 5440.1C, National Environmental Policy Act (NEPA), DOE NEPA Guidelines (52 FR 47662), and Council on Environmental Quality (CEQ) regulations (40 CFR 1501.2) require an early NEPA review of all proposed actions and their reasonable alternatives prior to implementation, to consider their potential to significantly affect the environment. If delegated by the Secretarial Officer (Program Senior Official), authority to make NEPA determinations for actions listed in Section D of the DOE NEPA Guidelines rests only with the Operations Office Manager (SEN-15-90). For those projects not listed in Section D, the required level of NEPA documentation is decided by the Office of Environment, Safety and Health.

Finding

The LBL review process is such that many proposed actions are not sent to SAN for NEPA review and determination; therefore, *de facto* NEPA determinations have been made by LBL.

Discussion

LBL Project Management has a series of recently developed internal forms to review and evaluate proposed construction projects for their potential environmental impacts. These include the Environmental Checklist Form, dated July 24, 1990 (0228), and the Environmental Impact and Safety Analysis Classification Document (EISACD), dated December 19, 1990 (0228). Following review of the internal forms by the LBL Environmental Working Group (oversight), a project description and EISACD summary of the LBL NEPA recommendation for the proposed action is sent to SAN from the Associate Laboratory Director for Planning and Assurance. Since November 6, 1990, the status of NEPA and the California Environmental Quality Act reviews and safety analysis reports for construction projects has been tracked by the LBL Project Management Section. Plans are underway to review and track construction-related, in-house energy management projects and accelerator improvements.

Although the NEPA review process for proposed construction actions is apparently satisfactory (I-N-1, I-N-3, and I-N-4; 0228), interviews showed that requests used for Field Task Proposals (FTP) for DOE-sponsored research cite Operational Safety Procedures, which do not describe NEPA procedures, for their NEPA review (I-N-9, I-N-22, and I-N-23; 0230). Furthermore, requests used for Work For Others projects (i.e., Requests for Approval of Sponsored Work) (I-N-9; 0232) do not include NEPA review. In the LBL FY 1992 Budget Request for Environmental Monitoring (EM) (April 1, 1990) (0233), 13 of 24 Activity Data Sheets, which were provided by EM, show that NEPA is "not applicable" to the projects. Moreover, maintenance projects and nonconstruction, noncapital projects are presently not subject to NEPA review (I-N-3 and I-N-22). By not submitting these proposed actions to SAN for review and NEPA determination, LBL is, in effect, making NEPA determinations.

DOE guidelines require DOE, not contractors, to make determinations on the appropriate level of NEPA documentation.

Both the LBL and SAN Self-Assessments address certain aspects of the inadequacy of the NEPA review process. Both LBL and SAN are aware that *de facto* NEPA determinations are made by LBL, but are not aware of the magnitude of the problem.

The apparent causes of this finding are incomplete training in the DOE NEPA review process, lack of guidance from SAN, inadequate guidance from EM, and inadequate oversight by SAN and DOE Headquarters.

FINDING NEPA/CF-3:

**National Environmental Policy Act Documentation
is Not Completed Prior to Either Project Start
or the Decisionmaking Process**

Performance Objective

Council on Environmental Quality regulations require environmental information to be available before decisions are made and before actions are taken (40 CFR 1500.1(b)). DOE Order 5440.1C, National Environmental Policy Act (NEPA), and DOE NEPA Guidelines require documentation for ongoing and proposed actions.

Finding

Actions have been taken by LBL for which there is no valid NEPA documentation. Furthermore, for several projects, decisions have been made prior to the NEPA process. NEPA documents are often written after decisions have been made.

Discussion

This finding is based on a review of NEPA documentation at the site, the Long-Range Site Development Plan (LRSDP), project lists, and SAN memoranda.

Project lists (0212, 0215 through 0219, 0223, 0224, and 0226) were reviewed and found to be lacking in NEPA review and documentation. For instance, approximately 300 to 400 small construction and maintenance projects generated each month have no NEPA documentation.

A memorandum on SAN NEPA procedures, dated November 29, 1990 (0240), states that, prior to February 1990, SAN rarely documented categorical exclusions or minor actions that would have required Memoranda-to-File. A memorandum dated August 8, 1989 (0210), from the SAN acting manager to Senior Managers, also recognizes the need for complete NEPA documentation.

Even for projects that have undergone or are undergoing NEPA review, the LBL NEPA process has not complied with the purpose of NEPA, which is to consider environmental effects prior to decisionmaking. Decisions are made at LBL prior to the NEPA process.

DOE required LBL to prepare the LRSDP, dated September 1989 (0003), under DOE Order 4300.1B. LBL has used this document as if it had NEPA documentation, although it does not. This document describes concrete proposals for the construction and siting of, and proposed budget allocations for, projects for which the NEPA documentation has not yet been finalized. Two examples of such projects are the Replacement Hazardous Waste Handling Facility (HWHF) and the Human Genome Laboratory.

The LRSDP states that the HWHF will be located at the Life Sciences Research Area (page 96). The HWHF Environmental Assessment (EA), the first draft of which was dated November 1989 (0098), states that alternative sites for the facility are precluded because the LRSDP has designated the use of these sites for other actions.

On page 36, the LRSDP states that the 1980 Site Utilization Study was used to site the Human Genome Laboratory. This project does not yet even have a draft NEPA document.

Both the LBL and the SAN Self-Assessments acknowledge that there are ongoing and proposed actions for which valid NEPA documentation does not exist. Nevertheless, neither the LBL nor the SAN Self-Assessments addressed decisionmaking prior to the NEPA process, as neither self-assessment included a review of the NEPA documents at LBL. LBL is not aware that they are violating the purpose of NEPA by writing NEPA documents after decisions are made.

The causes of this finding appear to be a lack of training in the purpose of NEPA, lack of guidance from DOE Headquarters, and lack of written procedures.

FINDING NEPA/CF-4:**Inadequacy of National Environmental Policy Act Documentation****Performance Objective**

For National Environmental Policy Act (NEPA) documentation to be sufficient and to be appropriate for tiering, it must adequately address all relevant environmental issues, fully consider the applicable statutes and regulations, and be up to date. Specifically, NEPA documentation must (1) identify and assess the reasonable alternatives to the proposed actions that will avoid or minimize adverse effects on the quality of the environment (40 CFR 1500.2(e)), (2) consider the cumulative impacts of connected actions that cannot or will not take place unless other actions are taken previously or simultaneously (40 CFR 1508.25(a)(1)), (3) consider the requirements of other environmental laws (40 CFR 1500.2(a)), and (4) be concise and analytic rather than encyclopedic in nature (40 CFR 1502.2(a) and 1508.9(a)).

Finding

LBL's NEPA documentation suffers from several deficiencies.

Discussion

This finding is based on a review of LBL's three environmental assessments (EAs), the 1-2 GeV Synchrotron Radiation Source EA (0156), the draft Hazardous Waste Handling Facility (HWHF) EA (0098), and the Omnibus EA (0173); the associated Findings of No Significant Impact (0163 and 0171); and various categorical exclusions (CXs) (0190). Table 3-13 lists the NEPA documents reviewed and their inadequacies.

LBL's sitewide EA, "Omnibus Environmental Assessment," dated August 1976, is outdated and an inappropriate document from which to tier. It was written before the implementation of Council on Environmental Quality regulations and DOE Orders and guidelines implementing NEPA and, therefore, does not fully comply with NEPA requirements. For example, the EA does not contain a floodplains/ wetlands assessment or discussion of endangered species. Although the document is no longer appropriate from which to tier, the site has tiered to this sitewide EA in more recent NEPA documents, which may also render these more recent documents inadequate.

The site has not performed the appropriate consultation with other agencies or appropriately considered other environmental laws in its analysis. Some examples are (1) the site receives its information on threatened and endangered species from the state instead of the Fish and Wildlife Service, as required by DOE, (2) to be issued a new permit under the Resource Conservation and Recovery Act, the site must perform corrective actions on all of its solid waste management units, per Section 3004(u), and (3) the State Historic Preservation Officer has not been consulted. The last point is especially important as the 1-2 GeV Synchrotron Radiation Source will impact a building that may be considered an historic landmark.

The site does not have a process or system to ensure the acquisition of all necessary permits. Therefore, although LBL's NEPA documentation states that all necessary permits have been or are being acquired, it is not clear that this is the case.

TABLE 3-13
LBL NEPA DOCUMENTS REVIEWED

Date of Document	Document Number	Project Description	Inadequacies in the Documents										
			1	2	3	4	5	6	7	8	9	10	11
Categorical Exclusions													
08/17/89	0190a	Building Lighting Test						✓					
08/29/89	0190b	Replace or Monitor USTs						✓	✓				
08/17/89	0190c	Building 37 Process Metering Project						✓					
08/21/89	0190d	Phase III, Laboratory Lighting Retrofit						✓					
08/21/89	0190e	Phase II, Laboratory Lighting Retrofit						✓					
08/21/89	0190f	Building 62 Area Slope Stabilization						✓					
08/17/89	0190g	Building 50 Cooling System Metering						✓					
08/17/89	0190h	Building 26 Automation Test and Demonstration						✓					
02/02/90	0190i	17 General Plant Projects						✓					
04/20/90	0190j	Slope/Seismic Stabilization						✓					
06/14/90	0190k	Labsite Substation						✓					
08/27/90	0190l	Building 70A Utility Upgrade											
08/27/90	0190m	AML Fire Protection Improvement											
08/27/90	0190n	Building 3 Alternative UCB Campus											
10/26/90	0190o	Modifications, Existing Building 75, HWHF						✓					

LEGEND

1. Purpose/Scope Unclear
2. Inappropriate Treatment of Alternative
3. No Appropriate Consideration of Other Laws/Consultation with Agencies
4. Segmentation Connected Actions

5. Not a NEPA Document
6. Incomplete Administrative Record
7. Document Does Not Support Decision
8. Inappropriate Level of Documentation

9. No Record of NEPA Determination for Project
10. Decision Made Prior to NEPA Determination
11. Encyclopedic Text

TABLE 3-13 (Continued)
LBL NEPA DOCUMENTS REVIEWED

Date of Document	Document Number	Project Description	Inadequacies in the Documents										
			1	2	3	4	5	6	7	8	9	10	11
Environmental Assessments													
08/31/76	0173	Omnibus Environmental Assessment		/				/					/
08/11/89	0156	Advanced Light Source	/	/	/	/							/
11/30/89	0098	Hazardous Waste Handling Facility	/	/	/	/						/	/
Environmental Evaluations													
02/09/78	0194a	Ultra High Vacuum Cleaning Facility					/	/			/		
10/18/84	0194b	Center for Advanced Materials					/	/			/		
04/19/85	0194c	Building 69 North End Modification					/	/		/			
04/16/86	0194d	Building 55 2nd Floor Addition					/	/	/		/		
02/01/88	0194e	Phase I, Utility Rehabilitation					/	/			/		
Findings of No Significant Impact													
03/17/77	0171	Omnibus Environmental Assessment		/				/	/				
08/11/89	0163	Advanced Light Source	/	/		/							
Initial Studies													
11/30/80	0192a	Building 74 Addition					/	/			/		
Memoranda-To-File													
06/19/87	0193a	Advanced Light Source						/	/	/			
05/11/90	0193b	Instrument Support Laboratory Rehabilitation						/					
09/19/90	0193c	Chiller Unit at ALS						/	/		/		

LEGEND

1. Purpose/Scope Unclear
2. Inappropriate Treatment of Alternative
3. No Appropriate Consideration of Other Laws/Consultation with Agencies
4. Segmentation Connected Actions

5. Not a NEPA Document
6. Incomplete Administrative Record
7. Document Does Not Support Decision
8. Inappropriate Level of Documentation

9. No Record of NEPA Determination for Project
10. Decision Made Prior to NEPA Determination
11. Encyclopedic Text

EAs at the site are overly long and encyclopedic in nature. The shortest EA is 159 pages, and much of the information in all three EAs is redundant.

None of the three EAs has thoroughly considered the alternatives to the proposed actions. All three EAs state that no true alternatives to the action exist, and none perform a comparative analysis of the environmental consequences of the alternatives.

Proposed actions have been segmented, and cumulative impacts have not been fully considered in LBL's NEPA documents. The 1-2 GeV Synchrotron Radiation Source EA states that its analysis includes only the completion of the light source (page 3). However, the EA later mentions a "future Phase II [that] will be proposed for completion at a later date (page 55). The EA does not describe the scope of this proposed project, apparently because plans have not yet been finalized. Nevertheless, the EA then states that "at the completion of Phase II, Building 7 will be removed in its entirety" (page 56). And "at the completion of Phase II, there will be 200 more users at the facility" (page 82). The potential impacts of Phase II have not been addressed in the EA, except for potential impacts to traffic patterns (page 33). Further, the impacts cannot be addressed because the project scope does not include a description of Phase II.

The EA does not consider the cumulative impacts of the various components of construction and operations. The document acknowledges that decommissioning and part of the construction activities had occurred prior to the preparation of this NEPA document. The impacts of these activities were considered in an MTF, which was approved 6 months before decommissioning. However, even if the individual impacts had been considered previously, NEPA requires that the cumulative impacts be fully evaluated. The significance of cumulative impacts of all activities related to this project have not been assessed.

All NEPA and NEPA-related documents (EISs, EAs, CXs, ADMs, and MTFs) and supporting documents (e.g., Environmental Evaluations) were requested at the time of the pre-assessment visit. Upon arriving at LBL, we were told about three existing EAs. This created a staffing problem because the document review is a tedious time-consuming activity that is usually done before we arrive onsite. Apparently, the 100-page Environmental Evaluation was not available because it was not supplied to us at the time of the preassessment request nor was it given to us when we asked for all additional documents after we arrived at LBL. Nevertheless, if a MTF requires a 100-page environmental evaluation to show that the potential impacts are insignificant, it is a gross misuse of the MTF. A MTF was to be used only in circumstances where it was immediately clear that a proposed action would have no significant environmental impacts. If a proposed action required environmental data gathering or analysis to reach a conclusion, then it failed the MTF test of clearly insignificant and an EA or EIS was necessary.

All but one of the 15 CXs reviewed appeared to be the appropriate level of NEPA review and were adequately supported by the accompanying documentation. However, there is no record at the site that EH-25 has been informed of 12 of these determinations. Further, a CX on the replacement or monitoring of underground storage tanks, did not provide enough information to determine if the action was categorically excluded under Section D of the DOE NEPA Guidelines.

LBL does not appear to be aware of these deficiencies in its documentation. Neither the LBL nor the SAN Self-Assessments addressed these issues, as neither included a review of the NEPA documents at the site.

The apparent causes of this finding are lack of training in the requirements for NEPA documents and problems in the implementation of DOE policy for the integration of NEPA and CEQA. Although the site has made an admirable effort to integrate NEPA and CEQA, the process is not completely successful. For example, an attempt to comply with the requirements for documentation under CEQA has led, in some instances, to EAs that are overly long and encyclopedic.

FINDING NEPA/CF-5:**Inadequate Tracking and Recordkeeping for
National Environmental Policy Act Documentation****Performance Objective**

DOE Order 5440.1C, National Environmental Policy Act (NEPA), requires identifiable procedures (e.g., tracking) and records to ensure that environmental considerations are adequately considered in the decisionmaking process.

Finding

Neither LBL nor SAN has an integrated system for tracking the status of NEPA review and determinations for all LBL actions (0221 and 0225). There are no procedures for recordkeeping (0221) and there is no evidence to indicate that LBL and SAN staffs have a complete understanding of NEPA procedures (0225). This results in inadequate SAN oversight of NEPA documentation (0190) and inadequate LBL and SAN tracking of projects at the site.

Discussion

The inadequacy of LBL and SAN recordkeeping (0221 and 0225) and the lack of a tracking system (0221) were major hindrances to the Tiger Team members when they had to access the files to produce NEPA documentation that had not been provided as part of the pre-visit request. Review of available NEPA files and tracking records (0212, 0215 through 0219, 0223, 0224, and 0226) show that existing records are not adequate to demonstrate past or present compliance with NEPA requirements. Moreover, only 7 of the 31 NEPA documents obtained from the DOE Offsite Office for review by the Tiger Team (Table 3-13), had a complete administrative record.

The recent effort to establish files in the DOE Site Office is recognized by the Tiger Team. However, the files are incomplete. The SAN Self-Assessment recognized this problem. The site is aware of this problem, but did not report it in the LBL Self-Assessment.

The causal factors for this finding are lack of training in NEPA procedures by LBL and SAN and lack of guidance from SAN.

FINDING NEPA/CF-6:**Incomplete Implementation of SEN-15-90 and DOE Order 5440.1C****Performance Objective**

Secretary of Energy Notice (SEN)-15-90 (February 5, 1990), DOE Order 5440.1C, National Environmental Policy Act (NEPA), and the Interim Procedural Guidance for Implementation of SEN-15-90 (March 2, 1990 and September 20, 1990) establish requirements for compliance with NEPA and the Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508).

Finding

Guidance from SAN, Secretarial Officers (Program Senior Officials), and the Office of Environment, Safety and Health (EH) has either not been transmitted or is in draft and incomplete.

Discussion

There is no formal NEPA guidance from SAN to LBL. The Office of Environmental Restoration and Waste Management (EM) has provided draft Interim EM Procedures for Processing NEPA Actions, dated August 20, 1990 (0243), although this guidance is incomplete and outdated. Draft guidance has recently been prepared by SAN (0092) and the Office of Energy Research (ER), but has not been formally transmitted to LBL. EH has not provided guidance on certain subjects, such as preparation of Mitigation Action Plans, and has not provided formal guidance on other subjects, such as NEPA/Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) integration, although it has widely distributed its proposed guidance on this matter.

Some of the shortcomings in the SAN documents are as follows:

- The Interim Section D NEPA Procedures. This document was inappropriately titled, as it addresses only proposed categorical exclusion (CX) requirements under Section D. SAN and ER draft guidance reserve the concept of brief and concise environmental assessments (EAs) for proposed CX EAs, not for all EAs, as prescribed in the CEQ regulations and the DOE NEPA Compliance Guide.
- The Draft Management Directive 5440.1D. This document does not state that NEPA applies to all SAN actions, rather than just those having potential for environmental impact. It is inconsistent with SEN-15-90 and draft DOE Order 5440.1D in areas such as (1) the requirement of mitigation action plans for Findings of No Significant Impact that are based in significant part on mitigation and (2) coordination by EH of consultation with CEQ and the EPA on matters regarding NEPA.
- The Draft SAN NEPA Procedures. This document is rather general. Some of its shortcomings are (1) it does not state in A.1(f) that all contractor activities should be reviewed for compliance with NEPA and (2) it does not establish a system to provide information to the Secretarial Officer (Program Senior Official) for the required NEPA status report in the internal budget review process.

- NEPA Compliance Officer (NCO). Initial interviews (I-N-10 and I-N-13) showed that the NCO had a narrow view of his responsibilities, as outlined in draft DOE Order 5440.1D and in the spirit of SEN-15-90. Some illustrations of this are (1) the lack of integrated procedures that include LBL and SAN and documentation of compliance with those procedures, as described in Part 7.c(3) of the draft DOE Order, and (2) the lack of direct involvement to ensure that all proposed actions are reviewed for the appropriate level of NEPA documentation and to recommend schedules to ensure the early preparation of NEPA documents, as stated in Part 7.c(4). Further, SAN has not designated an ER NEPA Point of Contact for LBL. As a result of the Tiger Team visit, the responsibilities of the NCO were discussed, and it was apparent by the end of the Tiger Team Assessment that he had a better understanding.

Both the LBL and the SAN Self-Assessments partially addressed this finding. The focus of this finding is on SAN rather than LBL (see Finding NEPA/CF-1). The awareness level of SAN is illustrated by the deficiencies in the draft Management Directive and draft SAN NEPA procedures as noted above, primarily the requirement for a NEPA review of all proposed actions.

Inadequate training and resources have contributed to incomplete implementation of SEN-15-90 and draft DOE Order 5440.1D. Although SEN-15-90 was effective February 5, 1990, some of the requirements have not been implemented, either by LBL or SAN, due to inadequate planning and procedures for carrying out SEN-15-90.

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3.5.10 Environmental Monitoring

3.5.10.1 Overview

The purpose of the environmental monitoring portion of the environmental assessment of LBL was to evaluate whether the radioactive and nonradioactive constituents in the Laboratory's effluents and ambient environmental media are accurately measured; using appropriate field methods; whether field procedures exist, are adequate, and are being followed; to determine if the environmental monitoring program is sufficient to assess the dose to the public and the environment; and whether these activities are in compliance with the applicable Federal regulations, DOE Orders, and LBL policies and procedures.

The general approach to the environmental monitoring assessment included review of site documents, review of the environmental monitoring program and procedures, interviews with LBL personnel, and field observations of current environmental monitoring practices. As part of the environmental monitoring assessment, reviews were coordinated with other team specialists to ensure that all potential environmental monitoring issues were evaluated in sufficient detail. The environmental monitoring regulations and requirements which were used in the environmental assessment are presented in Table 3-14.

The environmental monitoring program at LBL is the responsibility of the Environmental Monitoring Group of the Environment and Safety Hazards Control Department (ESHC). This program includes the collection and analysis of onsite and offsite environmental media to determine regulatory compliance at LBL. These environmental media include air, precipitation, surface water, drinking water, and effluents. No routine soil, sediment, or vegetation sampling is performed as part of the monitoring program. Direct penetrating gamma and neutron radiation is continuously monitored at four LBL perimeter locations; however, there is no environmental thermoluminescent dosimetry program associated with the monitoring program.

Issues dealing with environmental monitoring are found in several sections of the LBL Self-Assessment, including Air; Soils, Sediments, Biota; Surface Water; and Quality Assurance. LBL has recognized that there are deficiencies in the manner and scope of the environmental monitoring effort. The Tiger Team Assessment verified that these deficiencies exist.

The existing environmental monitoring program needs improvement, particularly in the areas of formalized procedures, siting rationale, quality assurance/quality control, documentation, and scope. The scope of the current environmental monitoring program is not sufficient to completely characterize the radiological and nonradiological effluents from LBL. There are three compliance findings and one best management practice finding that concern environmental monitoring at LBL. The compliance findings detail inadequacies in the Annual Site Environmental Report, inadequacies in environmental monitoring procedures, and the lack of environmental management plans that are required by DOE Orders. The best management practice finding details deficiencies in the preparation and implementation of the Environmental Monitoring Plan.

TABLE 3-14
LIST OF APPLICABLE ENVIRONMENTAL MONITORING
REGULATIONS/REQUIREMENTS/GUIDELINES

<u>Regulations/ Requirements/ Guidelines</u>	<u>Sections/Title</u>	<u>Authority</u>
DOE Order 5400.1	General Environmental Protection Program	DOE
DOE Order 5400.4	Comprehensive Environmental Response, Compensation, and Liability Act Program	DOE
DOE Order 5400.5	Radiation Protection of the Public and the Environment	DOE
Draft DOE Order 5400.xy	Radiological Effluent Monitoring and Environmental Surveillance	DOE
DOE Order 5482.1B	Environment, Safety and Health Appraisal Program	DOE
DOE Order 5484.1	Environmental Protection, Safety, and Health Protection Information Reporting Requirements	DOE
DOE Order 5700.6B	Quality Assurance	DOE
40 CFR Part 141	Safe Drinking Water Act	EPA

3.5.10.2 Compliance Findings

FINDING EM/CF-1: Inconsistencies and Deficiencies in the LBL Environmental and Effluent Monitoring Procedures

Performance Objective

DOE Order 5700.6B, "Quality Assurance," establishes DOE policy on quality assurance (QA). Section 9d of this Order states: "Quality assurance activities shall be implemented by DOE organizations and contractors using written procedures and instructions appropriate to the activities to be performed."

DOE Order 5484.1, "General Environmental Protection, Safety, and Health Protection Information Reporting Requirements," specifies that all environmental data and information from DOE sites shall be summarized and reported in the facility's Annual Site Environmental Report.

The following draft DOE Order contains best management practice information relating to the Environmental Monitoring Plan and is presented as supporting information for this finding. Procedures for environmental monitoring and laboratory analyses should reflect the requirements of draft DOE Order 5400.xy, "Radiological Effluent Monitoring and Environmental Surveillance." This Order establishes requirements for the general criteria, performance, design, and basis for environmental radiological monitoring programs. The procedures should also be included in the Environmental Monitoring Plan which is required by DOE Order 5400.1 to be in place by November 1991.

Finding

The existing procedures for the LBL Environmental Monitoring Group do not adequately address the monitoring program operations and are not of sufficient detail and scope to ensure consistent and defensible performance and reporting of environmental and effluent monitoring sampling and analysis activities.

Discussion

The Environmental Monitoring Group Procedures, drafted in 1987 and used as guidance for sample acquisition and instrument calibration, provides inadequate procedures for the collection of surface water, wastewater, and atmospheric emission samples. The current laboratory analysis procedures were drafted in 1990. The following deficiencies were noted:

- Detailed sampling procedures are not provided for sanitary sewer sampling for volatile organic compounds.
- Standard procedures and requirements are not given for calibrating sanitary sewer flow meters and pH meters.
- There is no procedure for conducting a land use census to support radiological dose assessment activities.
- There are no procedures for groundwater sampling.

- There is no procedure for data analysis, trending, or review of monitoring results.
- Laboratory analysis procedures do not include reporting or action levels.
- The sample collection procedures for radiological samples refer to 9 "can" samplers, but samples are collected at 10 samplers.
- The air sample collection procedure does not specify the proper placement height for silica gel tritium samplers.
- The Environmental Monitoring Group procedures do not identify or justify sample locations or designate background/control locations for each media, nor do they provide any description or graphical representation as to the locations of the air monitoring stations and the sampling units with which they are equipped.
- The perimeter and in-accelerator penetrating radiation measurements procedure does not specify actions to be taken in the event of failure of the telemetry system.
- Sample collection procedures do not address the use of field logbooks to document sampling activities.
- Inconsistencies were found in Section 4 of the Environmental Monitoring Group procedures, between the data recording methods and requirements described in parts A(1) and A(2). For example, exchange data required under A(1) include the recording of date and time at both installation and removal of sample collectors. In this discussion, there is no requirement for the initials/signature of the person performing the exchange. The A(1) exchange data may either be recorded on the individual collectors or on a data recording sheet ("chit") accompanying a batch of collectors. Under A(2), collectors are handled in batches which must be accompanied by a "chit." The information required on the "chit" includes the personnel initials and collector removal date and time. However, there is no direct mechanism for recording the date and time of collector installation. Further, it is indicated in A(2) that the "chit" is used to record sampling unit conditions and sample exchange data. In Section A(1), the use of a "chit" for Filter Queen (FQ) samples is optional, and there is no requirement to record sampling unit conditions. This optional use of a "chit" is in conflict with Section 7 (A)1 which states that all FQ samples are accompanied by a "chit." The current policy in recording sampler conditions (as stated in the procedure) is one of "no news is good news." This policy does not adequately ensure that inspections of monitoring stations are being performed since no news may also mean inspections are not being performed. (Finding A/BMPF-1 provides further discussion concerning sampler inspections.)
- The procedures do not provide an example of the "chit" or detailed instructions for completion. Site personnel receive informal training on the use of these forms when initially employed by LBL.

A review was performed on the "chits" for the period January 28 through February 1, 1991 (A-09) for a total of 14 records. No entries were provided for Time Off at the bottom of two forms.

- Section 5 A(1) refers the reader to the FQ sample changing procedures in the Operations Group Manual for procedures detailing collection of airborne particulate samples from FQ air samplers. A review of the referenced procedures (A-07) revealed that no such collection procedures are provided.
- Section 6 A(1) instructs personnel to perform radioactive analyses on all membrane (particulate) filters and only some carbon disc (gaseous) filters. However, the procedure does not provide rationale for which disc filters are to be analyzed.
- Section 6 A(3) states that blank and spiked samples are to be analyzed with each batch of tritium samples. While the use of blank samples for analyses other than tritium is discussed later (in Section 15 E) there is no requirement to use spiked samples during analysis of other radionuclides.
- Appendix A provides instructions for flowmeter and sampler checks to be performed daily/weekly. There is no indication of which monitors are checked with which frequency. Additionally, there are no flow rate specifications provided to check against. (See Finding A/BMPF-1 for further discussion.)
- The procedures do not provide any description or graphical representation as to the locations of the air monitoring stations and the sampling units with which they are equipped.

In general, the procedures were lacking in requirements for recordkeeping and sample tracking. For example, there are no requirements to either maintain Field Activity Logs during sample exchanges or provide a formal Chain-of-Custody form in handling of samples. The manual also appears to be out of date as evidenced by reference to draft DOE Order 5400.xx, which, as of February 2, 1990, became DOE Order 5400.5.

In addition, there is no evidence that the manual of procedures is required to be reviewed and approved by a quality assurance representative, that the manual is a controlled document, and that the manual is assigned an Environment and Safety Hazards Control Department policy number. It is also not clear if the "procedures" in the manual are intended to be methods/protocols or standard operating procedures.

The draft Environmental Protection Group Laboratory Analysis Procedures (0391) document is lacking a quality assurance section and method-specific quality control and reporting requirements. This document is also not reviewed and/or approved, and there is no indication that it will be approved by a quality assurance representative or that it will be a controlled document.

During the Tiger Team Assessment, site personnel became aware of the lack of FQ exchange procedures in the Operations Group Manual and subsequently drafted a procedure. However, a review of this draft (A-08) revealed that deficiencies similar to those noted above exist in these procedures.

LBL personnel are aware of some of the deficiencies associated with the current procedures. However, the LBL Self-Assessment did not fully identify all of the individual deficiencies. The site plans to revise the existing procedures and create new ones.

The cause of this finding is failure to implement DOE policy by not providing appropriate quality assurance, failure to provide adequate procedures for performing environmental sampling and analysis, and that the Environmental Monitoring Group lacks adequate resources to adequately perform its functions. Another contributing factor is that LBL has not applied adequate quality assurance to the monitoring procedures.

FINDING EM/CF-2: Annual Site Environmental Report Deficiencies

Performance Objective

DOE Order 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements," page III-2, Section 4.b(2) states: "The environmental monitoring report shall summarize the results of monitoring to determine compliance with applicable effluent standards and permit conditions and should incorporate any other effluent and environmental data and information derived from routine sampling or special studies or measurements that would indicate adherence to or deviations from public safety and property protection commitments published by the Department of Energy in environmental impact statements or other official Department of Energy documents." DOE Order 5400.1, page II-2, Section 4.c states: "All DOE facilities that conduct significant environmental protection programs shall prepare an Annual Site Environmental Report. Environmental reports covering the previous calendar year shall be prepared annually and distributed by June 1. . ."

Finding

The LBL Annual Site Environmental Report does not include all elements required by DOE Orders. The site has also failed to meet the DOE schedule for issuance of the Annual Site Environmental Report.

Discussion

LBL's 1989 Annual Site Environmental Report was reviewed to determine whether it follows the requirements listed in the performance objective. Deficiencies were noted in the following areas:

- the report does not describe any historical changes to the scope and content of the environmental monitoring program;
- there is no discussion of incomplete, missing, or deleted environmental samples for the previous year;
- explanations of analytical data anomalies or outliers are not provided for 1989 data in the report; and
- LBL failed to meet the DOE schedule for issuance of the Annual Site Environmental Report.

The LBL Self-Assessment partially addressed this finding by identifying the delayed issuance of the Annual Site Environmental Report. The other examples cited in this finding were not included in the LBL Self-Assessment.

The causes of this finding appear to be policy implementation, quality assurance, review, oversight, and resources. SAN and LBL reviews of the report are not adequate to ensure adherence to DOE Order requirements. Oversight of the report compilation process has not been sufficient to ensure timely completion and issuance of the report. A contributing cause of this finding appears to be the lack of staff resources to prepare the report. Also, LBL has not implemented DOE policy as represented by DOE Order 5484.1 and has not provided adequate quality assurance for the report.

FINDING EM/CF-3: Deficiencies in the General Environmental Protection Program

Performance Objective

DOE Order 5400.1, "General Environmental Protection Program," establishes environmental protection program requirements to ensure that DOE facilities operate in compliance with applicable environmental laws and regulations, Executive Orders, and DOE policies. Chapter III of DOE Order 5400.1 requires that each field organization prepare: (1) an Environmental Protection Implementation Plan, for implementing the requirements of this Order (the Environmental Protection Implementation Plan must be updated annually and shall be approved by the appropriate Program Senior Official (PSO), with concurrence by EH-1); (2) a Long-Range Environmental Protection Plan; (3) a Groundwater Protection Management Program Plan; (4) a Waste Minimization Program Plan; and (5) a Pollution Prevention Awareness Program Plan.

Finding

LBL has not updated its Environmental Protection Implementation Plan (PUB 5242, October 1989) as required in DOE Order 5400.1, Chapter III. In addition, the following documents required in DOE Order 5400.1, Chapter III had not been prepared: the Long-Range Environmental Protection Program Plan, the Groundwater Protection Management Program, the Waste Minimization Program Plan, and the Pollution Prevention Awareness Program Plan.

Discussion

The LBL Environmental Protection Implementation Plan (PUB 5242) indicates the plan covers the period November 9, 1989 to November 9, 1990, or essentially FY 1990, hence the updated plan for FY 1991 is delinquent. LBL sources indicate the FY 1991 plan is being prepared. In addition, there is no indication that the plan has been approved by the PSO, with concurrence by EH-1, as required by DOE Order 5400.1.

A Groundwater Protection Management Program Plan (GPMPP) has not been prepared, nor has preparation begun in order to meet the November 1991 deadline (see Finding GW/CF-1). An outline for the Waste Minimization Program Plan has been prepared but completion of the Plan has been delayed due to budget constraints (see Finding WM/CF-4). Although a Pollution Prevention Awareness Program Plan has not been prepared, LBL is aware of the requirement for this plan in DOE Order 5400.1.

This finding was included in the LBL Self-Assessment.

The causes of this finding are failure to implement and comply with DOE policy and failure to devote resources necessary to complete needed planning. A further cause is lack of supervision, audits, and appraisals by SAN which would have noted these deficiencies.

3.5.10.3 Best Management Practice Findings

FINDING EM/BMPF-1: Lack of an Environmental Monitoring Plan

Performance Objective

DOE Order 5400.1, "General Environmental Protection Program," Chapter IV, Section 4 states: "A written environmental monitoring plan shall be prepared for each site, facility, or process that uses, generates, releases, or manages significant pollutants or hazardous materials. The plan shall contain the rationale and design criteria for the monitoring program, extent and frequency of monitoring and measurements, procedures for laboratory analyses, quality assurance requirements, program implementation procedures, and direction for the preparation and disposition of reports. The plan shall be reviewed annually and updated as needed. The plan shall identify and discuss two major activities: (a) effluent monitoring, and (b) environmental surveillance. The plan shall reflect the importance of monitoring as a critical element of an effective environmental protection program. The plan shall be reviewed annually and updated every three years." This plan is due by November 9, 1991.

DOE Order 5400.1 further states that environmental monitoring shall be conducted at all DOE sites to identify potential environmental problems and evaluate the need for remedial actions or mitigation measures. Environmental surveillance shall be conducted to monitor the effects, if any, of DOE activities on onsite and offsite environmental and natural resources. Environmental surveillance shall be designed to identify and quantify new and existing environmental quality problems.

Finding

LBL is carrying out environmental monitoring without a monitoring plan in place.

Discussion

An annotated outline for the Environmental Monitoring Plan has been approved, and LBL intends to have the plan in place by April 1991.

LBL does not have documentation for the environmental monitoring program design criteria referenced in the performance objective (I-R-2). These design criteria include the rationale for selecting the locations, media, frequency, and analyses for all effluent and environmental sampling. Examples of this lack of documentation of environmental monitoring program design criteria include the following:

- LBL does not have a comprehensive, coordinated monitoring strategy for groundwater (see Finding GW/CF-1);
- There is no documentation for the siting rationale and configuration of the ambient air monitors (see Finding A/BMPF-3);
- There is no documentation of the siting rationale for the meteorological monitoring station, and the current site is inappropriate (see Findings A/CF-6 and A/BMPF-2);

- There is no documentation for the siting and configuration of sanitary sewer monitoring locations; and
- LBL is not conducting soil, sediment, and biota monitoring (see Finding SSB/CF-1).

The LBL Self-Assessment addressed this finding.

The causes of this finding appear to be lack of policy implementation, procedures, and resources. The implementation of current regulatory guidance into LBL site practices has not been developed in the area of effluent and environmental monitoring. In addition, procedures that direct these monitoring activities have not been adequately developed. A contributing cause of this finding is the lack of resources for the environmental monitoring program.

3.5.11 Soils, Sediments, and Biota

3.5.11.1 Overview

The purpose of the soils, sediments, and biota portion of the environmental assessment was to (1) evaluate the environmental monitoring programs of these media; (2) evaluate the potential for and actual contamination of these media by radiological and nonradiological constituents as a result of past and present operations; (3) evaluate programs and procedures established to prevent future contamination, and prevent the spread of contamination from currently contaminated areas to areas that are not currently contaminated, and (4) compare the environmental monitoring data results of these media with applicable concentration guidelines and regulations.

The general approach to the soils, sediments, and biota assessment included review of site documents, review of the soil, sediment, and biota environmental monitoring program, and interviews with LBL personnel. As part of the soil, sediment, and biota assessment, reviews were coordinated with other team specialists to ensure that all potential issues were evaluated in sufficient detail. The regulations and requirements which were used in the assessment are given in Table 3-15.

Most of the LBL site is underlain by complex sedimentary and volcanic rock deformed by folding and faulting. In general, the bedrock is relatively weak and weathers deeply, which has produced a colluvial cover a few feet thick. The colluvium consists of silts, clays, and variable amounts of rock fragments derived from old landslide debris and weathering of the underlying volcanic bedrock. The colluvium is predominantly granular and contains abundant zones and lenses of loose gravel and rock fragments. These materials may be only moderately dense where there is a lack of silt or clay binder. Natural rock outcrops are few; although, there are many rock exposures in cut slopes. The major geologic unit consists of poorly consolidated sandstones, siltstones, claystones, and conglomerates of relatively low strength and hardness. These rocks are blanketed by clay soils having high shrink-swell characteristics. The western and southern portions of the site are underlain by moderately well consolidated shales, siltstones, sandstones, and conglomerates. Throughout most of the upper elevations, a volcanic unit overlies and is interbedded with the upper layers of the major geologic unit (DOE 1988 Environmental Survey Preliminary Report).

Landslide deposits have been encountered in numerous locations within the LBL site. During the past 20 years, LBL has carried out an aggressive program of slope stabilization to mitigate the risk of property damage due to soil movement (DOE 1988 Environmental Survey Preliminary Report). Grading and filling have often been necessary to provide suitable building sites at LBL because of the hilly terrain. As a result, areas have been filled with soil up to several tens of feet thick in some of the original ravines and depressions. Most of these fills were mechanically compacted during placement (DOE 1988 Environmental Survey Preliminary Report).

LBL is situated on the western flank of the Berkeley Hills and is underlain by a sequence of sedimentary and volcanic bedrock. The soils and surface deposits vary in thickness and are composed of clays, silts, and weathered rock fragments. Canyons have been cut into the hillsides at LBL by weathering and erosion.

TABLE 3-15
LIST OF APPLICABLE SOILS, SEDIMENTS, AND BIOTA
REGULATIONS/REQUIREMENTS/GUIDELINES

<u>Regulations/ Requirements/ Guidelines</u>	<u>Sections/Title</u>	<u>Authority</u>
DOE Order 5400.1	General Environmental Protection Program	DOE
DOE Order 5400.1	Comprehensive Environmental Response, Compensation, and Liability Act Requirements	DOE
DOE Order 5400.5	Radiation Protection of the Public and the Environment	DOE
Draft DOE Order 5400.xy	Radiological Effluent Monitoring and Environmental Surveillance	DOE

The Blackberry Canyon and Strawberry Canyon Areas consist mostly of oaks and laurels, with willows and brush along the water courses. There are fairly extensive open grasslands. Large numbers of eucalyptus and pine were planted in the area circa 1915, and both planted and natural redwood trees exist in certain areas (DOE 1988 Environmental Survey Preliminary Report).

The population of wild animals in the LBL area is fairly extensive, consisting of birds, deer, raccoons, feral cats, skunks, and rodents. Portions of the areas surrounding LBL have been designated natural preservation and ecological study areas by UCB (DOE 1988 Environmental Survey Preliminary Report).

LBL does not maintain a soil, sediment, and biota monitoring program. LBL did perform a one-time sampling and analysis of soil and vegetation at the site. The sampling and analysis effort included offsite locations and provided an indication of background levels of various constituents in the soil and vegetation around LBL.

The 1988 Environmental Survey at LBL identified one finding which has not yet been corrected. The soil, sediment, and biota issues covered in the LBL Self-Assessment adequately identified programmatic deficiencies at LBL. Proposed corrective actions were adequate.

There was one compliance finding identified by the Tiger Team. In general, the finding related to LBL's lack of progress in characterizing the contaminated soil, sediment, and biota and locating the sources of contamination.

3.5.11.2 Compliance Findings

FINDING SSB/CF-1: Inadequate Characterization of Soil, Sediment, and Biota at LBL

Performance Objective

DOE Order 5400.1, "General Environmental Protection Program," states DOE policy as follows: "DOE is committed to good environmental management of all its programs and all its facilities to correct existing environmental problems, to minimize risks to the environment or public health, and to anticipate and address potential environmental problems before they pose a threat to the quality of the environment or public welfare."

DOE Order 5400.5(6)(b) states that ". . .it is DOE's objective to protect the environment from radioactive contamination to the extent practical." Pursuant to these requirements, contaminated soil should be characterized and documented.

Finding

LBL has not fully characterized the extent, nature, and source of elevated levels of radioactive and nonradioactive contaminants which have been identified at the site in the soil, sediment, and biota.

Discussion

Soil samples collected in 1986 by LBL indicated the presence of radiological and heavy metals contamination near several buildings. These samples indicated contamination 2 times above background of alpha emitters around Building 4, the site of a previous radioactive waste storage and staging area; tritium activity 100 times above background around Building 75, the location of the National Tritium Labeling Facility; arsenic 1.5 times above background around Building 71; chromium 1.5 to 4 times above background around Buildings 4, 51, 70/70A, 71, 75, and East Canyon; copper 2 times above background around Building 4; lead 2 times above background around Building 74; and nickel 2 to 2.5 times above background around Buildings 51 and 75. Vegetation samples collected at the same time indicated tritium contamination 1,000 times above background around Building 75.

This 1986 study was limited in scope and did not characterize the full extent or nature of contaminants in the soil, sediment, and biota at the site.

Although LBL has known of this contamination since 1986, there has been little progress in locating the sources and characterizing the contamination. Soil from these areas, as well as other areas of soil contamination from past spills and operations, could potentially be transported offsite in stormwater runoff. However, it is not possible to adequately assess the potential transport of contaminants offsite nor the potential impacts they may pose to the environment and public health due to the lack of a soil, sediment, and biota monitoring program (see Finding EM/BMPF-1).

The subject material in this finding was included in the LBL Self-Assessment and the DOE 1988 Environmental Survey Preliminary Report.

The causal factor which contributes to this finding appears to be an inadequate assessment of the risk associated with operating the facility, and with failure to carry out policy implementation.

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3.5.12 Environmental Oversight and Reporting

3.5.12.1 Overview

Several issues and findings were identified by the Environmental Subteam during the assessment that apply to the overall environmental program and do not readily fit under any specific environmental discipline. These issues primarily concern the LBL and SAN environmental policies and their implementation, as well as the effectiveness of oversight by LBL and SAN in meeting their environmental protection and reporting responsibilities. Some of these issues are broad in scope and have relevance to findings and discussions included in other sections (e.g., Management) of the LBL Tiger Team Assessment Report. Where appropriate, the discussion has been limited and references other sections to eliminate redundancy. The Environmental Subteam decided it appropriate, however, to provide some discussion on these topics in the environmental section because their premise is rooted in environmental issues.

The environmental assessment included the review of LBL and SAN documents, procedures, and records associated with environmental programs. With regard to the particular issues and findings discussed in this section, the team reviewed the LBL Health and Safety Manual (PUB 3000), the SEN-7 reports, the documents tracking the Environmental Survey corrective actions, the SAN Self-Assessment, LBL Self-Assessment, the LBL Annual Environmental reports, and the air and sanitary sewer discharge permits and associated monitoring reports.

3.5.12.2 Compliance Findings

FINDING EOR/CF-1: Lack of Appropriate Level of Involvement by SAN in Regulatory Agency Interactions

Performance Objective

Secretary of Energy Notice (SEN)-6B-89, "Departmental Organization and Management Arrangements," directs that organizational and management changes be made to establish direct line responsibility to ensure successful accomplishment of major DOE programs. In addition, line organizations are to be fully responsible for their own activities, including those activities related to environmental protection, radiation and reactor safety, and worker and public health and safety.

DOE Order 5480.19, "Conduct of Operations Requirements for DOE Facilities," establishes requirements for conduct of operations at DOE facilities and directs that line organizations review existing and planned programs important to safe and reliable facility operations. The Order also directs that Program Senior Officials are responsible for ensuring that program managers oversee the conduct of operations at facilities under their cognizance.

DOE should take the lead in regulatory agency interaction to maintain control of the liabilities associated with regulatory compliance issues.

Finding

SAN has not maintained an appropriate level of involvement in all environmental regulatory activities.

Discussion

While SAN has interacted with regulatory agencies, the level of involvement has not always been adequate. Problems identified include (1) lack of involvement in the identification of potential emission sources requiring permits; (2) lack of reviewing permit applications; (3) lack of SAN's signature on all waste water discharge and air permit applications; (4) failure to take the lead in regulatory agency communications; and (5) failure to receive and review monitoring reports submitted to regulatory agencies. LBL holds three sanitary sewer discharge permits from the local treatment facility to discharge waste waters from the site. The site also holds 35 permits for air emission sources and has certificates of exemption for 82 additional sources from the Bay Area Air Quality Management District (BAAQMD).

SAN does not receive and review self-monitoring reports prior to submission to the East Bay Municipal Utility District (EBMUD). In addition, the Tiger Team noted a lack of SAN involvement and oversight in the identification of potential air emission sources requiring permits from the BAAQMD and a lack of SAN review of all air permit applications. Discussions with LBL personnel (I-A-11) indicate that SAN is often not part of the communication loop with regulatory agencies.

A key finding in the SAN Self-Assessment addressed lack of organization and insufficient staff to provide adequate and effective oversight of LBL. It was not clear in the discussion, however, that SAN is fully aware of the specific

deficiencies documented in this finding by the Tiger Team. Thus, the Tiger Team has concluded that while SAN may be aware of its general lack of involvement in regulatory activities, this specific finding was not included in the SAN Self-Assessment.

Causal factors contributing to the finding include a failure to implement policy, lack of procedures, and lack of resources.

FINDING EOR/CF-2: Inadequate SEN-7A Reporting

Performance Objective

Secretary of Energy Notice (SEN)-7, "Policy on Line Management's Responsibility to Achieve Environmental Compliance" (May 1989) and SEN-7A (subsequent revision August 1990) direct selected DOE field offices, including LBL, to perform a continuous evaluation review and prepare a quarterly report on the status of the line organization's compliance with all environmental regulations. Guidance issued on August 21, 1989, by Secretary Watkins and the Assistant Secretary for Environment, Safety and Health (EH-1) included the requirement that SEN-7A reports be comprehensive and include compliance with DOE Orders. Additional guidance issued by EH-1 on January 31, 1990, required that SEN-7 reports include discussions of NEPA compliance activities, evaluations of management and operations (M&O) contractor performance, and staffing and budgetary needs associated with compliance activities. In addition, reports should include notification of sensitive documents that will be released during the subsequent 3 months.

Finding

SEN-7A reports submitted by SAN are incomplete and are not prepared in full accordance with SEN-7A and guidance issued by DOE Headquarters.

Discussion

Most of the elements in the LBL SEN-7A reports have been developed in accordance with SEN-7, SEN-7A, and DOE-Headquarters guidance; however, the reports are deficient in several areas as discussed below:

- The SEN-7A reports do not identify the lack of an adequate tracking system for NEPA documents at SAN. The Tiger Team identified two findings during the Lawrence Livermore National Laboratory (LLNL) Tiger Team Assessment (Findings NEPA/BMPF-1 and NEPA/CF-2) in April 1990 regarding this deficiency. SAN's proposed corrective action included establishing a formal tracking system. Thus, SAN has been aware of this deficiency at LLNL (as well as LBL) and has not included any discussion on this deficiency in the LBL SEN-7A reports. The Tiger Team identified this finding for SAN again (i.e., lack of a tracking system) during the LBL assessment (Finding NEPA/CF-5).
- The status of the Environmental Survey corrective actions was always appended to the SEN-7A reports as part of the requirements to report the status of all environmental compliance activities; however, the status of the survey corrective actions has not been updated since March 10, 1989 (see Finding EOR/CF-3). SAN has prepared a draft update which was included in the January 1991 report. In addition, Section 3.1 of the October 1990 compliance report states, "most of the items are complete or nearing completion"; however, the Tiger Team confirmed that 17 of the 23 deficiencies listed in the environmental survey are still open. The survey summary table attachment to the quarterly reports inaccurately identifies some open actions as being closed.

- Section 3.3, Permits, Appraisals/Audit Findings and Tracking System states, "LBL tracks and reports to SAN environmental compliance issues (generally, the status of permits) on a quarterly basis." LBL environmental compliance reporting is generally limited to the status of permits.
- Section 4.0, Environmental Protection Performance states "LBL has a relatively good record in protecting the environment. . .no highly contaminated materials resulting from past operations have been discovered." This statement is not supported by the site characterization data. While there is no evidence to prove that contamination has migrated offsite, as stated in the October 1990 SEN-7A report, likewise there is no evidence to rule out any offsite contamination. The statement as written is unsupported and possibly misleading.
- A list of sensitive documents expected to be released during the 3 months following completion of the each SEN-7A report is not included in the most recent LBL SEN-7A October 1990 report. Instead, the report includes a list of reports and documents that were released before the report was completed and delivered to DOE-Headquarters (see Section 3.4, Reporting, LBL SEN-7, October 1990).

The following is a partial list of compliance findings which were identified by the Tiger Team, but not reported in the LBL SEN-7A Report, although the site was aware of the issues:

- A/CF-3, Inadequate Evaluation of Air Permit Requirements and Regulations;
- SW/CF-3, Lack of an Approved Spill Prevention Control and Countermeasures Plan; and
- TCM/CF-1, Lack of Secondary Containment at Aboveground Storage Tanks Containing Petroleum Products.

In addition, although the LBL SEN-7A Report describes the Report of Violation (ROV) issued by the California Department of Health Services on April 16, 1990, the Tiger Team identified 14 compliance findings associated with waste management. Of these, the team determined that the site was aware (or partially aware) of 11. There was no discussion of these issues in the SEN-7A reports. While each individual finding might not be significant enough to warrant inclusion in the report, the fact remains that serious and widespread regulatory noncompliances are not being reported.

SAN was not aware of the SEN-7A reporting deficiencies, and the finding was not reported in the SAN Self-Assessment.

The causal factors contributing to this finding include failure to implement policy and failure to provide adequate quality assurance/quality control for SEN-7 reporting.

**FINDING EOR/CF-3: Lack of Implementation and Tracking for Corrective
 Actions in Response to the 1988 Environmental Survey
 Findings**

Performance Objective

A DOE memorandum dated April 24, 1987, from the Assistant Secretary for Environment, Safety and Health (EH-1) to Operations Office Managers established the requirement that Operations Offices and Program Offices develop and implement corrective action plans to address Environmental Survey findings. The DOE Office of Environmental Guidance and Compliance was identified as being responsible for followup and tracking of actions taken or planned in response to the Environmental Survey findings. A March 1, 1989, memorandum from the Deputy Assistant Secretary for Environment (EH-20) defines specific actions to be taken. (The Office of Environmental Compliance and Guidance has since been reorganized into two divisions with the Environmental Compliance Division (EH-22) assigned this responsibility.)

Finding

LBL and SAN have failed to effectively implement corrective actions for Environmental Survey findings. SAN and DOE Headquarters (EH-22) have failed to adequately followup and track corrective actions taken and planned in response to LBL Environmental Survey findings.

Discussion

As required by the EH-1 memorandum of April 24, 1987, SAN and LBL jointly prepared an Environmental Survey Final Action Plan (March 10, 1989). Since then, SAN has not updated the Final Action Plan or reported any changes in the status of survey findings. SAN has attached the same "Summary of Environmental Survey Findings for LBL" table in the SEN-7 report sent to EH-1 on a quarterly frequency (monthly until August 1990). During the Tiger Team visit, after an Environmental Subteam member interviewed several SAN personnel (I-EOR-1, I-EOR-2 and I-EOR-3) on procedures for tracking and updating Environmental Survey findings, SAN initiated the updating of the summary table; an updated draft was forwarded with the January 1991 SEN-7 report. SAN personnel indicated that they have received no guidance from Environmental Compliance Division of DOE Headquarters as directed by the EH-20 memorandum dated March 1, 1989 (I-EOR-2).

The responsibilities of the Environmental Compliance Division for tracking Action Plans and Action Plan Updates are further detailed in the March 1, 1989 memorandum from EH-20. Specifically, EH-22 is directed to "develop and issue new guidance to the Operations Offices for integrated Action Plans and Action Plan Updates which address. . . Survey. . . findings." The new guidance was to include, in part, the following:

- requisite elements of an acceptable Action Plan, Action Plan Updates, a minimum frequency for updating Action Plans, a corrective action schedule to be contained in the Action Plans and Updates that constitutes the priority in which the findings should be addressed;

- a process for delegation of responsibility, from EH-22 to the Operations Office, for ensuring that Action Plans and Updates are prepared on schedule and entered into the Computer-Assisted Tracking System (CATS) in a timely fashion. The delegation should also include a process for designating a senior manager within each Operations Office as responsible and accountable for certifying the accuracy of the information; and
- an EH-22 approach for determining that Action Plans and Updates are entered into CATS and for notifying delinquent Operations Offices.

Discussions with EH-22 staff indicated that they are unsure of how many Environmental Survey Preliminary Reports (which contain findings), site Action Plans, or site Action Plan Updates have currently been entered into CATS. All Action Plans and Final Action Plans were believed to have been received from the Operations Offices, DOE-wide. In addition, since the issuance of the March 1, 1989, memorandum, EH-22 had not issued new guidance to the Operations Offices for integrated Action Plans and Action Plan Updates to address survey findings as required (I-EOR-4). Information indicates that EH-22 is unsure that the Action Plans and Updates have been entered into CATS and that they do not ensure that regular updates are prepared.

LBL has failed to implement corrective actions expeditiously. Of the 23 Environmental Survey findings identified at LBL, 17 were determined by the Tiger Team to still be open (see Table 3-18). Five of these open findings are being reported by LBL/SAN as being closed. LBL/SAN have not developed a formal closure procedure to validate findings reported closed. Prior to the Tiger Team Assessment (January 14, 1991) the LBL/SAN corrective action plan listed seven corrective actions with planned completion dates before January 1991, yet all of these are still being carried as open findings. The Corrective Action Plan and the "Status of Corrective Actions for Environmental Survey Findings" table from the SEN-7 reports had not been updated to give new projected completion dates (see Finding EOR/CF-1). Table 3-16 presents the current status of each survey finding as determined by the Tiger Team. For each of the findings, a start date, SAN-established completion date, cost to complete, and cost to date have been included, where available. Numbered superscripts denote other specific information related to the finding.

It should be noted that funding for some of the corrective actions has been on hold pending implementation of the Environmental Restoration and Waste Management Five-Year Plan.

This finding was addressed in the SAN Self-Assessment, but was not addressed in the LBL Self-Assessment.

The apparent causal factors contributing to this finding are lack of policy implementation by DOE Headquarters and SAN by not providing adequate guidance and lack of oversight by DOE Headquarters and SAN in followup of action plan and corrective action updates. Inadequate audits/appraisals/reviews by LBL and SAN of the corrective actions planned or taken also contributed to this finding.

TABLE 3-16
STATUS OF CORRECTIVE ACTIONS FOR THE 1988 ENVIRONMENTAL SURVEY FINDINGS

Finding	Start Date	SAN Established Completion Date	Cost to Complete (\$K)	Cost to Date (\$K)	Tiger Team's Determination on Current Status
CATEGORY II					
1. HW release from Bldg. 76	NP	4/89 (closed) ²	61.0	61.0	Nonissue ¹
CATEGORY III					
1. Contamination from leaking sewers	FY 91	FY 89 (FY 96)	TBD (Assessment 7,788)	4249.0	Open ³
2. Contamination from scrap yard spills	FY 91	FY 89 (FY 96)	135.0 (Note 3)	Note 3	Open
3. Contamination from past spills and accidents	FY 91	FY 89 (FY 96)	Note 3	Note 3	Open
4. Well 13130 as contamination pathway	FY 90	Complete (Closed)	20.0/yr	NP	Nonissue ¹
5. Organic contamination in groundwater	FY 91	FY 89 (FY 96)	Note 3	Note 3	Open
CATEGORY IV					
1. Secondary containment for PCB transformers and articles	NP	FY 91 (Closed)	192.0	192.0	Open ⁴
2. Ambient air radiological sampling	NP	Complete (Closed)	2.5	2.5	Open
3. Nonrepresentative meteorological data	NP	Complete (Closed)	10.0	10.0	Open
4. Surface water contamination	NP	9/91	721.0	721.0	Open ⁵
5. Sewer monitoring location	FY 92	9/91 (FY 92)	220.0 (1900.0)	0.0	Open ⁶
6. Nonadherence to sewer monitoring procedures	NP	Complete	Included in Category IV, Item 8	NP	Open

TABLE 3-16 (Continued)
STATUS OF CORRECTIVE ACTIONS FOR THE 1988 ENVIRONMENTAL SURVEY FINDINGS

Finding	Start Date	SAN Established Completion Date	Cost to Complete (\$K)	Cost to Date (\$K)	Tiger Team's Determination on Current Status
7. Groundwater monitoring program	FY 91	9/89 (FY 96)	20.0/yr (Note 3)	Note 3	Open
8. Inadequately characterized sewer releases	NP	Complete (Closed)	15.0/yr	NP	Nonissue ¹
9. HW releases from SAP	NP	6/91 (FY 91)	41.0	200.0	Open ³
10. QAP for environmental monitoring	NP	2/92	40.0/yr (100.0/yr)	NP	Open
11. Soil and vegetation monitoring program	NP	12/89 (Continuing)	40.0/yr (70.0/yr)	NP	Open
12. pH exceedances due to ion exchange columns	FY 90	No date established (Closed)	90.0	90.0	Nonissue ¹
13. Improper segregation of HW	NP	Complete (Closed)	0.0	NP	Nonissue ¹
14. Written maintenance procedures for air pollution control devices	NP	Complete (Closed)	10.0	NP	Open
15. Inadequate SPCC Plan	NP	6/89 (FY 91)	20.0 (50.0)	NP	Open
16. Contamination from stored lead	NP	Complete (Closed)	30.0	NP	Nonissue ¹
17. Inadequate secondary ⁷ containment for drums and ASTs	NP	FY 91	Note 5	Note 5	Open

NOTES

NP Not provided

1. SAN does not have procedures in place to formally close survey findings

2. Information within parenthesis from SAN draft summary table dated 1/23/91 or provided during Tiger Team Assessment

3. Corrective action is part of Environmental Monitoring and Remediation Project

4. Finding is open due to large PCB capacitors without secondary containment

5. Corrective action is part of Environmental Health and Safety Project

6. Funding requested for FY 92

7. Finding not addressed separately in SAN Action Plan but parts included in other projects.

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4.0

SAFETY AND HEALTH ASSESSMENT

4.0 SAFETY AND HEALTH ASSESSMENT

4.1 PURPOSE

The purpose of the Safety and Health (S&H) Subteam assessment was to determine the effectiveness of representative safety and health programs at the Lawrence Berkeley Laboratory (LBL), which is operated by the University of California. A Technical Safety Appraisal (TSA) team was assembled for this purpose. The S&H Subteam assessment was performed concurrently with assessments conducted by the Environmental and Management Subteams.

4.2 SCOPE

Within the safety and health programs of LBL, performance was appraised in the following functional areas: Organization and Administration, Quality Verification, Operations, Maintenance, Training and Certification, Auxiliary Systems, Emergency Preparedness, Technical Support, Packaging and Transportation, Experimental Activities, Site/Facility Safety Review, Radiation Protection, Occupational Safety, Worker Safety and Health (OSHA) Compliance, Industrial Hygiene, Fire Protection, and Medical Services.

4.3 APPROACH

The TSA team was assembled by the Office of the Deputy Assistant Secretary for Safety and Quality Assurance, Office of Safety Appraisals (OSA). The team was composed of Headquarters, Department of Energy (DOE) experts, employees of DOE contractors, and outside consultants. The TSA was conducted according to the Draft DOE "Procedures for Conducting Technical Safety Appraisals," DOE/EH-0129, January 1991.

The S&H Subteam assessment was led by a Team Leader from OSA, and was conducted from January 14 through February 12, 1991. Guidance and direction was provided by the Acting Deputy Assistant Secretary for Safety and Quality Assurance. A list of the team members and their areas of responsibility is provided in Section 4.9; biographical sketches of the team members are provided in Appendix A-3.

A TSA is designed to be operationally focused. Therefore, the evaluation by the S&H Subteam focused on operations and the condition of equipment and facilities. This approach is based on the assumption that the facility and its equipment have been appropriately designed and constructed. The appraisal addresses whether current operations are being conducted within the scope of the operational safety procedures and programs established for specific facilities and activities.

The activities of the S&H Subteam were guided by the performance objectives and supporting criteria contained in the "Performance Objectives and Criteria for Technical Safety Appraisals at Department of Energy Facilities and Sites," DOE/EH-0135, June 1990.

The findings and resulting concerns identified by the S&H Subteam were developed using established performance objectives for each of the functional areas evaluated. Although nearly all of the performance objectives were addressed, this report cites only those objectives for which a concern was

identified. Therefore, the reader is cautioned against forming an opinion of the safety and operational performance within an area without first reading the overview concerning that area. When a performance objective is not listed, the omission implies that the team judged all applicable criteria to be met.

The findings and concerns identified by the S&H Subteam were obtained in three ways: (1) observing routine operations, emergency exercises, and the physical condition of the site and facilities; (2) interviewing management, staff, operators, and craft personnel; and (3) reviewing policy statements, records, procedures, and other relevant documents. In addition, the following self-assessments were reviewed:

"Lawrence Berkeley Laboratory Environment, Safety, and Health Self-Assessment Report," PUB 3090, January 7, 1991.

"San Francisco Operations Office Self-Assessment," December 1990.

Table 4-1 provides a comparison between the findings resulting from the self-assessments and those concerns identified during the TSA. Comparing total concerns to the numbers identified in self-assessments found that 46 percent of the concerns identified in the TSA were totally identified in the self-assessment and 19 percent were partially identified.

Table 4-1
Self-Assessments Summary

Concerns	LBL Self-Assessment LBL Concerns		SAN Self-Assessment SAN Concerns	
	Number	Percent	Number	Percent
Addressed	59	46	3	43
Partially Addressed	24	19	0	0
Not Addressed	45	35	4	57
Total	128	100	7	100

A concern addresses a situation that in the judgment of the S&H Subteam either: (1) reflected less than full compliance with a DOE safety and health requirement or mandatory safety standard; (2) threatened to compromise safe operation; or (3) if properly addressed, would substantially enhance the excellence of a particular situation, even though that part of the operation was judged to have a currently acceptable margin of safety. Because this last category addresses the excellence of operations, more concerns are reported than would result from a strictly compliance-oriented appraisal.

The findings that support each concern immediately precede the concern. The category rating, potential hazard level, and level of compliance for each concern were determined by using the criteria presented in Section 4.7. Most

of the concerns were judged to be Category III, except for seven which were evaluated as Category II.

A comprehensive Occupational Safety and Health Administration (OSHA) type compliance appraisal covering general industry and construction work sites was performed. The scope of this appraisal involved 30 buildings representing more than 1.1 million square feet and covering 1,947 employees. As a result, 456 noncompliance issues were identified, three of which resulted in Category II concerns involving oxygen-fuel gas welding, chemical carcinogen control, and hoisting and rigging.

Drawing upon the extensive experience of its appraisers, the S&H Subteam has made an effort to identify some of the responsible factors in each statement of concern. However, the Subteam recognizes that this effort is imperfect at best, because team members are relatively unfamiliar with the details of day-to-day operations at LBL. Therefore, the S&H Subteam believes LBL should consider the findings, and even the statements of concern, as possibly symptomatic of some set of deeper root causes. LBL management should search out and correct those root causes to ensure that improvements in the safety of the operation will be sustained.

4.4 SAFETY AND HEALTH ASSESSMENT SUMMARY

The S&H Subteam assessment was the second TSA to be performed at LBL. The first TSA was conducted during June and July of 1989. This first TSA found 92 concerns which included three Category II concerns. These three concerns were in the areas of Packaging and Transportation, Occupational Safety, and Industrial Hygiene.

The second TSA performed as part of this Tiger Team Assessment, included a followup of the concerns in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990). Of the 92 previous TSA concerns only 20 are recommended by the S&H Subteam for closeout. The 3 Category II concerns are included in the 20 recommended for closeout. It should be noted that the final action plan for the previous TSA was not approved by Headquarters, DOE until October 23, 1990. The approved plan includes the LBL schedule for corrective actions.

To preclude confusion of concern numbering during development of the corrective action plan, the concerns developed during this assessment are numbered consecutively from the concerns listed in DOE/EH-0096, February 1990. It should be noted that new findings determined during this assessment, but related to the older concerns in DOE/EH-0096, are contained in this assessment report. Therefore, a reevaluation of corrective actions on the concerns in DOE/EH-0096 should be accomplished to integrate actions required by the new findings contained in this assessment. (A tabulation of the concerns from DOE/EH-0096 is contained in Section 4.8.3.)

The S&H Subteam has addressed 136 new concerns at LBL. Seven Category II concerns were identified, three in the area of Radiation Protection, two in area of Industrial Hygiene and one each in the areas of Occupational and Worker Safety. Not all of the 136 new concerns are written against LBL. Seven concerns are written against the San Francisco Operations Office (SAN) and one is written against the DOE Office of Energy Research.

Of the 126 LBL concerns, only 7 were found to have a potential Hazard Level 1. However, 77 were found to be Compliance Level 1 concerns. Compliance Level 1 concerns are concerns where there is noncompliance with mandatory DOE, Federal, State, local or LBL requirements.

In summarizing LBL's S&H program, seven areas need to be discussed. These seven areas: safety attitude, implementation of safety, OSHA compliance, ES&H staff accommodations, institutionalization of LBL self-assessment program, untimely corrective action for known deficiencies, and formality of Laboratory operations will be discussed in the paragraphs to follow.

SAFETY ATTITUDE

A pervasive new safety attitude that is receptive to new safety initiatives of the DOE is evident throughout the Laboratory at all levels. However, unless a new program is installed while the interest is high, the opportunity to effect a positive and permanent change may be diminished and resistance to change, now at a hiatus, may return. The Laboratory's new appreciation for a safer workplace must be satiated before it wanes. The DOE and the Laboratory must expeditiously move to initiate implementation of new safety programs to take advantage of the new momentum. Attitude is not enough; it must be coupled with action.

IMPLEMENTATION OF SAFETY

LBL is institutionalizing a new safety culture. The institutionalization of this culture appears to be occurring more rapidly than the implementation of a formal sitewide safety program. Management is committed to an improved safety culture but has not fully demonstrated its ability to implement and manage the change necessary to bring it about. Communicating the new safety culture to its personnel, correcting significant safety and health resource deficiencies, demonstrating its ability to implement an effective sitewide safety and health program, and developing the management tools to assess LBL safety programs are critical challenges facing LBL management.

OSHA COMPLIANCE

LBL exhibits a high level of OSHA awareness, albeit a new awareness, and their road to complete OSHA compliance is still a long one. In addition to identification and correction of noncompliance, all Laboratory personnel need an indoctrination to produce a long-lasting recognition of OSHA hazards in their workplaces, to develop and maintain a justified expectation that unsafe conditions will be quickly corrected.

ES&H STAFF ACCOMMODATIONS

The allocation and quality of accommodations for the ES&H staff at LBL offers a clear indication of the relative importance and the expectations by management and other employees, of the ES&H staff. Having to cram their files, reference materials, and working materials into corners; sharing precious space in and around equipment; and otherwise using spaces intended to accommodate much less is not conducive to optimum productivity from professionals nor encouraging to prospective employees. The accommodations of

the ES&H staff definitely need to be upgraded and should consider the potential expansion expected to be associated with an increased ES&H program.

INSTITUTIONALIZATION OF LBL SELF-ASSESSMENT PROGRAM

The Laboratory does not have the necessary tools to assess site safety programs. The role of the Independent Review and Assurance Department (IRAD), as an organizational element to provide many of these assessment tools, is not well defined and understood. Performance indicators have not been developed. The LBL Corrective Action Program has not been fully developed and integrated across the site.

UNTIMELY CORRECTIVE ACTION FOR KNOWN DEFICIENCIES

The LBL self-assessment thoroughly identified issues, and indicated a good understanding of safety problems. The previous TSA also identified issues, and the draft TSA report was provided to the Laboratory at the time of the TSA closeout. However, response to these assessments has been vague and difficult to evaluate for effectiveness, if provided at all. This is due mainly to LBL waiting the Tiger Team Assessment findings and concerns and then developing an overall corrective action plan encompassing those concerns as well as those from the previous TSA and the self-assessment. This approach is reactive, and inappropriate. The Tiger Team Assessment serves as a baseline for defining the current needs for corrective actions, but it cannot be considered to be sufficient to carry the Laboratory far into the future. The Laboratory cannot become dependent upon such outside resources to identify ES&H issues, but must accept such responsibility on its own. It must become proactive, and prioritize and initiate corrective actions as issues are identified or anticipated. It must reject, and continue to resist the tendency to over study safety issues to the point of taking no action at all rather than risking other than an optimum solution. Unsafe conditions should not continue to exist while developing the best corrective actions. Under such circumstances, a compensatory mechanism should be emplaced, or the operation shut down until the corrective action can be implemented.

FORMALITY OF LABORATORY OPERATIONS

Many activities at LBL are conducted in an informal manner, in many technical areas, including: procedures, training and certification, instrument calibrations, quality verification, records, and many other areas. Important communications are often delivered verbally, and records are seldom kept in a form designed for ease of review or later investigation, audit, or trending. The lack of formality in control of operations is still evident at the Laboratory from identification in the previous TSAs, and is inappropriate in a modern safety culture.

In conclusion, although management is fully committed to an improved safety culture, it has not fully demonstrated its ability to implement and manage the change necessary to bring it about. Communicating the new safety culture to its people, correcting significant safety and health resource deficiencies, demonstrating its ability to implement an effective sitewide safety and health program, and developing the management tools to assess the safety programs are critical challenges facing Laboratory management.

Finally a discussion of SAN oversight is required. SAN has not provided timely formal communications of DOE Orders and requirements to LBL or the University of California, and has not provided sufficient oversight in several areas. The allocation of DOE staff is not sufficient for the LBLSO to carry out DOE's ES&H oversight responsibilities at the site. The relative roles and responsibilities of the Division of Energy Research, SAN and the LBLSO are not well defined.

4.5 SAFETY AND HEALTH FINDINGS AND CONCERNS

4.5.1 Organization and Administration

4.5.1.1 Overview

All eight of the performance objectives in the Organization and Administration functional area were addressed in the course of this appraisal. Interviews were conducted with the Director, Lawrence Berkeley Laboratory (LBL) and members of the LBL management team from the Deputy Director down through several of the Division Directors and their safety coordinators. In addition, interviews were conducted with the Manager, San Francisco Operations Office (SAN) and the Manager, Lawrence Berkeley Laboratory Site Office (LBLSO). Documents reviewed included the Health & Safety Manual (PUB 3000), Regulations & Procedures Manual (PUB 201), Department Of Energy (DOE) appraisals of LBL, occurrence reports and several Policy and Procedure Administrative Memoranda and Operational Safety Procedures (OSPs). Tours of some of the research division facilities were made including the Calvin and Donner Laboratories on the University of California (UC) campus. During the course of the tours, LBL personnel were randomly selected for informal interviews.

LBL is undergoing change as it moves toward institutionalizing a new safety culture. The institutionalization of this culture appears to be occurring more rapidly than the implementation of a formal sitewide safety program. Management is committed to an improved safety culture but has not fully demonstrated its ability to implement and manage the change necessary to bring it about. Communicating the new safety culture to its people, correcting significant safety and health resource deficiencies, demonstrating its ability to implement an effective sitewide safety and health program, and developing the management tools to assess LBL safety programs are critical challenges facing LBL management.

A comprehensive sitewide safety program has not yet been implemented at LBL. Presently, a three-tier assessment program, consisting of division self-assessment; an Environmental Protection, Health and Safety Division (EPHS) monitoring program; and an independent safety assessment element performed by the Independent Review and Assurance Department (IRAD), is under development. The status of these sitewide programs could not be ascertained as the program plans and implementation schedules were not available for review by the Safety and Health (S&H) Subteam. In the absence of specific direction from upper management, some of the divisions are moving forward with their own safety programs. Therefore, management needs to communicate the new safety program to the entire Laboratory in an expeditious manner.

Of particular concern are resource deficiencies that now exist within EPHS that will be exacerbated by the PLUS "5" voluntary employee incentive retirement program. In addition, the Division Director, EPHS recently resigned and the Department Head, Environment and Safety Hazards Control Department (ESHC) will be retiring this year, thereby, further impacting on the sites "corporate memory." No formalized strategy has been developed to deal with this critical issue. Management needs to focus attention in this area since professional environment, safety, and health (ES&H) resources are vital to the success of the sitewide safety program and the LBL Self-Assessment Program.

Management has not established annual quantified safety and health goals that are shared at the various levels of the LBL organization. Such goals are vital to the institutionalization of the new safety culture and to communicating the new safety program direction to all divisions on an annual basis.

Deficiencies with respect to procedures and management enforcement of their proper use continue to exist. Such deficiencies include lack of procedures, use of procedures that are not approved, and lack of proper control over procedures. These deficiencies are similar to the ones noted in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

UC support for LBL ES&H programs has been through the activities of the Health Safety Environment Advisory Committee (HSEAC) that reports to the President of UC. The HSEAC meets three times per year, once each at the three DOE sites administered by UC. The UC ES&H policy, the subject of a concern cited in the report for the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990), does not demonstrate a strong commitment to safety. The UC Senior Vice-President, Administration has indicated a strengthened safety policy will be published by July 1, 1991.

Clause 28 of the Prime Contract between the UC Regents and the DOE, Contract No. DE-AC03-76SF00098, stipulates that UC "shall comply with all applicable safety and health regulations and requirements (including reporting requirements) of the DOE communicated to the University." Furthermore, Policy and Procedure Administrative Memo, Volume XVII, No. 10, January 14, 1991, states that Orders pertaining to health, safety and the environment are to be implemented. Although LBL has the right to review for applicability other Orders outside of safety and health, those health and safety Orders communicated to LBL must be implemented according to the contract. The formal communication of DOE Orders to LBL has not always been timely. This is a deficiency that needs SAN management attention if health- and safety-related Orders are to be implemented in a timely manner by LBL.

Occurrence reporting requirements in accordance with DOE 5000.3A are defined for LBL in the Occurrence Reporting, Environmental Protection, Health and Safety Division Manual which has been distributed to Division Directors and other site management personnel. Informal training sessions have been given by the Scientific and Technical Resources Associate Laboratory Director to management down through the Division Director level. Although some additional communication and training sessions on the occurrence reporting system are still required, LBL has made significant improvements since the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

LBL management has not implemented the necessary tools to assess site safety programs. The role of the IRAD, as an organizational element to provide many of these assessment tools, is not well defined and understood. Performance indicators have not been developed for use by management in assessing its safety and health programs. In addition, the LBL Corrective Action Program, an important part of the three-tier LBL Self-Assessment Program, has not been fully developed and integrated across the site.

Although the storage of nearly all LBL vital records are in approved facilities at the National Archives, Federal Records Center, San Bruno, California, recent dosimetry records (less than 2 years old) were found stored in normal office files which do not meet DOE requirements.

The control of documents across LBL continues to be deficient which is a carry-over concern from the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990). Lack of rigorous control of OSPs, use of the Policy and Procedure Administrative Memo to implement policy, and proliferation of document control systems across the site without any site policy were deficiencies observed during the course of this appraisal.

LBL has an excellent Employee Assistance Program (EAP) that is used by its employees and well supported by management. The program, providing assistance for a broad range of problems, is well communicated to LBL employees through the LBL "Employee Handbook" and "Employee Guide for a Drug Free Workplace." The EAP includes a Substance Abuse Program that encourages addicted employees to seek assistance for drug- and alcohol-related problems. However, LBL has not implemented a supervisory training program directed at the detection and handling of employees suspected of substance abuse. A supervisory training program along with a modified policy requiring this training is to be implemented by June 1991.

SAN has not provided timely formal communications of DOE Orders and requirements to LBL and has not provided sufficient oversight in several areas. The allocation of staff is not sufficient for the LBLSO to carry out DOE ES&H oversight responsibilities of the site. The relative roles and responsibilities of the Division of Energy Research, SAN and the LBLSO are not well defined. SAN is presently undergoing a review to resolve the responsibility issue and assign organizational responsibilities to improve oversight and support of LBL.

The LBL self-assessment thoroughly identified issues. The Discussions and Findings section of the report indicated a good understanding of the issues. However, the Initial Response and Corrective Actions were vague and difficult to evaluate for effectiveness. This is due mainly to LBL awaiting the Tiger Team assessment concerns and LBL plans for developing an overall corrective action plan encompassing those concerns as well as those from the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

Corrective actions taken on the concerns identified in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) were reviewed for adequacy and completion. One of the 10 concerns in the Organization and Administration functional area in DOE/EH-0096 is recommended for closure.

4.5.1.2 Findings and Concerns

OA.1 SITE/FACILITY ORGANIZATION

PERFORMANCE OBJECTIVE: Management should organize and manage the site/facility's work, programs, and resources so that safety and health are an integral part of the personnel duties and requirements are consistently implemented.

- FINDINGS:**
- Responsibilities for important ES&H functions are spread throughout and outside EPHS. For example, in the area of personnel dosimetry, ESHC is responsible for external dosimetry, the Medical Services Department is responsible for bioassay services, and whole body counting is provided by the Nuclear Medicine Department which is outside of EPHS. With this organizational configuration there is no place where bioassay data come together with environmental monitoring information to ensure appropriate monitoring of the individual is taking place. (Also see Section 4.5.12, RP.1.)
 - Two different groups within ESHC are making decisions on sampling and monitoring of the workplace. The decision on where smear samples are taken comes from the Operations Group while some decisions on air samples taken in the workplace come from the Environmental Monitoring Group. This leads to inconsistencies and may result in omissions.
 - The organization chart for ESHC is confusing since it shows organizational units as well as functional responsibilities without differentiating between the two.
 - This concern was not addressed in the LBL self-assessment.

CONCERN: The Environmental Protection, Health and Safety Division is not presently organized to support the necessary integration of safety and health programs into the activities of the site.
(OA.1-3)
(H2/C2)

- FINDINGS:**
- A three-tier Self-Assessment Program is under development at LBL. These tiers consist of division-level self-assessments, EPHS inspection and monitoring programs, and independent reviews of safety performed by IRAD. Approval of this program is not anticipated before March 1991. Furthermore, an overall implementation plan with associated schedules and milestones has not been developed.
 - A sitewide ES&H program has not been implemented at LBL. Similarly, program and implementation plans for such a sitewide safety program have not been developed.
 - Interviews with various Division Directors indicated there has been no uniform approach to implementing a consistent sitewide ES&H program. Some divisions are moving ahead with their own programs while others are making little change. In many cases

the existing division safety plans lacked definition and an understanding of DOE requirements.

- All division personnel understood changes are forthcoming relative to ES&H; however, they indicated there is need for a clear message from management of what is needed to meet the new DOE ES&H requirements.
- The successful implementation of a sitewide ES&H safety program relies heavily on well-trained, professional resources, yet the present resources are not sufficient to support this site initiative.
- Many safety-related programs have not been implemented and supporting resources have not been provided. (Also see Section 4.5.15, OS.1 and Concerns OA.2-3, AX.3-1, EP.2-2, OS.2-4, and FP.1-7.)
- The concern of not implementing a consistent sitewide ES&H program was partly addressed in the LBL self-assessment. The action plan to correct this deficiency, as described in the Lawrence Berkeley Laboratory Technical Safety Appraisal Action Plan, is not clear and does not directly address this concern.

CONCERN:
(OA.1-4)
(H1/C2)

Lawrence Berkeley Laboratory has not implemented a consistent sitewide environment, safety, and health program.

FINDINGS:

- Several instances of lack of oversight by SAN were noted. These resulted in a failure to identify deficiencies in the Quality Verification, Emergency Preparedness, Radiological Protection, and Fire Protection functional areas. (Also see Sections 4.5.7, EP.1 and Concerns QV.1-3, QV.1-4, RP.2-3, and FP.7-11.)
- These deficiencies were cited in the SAN self-assessment. The proposed corrective actions were difficult to interpret, thus a definite conclusion on their adequacy could not be made.

CONCERN:
(OA.1-5)
(H2/C1)

The San Francisco Operations Office has not consistently performed its oversight role of the Lawrence Berkeley Laboratory in many safety- and health-related areas.

OA.2 ADMINISTRATION

PERFORMANCE OBJECTIVE: Administrative programs and controls should be in place to ensure policies concerning health and safety are administered throughout the facility.

- FINDINGS:**
- Three radiological protection technicians on day shift and one on swing shift perform all routine surveys, collect radwaste and mixed waste, perform filter changes, bag out waste, perform decontamination, and deliver radioisotopes to users. Because of these assigned duties, other important health- and safety-related activities are not being performed. For example, operations in Bldgs. 70A and 74B have been shut down due to the lack of staff to change high-efficiency particulate air filters in these facilities. Swipes are not routinely taken in Bldgs. 3, 55, and 74 for the same reasons.
 - Safety and industrial hygiene staff spend much time responding to employee questions, concerns, and complaints. Specifically, their time is spent responding to construction site problems, answering audits and appraisals, helping employees to understand requirements, providing special air sampling tests in response to concerns and complaints, and responding to hazards communications problems. As a result there is not time for walkthroughs of buildings by the industrial hygiene staff. An inventory of confined spaces has not been performed. Industrial hygiene has not implemented a periodic monitoring program for air contamination as required by DOE 5480.10.
 - Existing ES&H resources will be impacted by the PLUS "5" voluntary employee incentive retirement program. It is estimated that approximately 40 percent of ESHC staff will be eligible for this program which takes effect in April and October of this year. Presently, there is no documented management strategy directed at correcting these deficiencies or dealing with the consequences of losing these resources.
 - Random interviews conducted with laboratory personnel indicated the need for professional safety and health resources to assist them in understanding, interpreting, and applying DOE Orders and requirements.
 - See Sections 4.5.3, OP.1; 4.5.5, TC.1; and 4.5.7, EP.1; and Concerns RP.1-1, IH.1-1, and MS.3-1.
 - This concern was identified in the LBL self-assessment. The action plan to correct this concern was referenced in the Lawrence Berkeley Laboratory Technical Safety Appraisal Action Plan but lacked specific detail to ensure this deficiency will be corrected in a timely fashion.

CONCERN:
(0A.2-3)
(H2/C2)

The resources applied to critical safety and health functions are not sufficient to support the safety needs of the Lawrence Berkeley Laboratory site.

OA.3 MANAGEMENT OBJECTIVES

PERFORMANCE OBJECTIVE: Site/facility management objectives should ensure commitment to safe operation, including enforcement of approved work practices and procedures.

- FINDINGS:**
- Deficiencies with respect to procedures and management enforcement of their proper use were documented in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
 - During the course of this appraisal, additional deficiencies were observed:
 - OSPs were improperly implemented. For example, the procedure "Fitting and Issuing Procedure for 1/2 or Full-Face Respirators at Lawrence Berkeley Laboratory" was unsigned, undated, and not controlled.
 - Documented procedures in the Medical Services Department were lacking in content, outdated, and, in some cases, nonexistent. (Also see Concern MS.2-1.)
 - There was no written procedure to accompany the detailed checklist used for testing the interlocks at the 88-inch Cyclotron. (Also see Concern RP.3-8.)
 - Procedures had not been developed for testing of fume hoods across the site. (Also see Concern TS.4-3.)

CONCERN: See Concern OA.3-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

- FINDINGS:**
- Performance expectations have been developed for all LBL personnel and are published in the Health & Safety Manual (PUB 3000, Chapter 1, paragraph 3). These are broad statements that provide a framework for each employee to follow in support of the LBL ES&H program. These statements are not developed on an annual basis but have been formulated to establish a continuing expectation of employee safety performance.
 - Interviews with personnel at various division levels indicated that annual quantified ES&H goals, established by LBL management, do not exist.
 - This concern was partially identified in the LBL self-assessment. There was no corrective action found in the referenced Lawrence Berkeley Laboratory Technical Safety Appraisal Action Plan.

CONCERN: Management has not established and communicated annual quantified
(OA.3-2) safety and health goals for the Lawrence Berkeley Laboratory
(H3/C2) organization.

OA.5 MANAGEMENT ASSESSMENT

PERFORMANCE OBJECTIVE: Management and supervisory personnel should monitor and assess facility activities to improve performance in all aspects of the operation.

- FINDINGS:**
- The role of IRAD, as an organization to provide management with an assessment of its safety programs, is not well defined and understood by LBL division personnel.
 - IRAD has initiated some independent reviews. First, an independent review of performance standards and job descriptions is underway to verify ES&H responsibilities are included in these documents. Secondly, an independent review of OSPs is being conducted to verify these documents are properly reviewed and approved. Many other assessments and assessment mechanisms remain to be developed.
 - A comprehensive set of performance indicators have not been developed for use by management in assessing its safety and health programs and to develop corrective actions.
 - Interviews with Division Directors revealed that mechanisms to assess division safety progress have not been developed.
 - The LBL Corrective Action Program, an important part of the three-tier LBL Self-Assessment Program, has not been fully developed and integrated.
 - See Concern OP.5-2.
 - The lack of management assessment mechanisms was addressed in the LBL self-assessment. The corrective action plan referenced in the Lawrence Berkeley Laboratory Technical Safety Appraisal Action Plan did not address this concern.

CONCERN: Lawrence Berkeley Laboratory has not implemented mechanisms to assess site safety and health programs.
(OA.5-2)
(H2/C2)

OA.6 PERSONNEL PLANNING AND QUALIFICATION

PERFORMANCE OBJECTIVE: Personnel programs should ensure that appropriate job qualification requirements or position descriptions are established for all positions that affect safe and reliable operation.

- FINDINGS:**
- Job descriptions and performance standards are established as part of the employee appraisal system as described in the Regulations and Procedures Manual (PUB 201, 2.03B).
 - The degree to which safety is a mandated element of the job description and performance standards varies according to the employee group; viz, Scientists and Engineers and Professional, Administrative, Technical and Represented Employees. In those cases where safety responsibilities are a required part of the appraisal, they are only referred to in general terms on the appraisal form.
 - A draft Policy and Procedure Memo, "Modifications to Annual Performance Review Forms," has been written to incorporate more specific safety responsibilities that will be identified on the appraisal forms for all LBL employee groups. In addition, a draft "Laboratory Policy on Health and Safety Responsibilities" has been developed to incorporate health and safety responsibilities into all job descriptions/expectations as part of the appraisal document. These policies are to be approved for the upcoming performance appraisal cycle.
 - This concern was identified in the LBL self-assessment. There was not an action plan provided in the self-assessment; however, there is an acceptable action plan in the Lawrence Berkeley Laboratory Technical Safety Appraisal Action Plan that addresses this concern.

CONCERN: Specific safety responsibilities are not included as a required element in the annual performance appraisals of all employee groups.
(OA.6-1)
(H2/C2)

OA.7 DOCUMENT CONTROL

PERFORMANCE OBJECTIVE: Document control systems should provide correct, readily accessible information to support site/facility operations.

- FINDINGS:**
- Storage of important LBL records is provided at the National Archives, Federal Records Center, San Bruno, California, which meets DOE storage requirements.
 - Dosimetry and other exposure records, less than 2 years old, are presently being stored in Bldg. 75 in regular office files. Contrary to DOE 1324.2A, DOE 5500.7A, and ANSI/ASME NQA-1, "Quality Assurance Requirements for Nuclear Facilities" (NQA-1), these storage conditions do not provide adequate protection for these records.
 - See Section 4.5.12, RP.12 and Concern RP.12-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
 - This concern was not addressed in the LBL self-assessment.

CONCERN: Storage of dosimetry and exposure records, less than 2 years old, does not meet the requirements of DOE 1324.2A, and DOE 5500.7A, and ANSI/ASME NQA-1 in that the records are not provided adequate protection in their present location.
(OA.7-3)
(H3/C1)

- FINDINGS:**
- There is little evidence of improvement relative to the control of important documents since the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
 - During the course of this appraisal additional deficiencies were observed:
 - A copy of the Policy and Procedure Administrative Memo, Volume XVI, No. 20, June 11, 1990, was provided by a member of LBL management which contained a list of employee Performance Expectations. That list is different from the one published in the Health & Safety Manual (PUB 3000). Apparently, the June 11, 1990, Policy and Procedure Administrative Memo was no longer applicable, yet was still being used.
 - The Health & Safety Manual (PUB 3000) is not a receipt-controlled document. This is an important document, for which incorporation of changes should be verified by the custodian.
 - Important Emergency Operations Center (EOC) checklists used by EOC support personnel are not controlled.

- The use of Policy and Procedure Administrative Memoranda to implement policy can lead to misunderstanding as to current revision as was the example above. These memoranda can readily be separated from a given manual and result in the use of improper policies or procedures since they are not in a replacement page format.
- Document control systems across the site have no common policy to ensure a consistent sitewide approach is used.

CONCERN: See Concern OA.7-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

OA.8 FITNESS FOR DUTY

PERFORMANCE OBJECTIVE: A Fitness For Duty Program should be capable of identifying persons who are unfit for their assigned duties as a result of drug or alcohol use, or other physical or psychological conditions, and should provide procedures to remove them from such duty and from access to vital areas of the site or facility pending rehabilitation or remedial actions.

- FINDINGS:**
- LBL has adopted a policy on substance abuse that encourages addicted employees to seek assistance for drug and alcohol-related problems. This policy is described in the Regulations and Procedures Manual (PUB 201, 2.22C.1). The policy does not require training of supervisors in handling employees suspected of substance abuse.
 - Presently, there is no mandatory training program in place for supervisors that deals with the detection and handling of employees suspected of substance abuse.
 - Although a training program for supervisors is under development, it will not be implemented until June 1991, according to the LBL Personnel Director.
 - This concern was identified in the LBL self-assessment. There was no action plan or timetable established for the implementation of a supervisory training program.
- CONCERN:** Lawrence Berkeley Laboratory has not implemented a supervisory training program directed at the detection and handling of employees suspected of substance abuse and has not adopted a policy requiring this training.
- (OA.8-2)
(H2/C2)

4.5.2 Quality Verification

4.5.2.1 Overview

This appraisal addressed the seven performance objectives in the Quality Verification functional area, and was conducted through interviews with both San Francisco Operations Office (SAN) and Lawrence Berkeley Laboratory (LBL) employees, inspections of records and written procedures, plans and policies, and visits to selected facilities. Among the LBL employees interviewed were those having line management authority for quality, those assigned to collateral duties as Quality Assurance (QA) Representatives for their organizations, and those responsible for selected activities. Activities selected for special consideration were procurement and material-receiving practices, nondestructive examination, electronic circuit board construction and the calibration of measuring and testing equipment. Procurement and material-receiving practices were emphasized in order to assess the response of the LBL to the Department of Energy (DOE) initiative to combat the fraudulent sale of counterfeit and substandard building materials and replacement parts. The other activities were selected to represent QA program adherence to specific performance objectives.

The Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) contained three quality verification concerns which described LBL as having a QA program lacking three key attributes required by DOE 5700.6B; namely, a means of independent verification of quality attainment, formal requirements for retention of certifications, and a uniform policy towards calibration of measuring and testing equipment. The deficiencies identified in DOE/EH-0096 of LBL regarding material storage, metal certifications, and retention of certifications were found to be corrected. Therefore only one of the three concerns in the Quality Verification functional area in DOE/EH-0096 has been recommended for closure. The present Technical Safety Appraisal (TSA) has found that the LBL QA Program is lacking not only the other remaining attributes, but other required attributes as well. LBL management has recognized this deficiency, and has elected to reorganize its QA program in a fundamental way to correct it.

To avoid wasted effort, LBL has terminated corrective actions on its existing QA program pending the formulation of the plan and schedule (memorandum from P.J. Oddone to Division Directors, "Facility Notebooks," dated January 8, 1990) for its restructure. The proposed plan includes the use of "Facility and Project Notebooks," which would combine QA requirements with those of other DOE Orders, such as DOE 5480.19 "Conduct of Operations Requirements for DOE Facilities," in a form that would be simple and compact and more easily accepted and learned by the individual researchers at LBL. LBL management has outlined the main features of this proposed approach to the Safety and Health (S&H) Subteam, and the Subteam concurs in the advantages it possesses. There is an excellent attitude towards quality coupled with enthusiasm for the restructuring, and there exists a schedule to achieve implementation by December 31, 1991. However, the schedule is not comprehensive in that it does not address all actions required to achieve implementation, e.g., training, staffing, funding, and the establishment of lower tier implementing procedures.

The management and operations contract under which the University of California operates LBL does not have a clause requiring QA, and under this contract LBL management need only comply with those DOE Orders that are communicated to its Contract Officer. LBL is required to implement the DOE Safety and Health and Work-for-Others Orders. LBL also reserves the right to interpret the applicability of other DOE Orders. In reviewing the manner in which this practice is conducted, the S&H Subteam found that DOE Orders to the LBL Contract Officer in some cases were not communicated.

Many activities at LBL are conducted in an informal manner. For example, welding and nondestructive examinations are not performed in accordance with written procedures and by personnel whose qualifications have been certified, and the results of acceptance inspections and tests, calibrations, and vendor qualification evaluations are not consistently documented. Work orders, instructions, decisions, and other important communications are often delivered verbally, and records are seldom kept in a form designed for ease of review or later investigation, audit, or trending.

The S&H Subteam search for counterfeit and suspect items included not only the numerous suspect graded bolts which were found, but also small electrical circuit breakers and other items likely to be sold under false pretenses. Due to the discovery of suspect electrical circuit breakers at other west coast DOE facilities, it was expected that they also would be found at LBL, but none were found.

LBL lacks criteria to determine the importance of items and activities for the purpose of selectively applying QA requirements. To implement a graded approach to the application of QA requirements, such criteria will have to be developed. Items or activities that are not important to safety or mission success would not require the level of QA implied in the S&H Subteam concerns.

4.5.2.2 Findings and Concerns

QV.1 QUALITY PROGRAMS

PERFORMANCE OBJECTIVE: Administrative programs and controls should be in place to ensure policies concerning quality are administered for each facility throughout the site.

- FINDINGS:**
- The deficiencies identified in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) regarding the Institutional Quality Assurance Program Plan (IQAPP) and division Quality Assurance Program Plans (QAPPs) persist.
 - Work on revision of the QAPPs was suspended pending the redefinition of responsibilities for QA within the LBL divisions.
 - No documented guidance was found in existing and approved QAPPs, procedures, or policy manuals that could have been used to determine the level and extent that QA requirements should be applied to specific items or activities. Consequently, the application of QA requirements was often found to be incomplete, inconsistent, and not defensible.
 - Many division QAPPs provide that "special QA requirements" are to be specified in individual project QA plans. However, no guidance is given for the selection of these special QA requirements.
 - QA audits of each division are scheduled on a 3-year cycle, but this oversight function is not complemented by a program of more frequent surveillances.
 - The LBL self-assessment, Section QV.1, "Quality Programs," finds that: "Laboratory Management has applied limited attention and resources to development of documented quality programs, and the Laboratory does not meet the requirements of DOE 5700.6B." The above LBL finding addresses this concern.
 - The action plan in the LBL self-assessment is a reference to the self-assessment Appendix C, "Technical Safety Appraisal Action Plan Annual Status Report." However, LBL has terminated corrective actions on its existing QA program pending the formulation of a plan for its restructure. There exists a schedule to achieve implementation of the restructuring by December 31, 1991. However, the schedule and plan are not comprehensive in that they do not address all actions required to achieve implementation, e.g., training, staffing, funding, and establishment of lower tier implementing procedures.

CONCERN: See Concern QV.1-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

- FINDINGS:**
- Many existing division QAPPs require the establishment of QA procedures that "... are commensurate with the nature, cost, safety, and programmatic significance of the work." While evidence was found that some QA practices are performed (e.g., inspections, tests, calibrations, and supplier qualification), these practices were not implemented in that they were found to be informal, undocumented, and inconsistent among the divisions.
 - The architect/engineer subcontractor for the Advanced Light Source (ALS) project has a QA program. (This program was not evaluated by the S&H Subteam.) However, no audits by LBL have been performed to verify compliance with that program and to implement the QA oversight requirements.
 - The LBL self-assessment, Section QV.1, does not address the lack of implementation of those QA requirements that were specified in the existing IQAPP and QAPPs.
 - The action plan in the LBL self-assessment is a reference to Appendix C, "Technical Safety Appraisal Action Plan Annual Status Report." However, LBL has terminated corrective actions on its existing QA program pending the formulation of a plan for its restructure. There exists a schedule to achieve implementation of the restructuring by December 31, 1991. However, the schedule and plan are not comprehensive in that they do not address all actions required to achieve implementation, e.g., training, staffing, funding, and establishment of lower tier implementing procedures.

CONCERN: Many of the quality assurance requirements specified in the (QV.1-2) Institutional Quality Assurance Program Plan and divisional (H2/C1) Quality Assurance Program Plans have not been implemented as required by DOE 5700.6B. (Also see Concern RP.7-3.)

- FINDINGS:**
- The most recent SAN QA appraisal of LBL was performed in December 1989, the report for which was issued on February 20, 1990. The SAN response to the LBL response to the appraisal report, dated March 23, 1990, has not been issued and is not timely. The most recent SAN QA appraisal of LBL was performed by one person during a 3-day period.
 - No SAN QA audit schedule exists for 1990 or 1991.
 - There is no evidence that day-to-day or periodic QA oversight is performed by SAN.
 - Since November 1989, the QA function within SAN has been reorganized at least three times.

- The SAN self-assessment, Section II.F, "Quality Assurance Self Assessment," finds that: "SAN has not performed a sufficient number of appraisals/audits to provide accurate assessments on the adequacy and effectiveness of the contractor's QA programs." It also finds that "SAN's QA surveillance activities have not been adequate." The SAN findings address this concern.

CONCERN: Quality Assurance oversight of Lawrence Berkeley Laboratory activities by the San Francisco Operations Office is infrequent and unscheduled. (Also see Concern OA.1-5.)
(QV.1-3)
(H3/C2)

- FINDINGS:**
- The SAN MD 5700.6B does not specify ANSI/ASME NQA-1, "Quality Assurance Requirements for Nuclear Facilities" (NQA-1) as the preferred standard for QA and the SAN implementation plan for DOE 5700.6B is not up-to-date.
 - The most recent SAN QA appraisal of LBL (February 20, 1990) contradicts the findings of the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
 - QA information on suspect parts received by SAN from Headquarters, DOE in December 1990, had not yet been distributed to LBL but was transmitted to LBL by SAN on February 7, 1991.
 - The SAN self-assessment, Section V, "Self-Assessment of Environmental Restoration and Waste Management Activities at LBL," finds that "... information from SAN, and from the sites does not always get shared in a timely manner, if at all." However, it does not specifically address the inconsistent and incomplete direction on QA requirements provided to LBL by SAN.

CONCERN: Direction given to Lawrence Berkeley Laboratory concerning quality assurance requirements by the San Francisco Operations Office is incomplete and inconsistent with DOE 5700.6B.
(QV.1-4)
(H2/C1)

QV.2 PROCUREMENT AND SUPPLIER CONTROL

PERFORMANCE OBJECTIVE: Provisions should be established for the control of purchased material, equipment, and services; for selection and control of suppliers; and for assessing the adequacy of procurement activities.

- FINDINGS:**
- The deficiencies that were identified in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) regarding procurement and supplier control persist.
 - The Laboratory lacks a QA policy that stipulates the criteria to be used to determine the need to impose QA requirements upon suppliers. There is no documented evidence that importance to safety or mission success was considered for low-cost purchases.
 - Evidence was found that supplier responsibility (qualification) is usually evaluated, frequently using references from other purchasing organizations; however, the basis and results of these evaluations were often not documented.
 - Materiel Management maintains a list of firms qualified to supply store stock items. However, Purchasing does not maintain such a list for nonstore stock items. The selection of potential suppliers is usually based upon requestor's recommendations or upon the experience of individual buyers.
 - Requisitioners of items to be procured have no documented guidance or training dealing with the selection of QA requirements to be imposed upon potential suppliers as the basis for their qualification. In one procurement specification (Specification #16321-3, Liquified Distribution Transformer, P.O. #3790806), the only QA requirement was that the supplier have a minimum of 10 years of experience specializing in distribution transformers.
 - The LBL self-assessment, Section QV.2, "Procurement and Supplier Control," finds that "Lab-wide formalized QA Program controls for procured items are not sufficient," but it does not specifically address the qualification of suppliers of items that are important to safety or mission success.

CONCERN: With the exception of store-stock items, the basis for the (QV.2-1) qualification of suppliers is often not documented, and (H3/C2) defective, low-cost items that are important to safety or mission success may be purchased from unqualified suppliers.

- FINDINGS:**
- No overcheck of material certifications are required or performed by LBL to verify authenticity of materials, and specifically, of the certifications of graded bolts.

- Numerous suspect/counterfeit bolts are installed in the ALS project and in the Mechanical Shops Department, and are contained in the inventories of the General Stores and the Motor Pool.
- A memorandum from R. L. Fulton to Mechanical Engineering Department Engineers and Designers, "Use of High-Strength Fasteners," dated February 1, 1991, establishes a policy to ensure that counterfeit or substandard bolts do not compromise performance or safety. This memorandum helps to mitigate this concern.
- The LBL self-assessment, Section QV.2, "Procurement and Supplier Control," finds that "Lab-wide formalized QA Program controls for procured items are not sufficient," but it does not specifically address measures to prevent the procurement of counterfeit items.

CONCERN:
(QV.2-2)
(H2/C2)

There are no policies and procedures established to ensure that suspect/counterfeit items are not purchased, installed, or used.

QV.3 RECEIVING AND PRE-INSTALLATION INSPECTIONS

PERFORMANCE OBJECTIVE: Provisions should be established for the inspection of purchased material, equipment, and services in accordance with documented procedures by trained personnel.

- FINDINGS:**
- Inspections and tests to accept purchased items are not independently performed by technically capable persons other than the originator of the purchase order. Under a graded approach to QA, purchased items important to safety and performance would require independent inspections and tests.
 - There is no routine testing of received goods to verify supplier certifications, except in the case of some specially fabricated items. Under a graded approach to QA, received goods important to safety and performance would require verification of supplier certifications.
 - Most acceptance inspections are not performed in accordance with written procedures that specify the attributes to be verified and the criteria for their acceptance or rejection.
 - Inspections or tests were often not required to be performed for accepting purchased items.
 - The LBL self-assessment, Section QV.3, "Receiving and Pre-Installation Inspections," finds that "Formal documentation of receipt inspections and other inspections is not practiced uniformly throughout the site." The LBL finding addresses this concern.
 - The action plan in the LBL self-assessment is a reference to Appendix C, "Technical Safety Appraisal Action Plan Annual Status Report." However, LBL has terminated corrective actions on its existing QA program pending the formulation of a plan for its restructure. There exists a schedule to achieve implementation of the restructuring by December 31, 1991. However, the schedule and plan are not comprehensive in that they do not address all actions required to achieve implementation, e.g., training, staffing, funding, and establishment of lower tier implementing procedures.
 - See Section 4.5.2., QV.6.

CONCERN: Defective items may be accepted because inspection practices are often informal and undocumented.
(QV.3-2)
(H2/C2)

QV.4 CALIBRATION PROGRAM

PERFORMANCE OBJECTIVE: Provisions should be made to ensure that tools, gauges, instruments, and other measuring and testing devices are properly identified, controlled, calibrated, and adjusted at specified intervals.

- FINDINGS:**
- The deficiencies identified in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) regarding calibration of measuring and testing equipment persist.
 - No division level policies or procedures exist that would prevent the use of measuring and testing equipment whose calibration interval has expired. When expiration dates are displayed on the equipment calibration tags, these dates are not enforced. With the exception of the Engineering Division, custodians of measuring and testing equipment do not have any systems in place to recall the equipment for recalibration.
 - When measuring and testing equipment is found to be out-of-tolerance, there are no policies or procedures for the performance and documentation of evaluations to determine the validity and acceptability of measurements performed since the last calibration.
 - The LBL self-assessment, QV.4, "Calibration Program," finds that "The calibration program does not fully meet the safety-related requirements of DOE 5700.6B." The LBL finding addresses this concern.
 - The action plan in the LBL self-assessment is a reference to Appendix C, "Technical Safety Appraisal Action Plan Annual Status Report." However, LBL has terminated corrective actions on its existing QA program pending the formulation of a plan for its restructure. There exists a schedule to achieve implementation of the restructuring by December 31, 1991. However, the schedule and plan are not comprehensive in that they do not address all actions required to achieve implementation, e.g., training, staffing, funding, and establishment of lower tier implementing procedures.

CONCERN: See Concern QV.4-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

- FINDINGS:**
- Practices that are used to assess the cost of work performed at the electronic calibration facility discourage the use of that facility. The estimated charge for equipment brought in for calibration may be a disincentive.
 - The electronic calibration facility has no procedures that define the format, content, maintenance, retention, review, and distribution of calibration records. For example, there are no requirements to include as-found and as-left readings,

identification of standards used, and calibration procedure used.

- The electronic calibration facility has no requirement to record as-found calibration data before performing repairs and adjustments. Users of equipment are not routinely informed when calibrations identify out-of-tolerance conditions which indicate that past measurements could be in doubt. There is undue reliance upon verbal communications between the users and the calibration facility personnel.
- The electronic fabrication facility does not routinely calibrate its crimping devices and some other measuring and testing equipment.
- It was observed that calibration labels or other methods are not used to identify the calibration status of fire suppression system gauges and other indicating devices.
- The helium standard in use at the Bldg. 62 Vacuum Test Facility was found to be outdated by a few months beyond its 10-year life.
- The LBL self-assessment, QV.4, "Calibration Program," finds that "The calibration program does not fully meet the safety-related requirements of DOE 5700.6B." The LBL finding addresses this concern.
- The action plan in the LBL self-assessment is a reference to Appendix C, "Technical Safety Appraisal Action Plan Annual Status Report." However, LBL has terminated corrective actions on its existing QA program pending the formulation of a plan for its restructure. There exists a schedule to achieve implementation of the restructuring by December 31, 1991. However, the schedule and plan are not comprehensive in that they do not address all actions required to achieve implementation, e.g., training, staffing, funding, and establishment of lower tier implementing procedures.

CONCERN:
(QV.4-2)
(H2/C2)

Inaccurate measuring and testing equipment may invalidate inspection, test, and research data at the Lawrence Berkeley Laboratory.

QV.5 IDENTIFICATION AND CONTROL OF HARDWARE/MATERIALS

PERFORMANCE OBJECTIVE: Provisions should be established to identify and control the use or disposition of hardware, materials, parts, and components as well as to ensure that incorrect/defective items are not used.

- FINDINGS:**
- The deficiencies identified in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) regarding mechanisms to identify, report, disposition and trend discrepancies persist.
 - Numerous suspect/counterfeit bolts exist at LBL. No system exists to identify and report suspect/counterfeit items.
 - No system exists to determine if installed suspect/counterfeit items are acceptable or if they should be replaced and destroyed. A memorandum from R. L. Fulton to Mechanical Engineering Department Engineers and Designers, "Use of High-Strength Fasteners," dated February 1, 1991, establishes a policy to ensure that counterfeit/suspect bolts do not compromise performance or safety.
 - No system exists to prevent suspect/counterfeit items from entering LBL through the procurement system.

CONCERN: See Concern QV.2-2.

- FINDINGS:**
- Materiel Management identifies and/or segregates nonconforming stocked items during receiving and material release inspections according to written procedures; however, other LBL organizations do not have equivalent systems in place to prevent inadvertent use of such items.
 - The LBL self-assessment, Section QV.5, "Identification and Control of Hardware/Material," only addresses items of "significant value" covered by the site Property Management Plan and is silent on other measures of significance, such as importance to safety or mission success.

CONCERN: With few exceptions, practices to identify and control hardware, materials, parts, and other items are not documented or consistently applied; therefore, these items may be inadvertently used in applications for which they do not meet the specifications.
(QV.5-1)
(H2/C2)

QV.6 INSPECTIONS

PERFORMANCE OBJECTIVE: Prerequisites should be provided in written inspection procedures with provisions for documenting and evaluating inspection results.

FINDINGS:

- The deficiencies identified in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) regarding inspections persist.
- Inspections are often performed without the benefit of documented preplanning, written procedures, specified acceptance or rejection criteria, or provisions for recording inspection results.

CONCERN: See Concern QV.3-2.

QV.7 CONTROL OF SPECIAL PROCESSES

PERFORMANCE OBJECTIVE: Provisions should be established to ensure the acceptability of special processes such as welding, heat treating, nondestructive testing, and chemical cleaning, and that special processes are performed by qualified personnel using qualified procedures and equipment.

- FINDINGS:**
- The deficiencies identified in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) regarding welding persist.
 - Procedures are not established for recording, characterizing, and dispositioning defects identified during the performance of magnetic particle examinations of hoisting and rigging devices. An informal, nonproceduralized form is used as a record of the examination. On one such form, defects were reported to have been found; however, the type, size, location, orientation, and the basis for acceptance of the defects were not recorded.
 - The qualifications of personnel who perform magnetic particle examinations of hoisting and rigging devices are not certified in accordance with a written program that conforms with the requirements of ANSI/ASME NQA-1, Supplement 2S-2, "Supplementary Requirements for the Qualification of Nondestructive Examination Personnel," and the American Society of Nondestructive Testing, Recommended Practice No. SNT-TC-1A. LBL has not properly certified the qualification of nondestructive examination (NDE) personnel and has accepted a 1984 Certificate of Achievement from a community college as a partial basis for qualification. Experience, training, and demonstrated proficiency requirements have not been established and NDE personnel have not been tested to verify qualification to the above standards.
 - Equipment, procedures, and techniques used to perform magnetic particle examinations of hoisting and rigging devices are not qualified in accordance with a documented program that conforms with the requirements of ANSI/ASME NQA-1, Supplement 9S-1, "Supplementary Requirements for Control of Processes." Documented procedures are not used to control critical process parameters and environmental conditions and to specify acceptance or rejection criteria and equipment calibration requirements.
 - The LBL self-assessment, Section QV.7, "Control of Special Processes," addresses special processes in general, but does not address the qualification of personnel, procedures, and equipment used to perform nondestructive examinations.

CONCERN: See Concerns TC.8-1 and OS.2-2.

4.5.3 Operations

4.5.3.1 Overview

The eight performance objectives in the Operations functional area were addressed in this appraisal. The appraisal was conducted by means of interviews with Deputy Division Directors, Facility Managers, staff scientists, principal investigators, Group Leaders, and various technicians and operators; and reviews of directives, memoranda, Operational Safety Procedures (OSPs), procedures, logbooks, data sheets, and other operating and training records.

The facilities visited and reviewed were: Center for X-ray Optics, Bldg. 2; Bevatron and Heavy Ion Superconducting Spectrometer liquid helium systems, Bldg. 51; Si/Ge Detector Laboratories, Bldg. 70A; National Center for Electron Microscopy, Bldg. 72; Superconducting Magnet Fabrication and Testing, Bldgs. 58 and 64; Ion Test Stands, Bldgs. 16 and 5; Center for Advanced Materials (GaAs), Bldg. 2; transuranic gloveboxes, Bldg. 70A; Research Medicine and Radiation Biophysics Division Patient Treatment Program, Bldgs. 51 and 55; Heavy Ion Fusion Accelerators, Bldg. 58; heavy element isotope gloveboxes, Bldg. 70; Bevalac, Bldgs. 51 and 71; 88-inch Cyclotron, Bldg. 88; and Advanced Light Source (ALS), Bldg. 6.

The lack of formality in control of operations is still evident at the Lawrence Berkeley Laboratory (LBL). There are still five of six concerns from the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) that remain open. Completion of four of these (logbook requirements, operator aid guidance, dissemination of information, and shift turnover) are tied to compliance with DOE 5480.19 on conduct of operations. The fifth concern was on oxygen deficiencies in confined spaces associated with accelerators. This concern remains open since, subsequently identified, needed freon monitors were not installed owing to the lack of a tracking system for identified safety concerns. Oxygen deficiency and freon detectors were installed at the large microscope facilities as a result of findings in the earlier Technical Safety Appraisal (TSA). A concern on potential neutron production from the relocated Van de Graaff Generator was resolved since an OSP revision is required to reconfigure the operation.

In the earlier TSA, the concern, that a system for dissemination of essential operations information to all affected staff did not exist, was not well stated. While the findings supporting the concern were very specific, the concern as stated does not allow easy judgment when the concern should be closed. It is believed that successful implementation of the conduct of operations program will satisfy this concern.

The Department of Energy (DOE) imposed DOE 5480.19, "Conduct of Operations Requirements for DOE Facilities," on LBL in the fall of 1990. This Order allows the contractor to make a documented, graded approach assessment to determine the extent of the applicability of the chapters of the Order. LBL has chosen to let each division perform its own graded assessment, and that process appears to be well designed. An LBL implementation date for DOE 5480.19 was set during this appraisal but guidance to LBL on the Order from DOE has not been timely. This assessment process should identify many documents and procedures needed to control operations.

A concurrent initiative has been started to develop Facility Notebooks for use at the facility/laboratory level. These notebooks are an excellent concept to bring all identified operational and safety-related information into one controlled location. Documents identified and/or developed from the graded assessment will be incorporated into these notebooks. Therefore, these efforts need some coordination to improve efficiency in assembly of the notebooks. The appraisal team has a concern on the design and the quality of the review and approval processes for the graded assessments and Notebooks.

Another new concern was identified regarding the experimenter/operations interface. Additional findings are presented to support the previous TSA concerns on efficient operations staffing, OSP deficiencies, lack of procedure control guidance, and the lack of guidance for consistent documentation of job-specific training.

There were also a number of operational improvements observed since the time of the earlier TSA. Control rooms and areas have restricted access for nonessential staff and the clutter of postings of operational aids has been reduced. Most of the newer aids are dated and initialed. Housekeeping is significantly improved and operational areas are much cleaner with the concerted effort in late 1990 to remove a lot of extraneous material. Out-of-service equipment is posted. Some staff on an individual basis has started to formalize procedural steps where none existed previously, and others have updated existing procedure lists. However, very few of these have received any peer reviews or management approvals. Log bookkeeping has improved in that the identity of the staff person making entries can be identified.

Implementation of the DOE Order, including identifying and assimilating a comprehensive and systematic codified conduct of operations program, should result in significant improvements in operational safety. Pressing forward with these developments with less than timely guidance from DOE is necessary. A well-designed, properly-approved conduct of operations program will also contribute to addressing other TSA concerns. In parallel with a conduct of operations program, Laboratory-wide guidance is needed to achieve uniformity in the processes of developing documents and documenting activities.

The LBL self-assessment presented 18 findings in the operations area. Almost half of these would have been more properly covered in other functional areas. Most of the rest echoed the concerns of the previous TSA effort with three of them judged to be new. The action plans generally echoed previous actions for existing plans for existing concerns and most of the others were of nonsubstantial quality to achieve successful resolution.

4.5.3.2 Findings and Concerns

OP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Operations organization and administration should ensure effective implementation and control of operations activities.

- FINDINGS:**
- Staffing resources at the 88-inch Cyclotron are not sufficient for effective operation of the accelerator. Operations staff is highly matrixed with multiple job responsibilities. As an example, one staff member is assigned in various roles as staff scientist, Radiation Safety Officer, experimental coordinator, Health Physics Technician, and member of the LBL Radiation Safety Committee.
 - Continued development of the advanced ion source has been suspended to permit staff persons to fulfill the function of crew chief and for implementation of DOE 5480.19.
 - At the 88-inch Cyclotron, four of the five operators are eligible for the PLUS "5" early retirement incentive program in Fiscal Year 1991.
 - Staff scientists have been assigned to implement the calibrations of area monitors at the 88-inch Cyclotron called for in the previous TSA because of the lack of operating staff resources.
 - The current 4-month schedule established by the Program Advisory Committee will require nearly 6 months to complete.
 - General lack of full staffing capabilities is addressed in the LBL self-assessment.

CONCERN: See Concern OA.2-3.

OP.2 CONDUCT OF OPERATIONS

PERFORMANCE OBJECTIVE: Operational activities should be conducted in a manner that achieves safe and reliable operation.

- FINDINGS:**
- Little progress has been made in satisfying the original concern on establishing requirements for keeping facility and experiment logbooks. Review of logbooks in this appraisal showed the technical quality of entries was not consistent.
 - Review of recent logbook entries also showed the problems indicative of the lack of consistent guidance:
 - Many books did not indicate who made the entries.
 - Many books used only initials to indicate who made the entries without an attached sheet to indicate the identity of the initials.
 - Most books did not indicate peer or management reviews of entries that were made as would be documented by sign-offs.

CONCERN: See Concern OP.2-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

- FINDINGS:**
- In July 1990, DOE 5480.19, "Conduct of Operations Requirements for DOE Facilities," was issued. This Order was passed by the San Francisco Operations Office (SAN) to LBL. A copy of the covering transmittal letter was not found at LBL and the timing of the receipt at LBL is not known.
 - The guidance of the Order allows the contractor to make a graded approach assessment to determine the extent of applicability of the requirements. The Order requires that the graded approach assessment and its results be documented.
 - In mid-November 1990, a task force of designated persons, one in each division, was formed to do self-assessments of their division with the graded approach to determine chapter-by-chapter applicability of the Order requirements. This effort was started since LBL was anxious to respond to the Order but DOE guidance at that time was meager.
 - During the appraisal period, further discussions were held between the Lawrence Berkeley Laboratory Site Office (LBLSO) staff and LBL relative to development of LBL implementation documents. It was agreed that the graded approach assessment would also incorporate over-all hazard levels for which differing criteria would be applied. The categories are: Critical (not yet defined but might include accelerators and tritium facilities, for example), General Research, and Administrative. This agreement was formalized in a letter of January 31, 1991, from the LBLSO to ER-8. The LBL

implementation document is now scheduled to be submitted for DOE review and approval in early May 1991.

- The substance of this concern was expressed in the LBL self-assessment.

CONCERN: Lawrence Berkeley Laboratory has not implemented DOE 5480.19 on
(OP.2-2) conduct of operations.
(H3/C2)

CONCERN: Guidance has not been supplied to Lawrence Berkeley Laboratory or
(OP.2-3) to the San Francisco Operations Office by the Department of
(H3/C2) Energy Program Office (Energy Research) on a timely basis for
implementation of DOE 5480.19.

FINDINGS:

- A plan for review and approval of the graded self-assessments was not specified.
- In a parallel initiative, effort was started at the direction of the Deputy Laboratory Director in early January 1991, on developing the already existing concept of the Facilities Notebook into actual practice. These notebooks were to draw a variety of documents, OSPs, procedures, training records, and other safety-related and operations information into one controlled volume which would be readily available in the facility/laboratory. This effort is to be completed by September 1991. The mechanism for achieving effective technical review and approval of these Notebooks has not been planned.
- This effort should result in the generation and collection of important documents which should be included in the Facility Notebooks.
- The substance of this concern was not expressed in the LBL self-assessment.

CONCERN: Planned review and approval processes for acceptance of the
(OP.2-4) graded-approach assessment to comply with DOE 5480.19, and for
(H2/C3) the Facility Notebooks, have not been established by Lawrence Berkeley Laboratory.

CONCERN: See Concern OP.5-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

FINDINGS:

- The conduct of operations guides developed for the major national user facilities (Bevalac, ALS, 88-inch Cyclotron, etc.) do not address outside user group requirements.
- The user group at Cave 0 of the 88-in Cyclotron improperly used water cooler jugs for storage of radioactive waste solutions.

- During an incident reported in Unusual Occurrence LBL-89-13-88-2, a user group at Cave 0 of the 88-inch Cyclotron improperly initiated repairs of an activated component.
- Activation product and alpha contamination were measured by ES&H personnel at the East Area Landing of the 88-inch Cyclotron on April 3, 1990. Operations staff was unaware of the incident, the cause of the incident, the survey, or any remediation efforts at the time of this appraisal.
- The substance of this concern was expressed in the LBL self-assessment.

CONCERN:
(OP.2-5)
(H2/C2)

User groups conducting experiments at major Lawrence Berkeley Laboratory facilities are not required to conduct their operations in accordance with facility conduct of operation guides.

OP.3 OPERATIONS PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Approved written procedures, procedure policies and data sheets should provide effective guidance for normal and abnormal operation of each facility on a site.

- FINDINGS:**
- Research divisions have developed or are starting to develop more written procedures to supplement OSPs and to describe operating steps for facilities and equipment not needing OSPs.
 - The following were found in reviewing procedures developed locally in various research divisions:
 - The name of the author did not appear on some procedures.
 - Many procedures were not dated.
 - Procedures did not show that any peer or management reviews and/or approvals were performed before their implementation.
 - There is no document control guideline for procedure issuance, registration, and revisions.
 - A fragmentary approach for procedure development, review, approval, and issuance will become burdensome for each research division.
 - Also see Section 4.5.1, OA.3, and Section 4.5.8, TS.2.

CONCERN: See Concern OA.2-2, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

- FINDINGS:**
- Review of operations and experimental facilities in the various research divisions showed the following deficiencies associated with OSPs:
 - Contents included material and extraneous pages not called for by Chapters 1, Appendix B, "Operational Safety Procedures," Health and Safety Manual.
 - Approval pages were missing.
 - Operating procedures were incorporated in the OSPs.
 - On January 9, 1991, the Laboratory Director sent a directive to Division Directors authorizing the use of expired or new OSPs on an interim basis (6-month life) with a modified quick review and approval mechanism. This was forced by the backlog in reviews of new OSPs, by the Safety Review Committee (SRC) Subcommittees and Environment and Safety Hazard Control Department (ESHC), that developed when OSPs were identified as missing in the LBL self-assessment.

- The appraisal team observed OSPs with interim approvals dated the day of and the day before the facility appraisal visit. Several lapsed OSPs were seen without interim approvals. The interim approval dated January 1991, for the MBE-4 (an ion-induction linac) covered an OSP, "HIFAR Program, MBE-4 Operational Safety Procedure," that apparently lapsed in January 1989. Machine operators continued to use the lapsed OSP.
- An OSP was developed for custodial services in the Earth Sciences Division transuranic glovebox area to conform with OSP guidance, when this should probably only have been an operating procedure.
- Deficiencies with OSPs were identified in the LBL self-assessment.

CONCERN: See Concern TS.2-5; and see Concern TS.2-3, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

OP.5 OPERATIONS STATIONS AND EQUIPMENT

PERFORMANCE OBJECTIVE: Operation stations and facility equipment should effectively support facility operation.

- FINDINGS:**
- In response to the concern in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) on the potential for oxygen deficiencies in confined spaces at accelerators, LBL embarked on a program to identify confined spaces. In April 1990, this was linked to an attempt to implement ANSI Standard Z117.1-1989 "Safety Requirements for Confined Spaces." By August 1990, the Bevalac complex (Bldgs. 51, 64 and 71) had been surveyed and a mutually agreed upon list of confined spaces was documented.
 - Monitors were installed for oxygen deficiency but nothing was done to install freon detectors in areas of Bldg. 71 until January 30, 1991, as a result of this appraisal.
 - Only the Nuclear Science and Accelerator and Fusion Research Divisions responded to the confined space initiative. See Section 4.5.14, IH.2, for the status of an LBL confined space program.
 - See Concern IH.2-2.

CONCERN: See Concern OP.7-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

- FINDINGS:**
- The RF tank in the vault of the 88-inch Cyclotron has been posted with a DANGER sign and entry procedure recently.
 - Confined areas in Bevalac were posted in January 1991. Inspection by ESHC of these postings against procedures developed for entry was requested on February 1, 1991.
 - A confined space entry procedure for Bldg. 51 was issued in December 1990, and similar procedures were issued on January 30, 1991, for Bldg. 71, all in draft form.
 - The 88-inch Cyclotron staff only recently assigned an individual responsibility for resolution of Concern RP.8-2 from the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
 - The operational staff and the Director of the 88-inch Cyclotron were not aware of the findings for their facility from the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) until given a copy by the assessor during the week of this appraisal.

- The staff at the Bevalac reported considerable difficulty in establishing the status of recommendations made in UORs and other commitments made in safety appraisals and reviews.
- Also see Concern OA.5-2 and OS.2-1.
- The substance of this concern was partially expressed in the LBL self-assessment.

CONCERN:
(OP.5-2)
(H2/C2)

Lawrence Berkeley Laboratory has no system to track identified, needed safety improvements.

OP.6 OPERATOR KNOWLEDGE AND PERFORMANCE

PERFORMANCE OBJECTIVE: Operator knowledge and performance should support safe and reliable operation of the equipment and systems for which they are responsible.

- FINDINGS:**
- Not all OSPs, which were located in operating areas and with equipment, listed staff authorized by facility or division management to operate the facility, equipment, and/or experiment.
 - Some OSPs contained the signatures of those staff authorized to operate the equipment. However, these signatures were not of those staff identified as having become acquainted with the OSP, and many were not dated. Some OSPs and procedures contained reading sheets with signatures of the staff members to document their understanding of the document.
 - Various local training files for documenting job specific training and certification were inconsistent in providing signatures of trainees or trainers with dates and content.

CONCERN: See Concern TC.1-4; and see Concern TC.3-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

4.5.4 Maintenance

4.5.4.1 Overview

The eight performance objectives in the Maintenance functional area were addressed. Maintenance programs at the Lawrence Berkeley Laboratory (LBL) were assessed for plant facilities, support systems, and for a sample of research activities. The assessment included tours of facilities and interviews with managers, supervisors, and workers. Documentation and procedures, to the extent that they were available, were also reviewed. Besides inspection of facilities and records at the main Laboratory, the physical condition of the two LBL on-campus buildings (Donner and Calvin) and the campus management activities associated with maintaining those buildings were also assessed. The Laboratory facilities that were visited and inspected included various accelerators and research activities, electrical distribution facilities, cooling towers and other various support systems, major machine shops, and maintenance work centers.

Overall, the physical condition of most of the facilities was found to be good. Fewer actual deficiencies in plant systems and components were found than are normally found at a research laboratory. Nevertheless, the level of control of maintenance activities in some specific areas reflects a continued failure to provide coordination and proactive maintenance activities and results in significant vulnerabilities.

Two LBL maintenance-related activities are considered to be particularly well done relative to some other Department of Energy (DOE) laboratories. These are the energy management program and the approach used to control hazards of asbestos brake linings in the vehicle and crane maintenance areas.

Weaknesses in the LBL maintenance program include significant manpower shortages that, for example, adversely affect the preventive maintenance program in several important areas, all of which are well known to LBL managers. The principal obstacles to establishing a good maintenance program are related to funding and manpower, which have gradually eroded over the past 20 years. It was also determined during this assessment that cross-divisional coordination is deficient to the point that a good maintenance program conforming to standards developed under the graded approach for nonnuclear facilities is not currently possible without improvements in this coordination.

Resources and programs are severely limited in the area of preventive maintenance and facilities inspection capabilities. For example, machine shop equipment preventive maintenance is currently marginal, and general building inspections by managers are not routinely performed. Also, the vehicle maintenance shop has inadequate bay and lift facilities, resulting in excessive amounts of work being accomplished by the use of jacks. Programs to upgrade roadways, especially where concrete has cracked due to subsidence, are likewise inadequate. These conditions and limitations result in reduced levels of safety and efficiency.

Cross-divisional and other organization coordination (for example, with public utilities) is considered to be the most severe safety issue related to maintenance. In particular, electrical power distribution systems are

vulnerable to uncoordinated modifications by multiple organizations. Similarly, the laboratory public announcing system is part of the LBL emergency communications capability, but it is very poorly controlled, resulting in random system modifications throughout the Laboratory. This condition requires constant attention of the communications system maintenance personnel, who are also undermanned relative to these increased requirements.

DOE and LBL managers have not provided the required additional resources; however, significant interim improvements can be achieved using resources that are currently available. The principal opportunities in this regard all involve better training, coordination, and communication among the various laboratory organizations, including the operators of research activities; contractors; Plant Engineering; Construction and Maintenance; Environmental Safety and Hazards Control; and even the students that use the LBL facilities.

Corrective actions taken on the Concerns identified in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) were reviewed for adequacy and completion. None of the seven concerns in the Maintenance functional area in DOE/EH-0096 were recommended for closure.

4.5.4.2 Findings and Concerns

MA.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Maintenance organization and administration should ensure effective implementation and control of maintenance activities.

- FINDINGS:**
- The secondary electrical distribution system is not under a change control system that would ensure the safety of electrical workers. Often these personnel must work on secondary electrical distribution components and loads without knowledge or control of changes being implemented by contractors or Plant Engineering. No compensatory actions have been taken.
 - Electrical system drawings are not controlled and are not used to control or reflect proposed modifications to electrical panels, cables, loads, and protective devices. No compensatory actions have been taken.
 - The public announcing system is subjected to uncoordinated modifications by facility users, as well as other divisional shops and contractors, without coordination with operational and maintenance personnel.
 - Job orders are not systematically or independently assessed for hazards that fall under the expertise of the responsible Laboratory safety groups.
 - Access to high voltage breaker panels was not controlled in that the necessary coordination of locks between LBL electrical personnel and the outside utility company was not in place.
 - Natural gas regulator stations were found that were not physically supported or seismically braced, apparently due to failure to identify related work and to perform the necessary post-modification inspections by cognizant technical groups.
 - The LBL self-assessment recognizes these control issues but fails to fully address the following concern.

CONCERN: Coordination among Laboratory divisions and with local utility companies does not ensure effective maintenance and control of systems important to safety. (Also see Section 4.5.6, AX.6, and Concerns MA.8-2 and TS.3-2 in this document; and Concern OA.1-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).)

(MA.1-2)
(H1/C2)

MA.2 CONDUCT OF MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance should be conducted in a safe and effective manner to support each facility condition and operation on the site.

- FINDINGS:**
- Electrical lineups were conducted without the benefit of up-to-date electrical drawings, resulting in the discovery of unexpected changes to electrical panels during the performance of electrical isolation tasks. Compensatory measures were not in place.
 - Danger tags were not properly removed and destroyed upon completion of maintenance activities.
 - Operator logs frequently identified equipment problems but did not record corrective actions; logs were not routinely reviewed and initialed by supervisors; multiple failures were not being addressed in terms of root causes.
 - Storage for tools and supplies in some shops was not sufficient to allow orderly and efficient maintenance or operations.
 - Diesel generators were found to be modified electrically in an attempt to allow easier repairs. There was no safety review of this design, and the maintenance procedures did not compensate for this deficiency. This resulted in an increased potential for component failure and human error.
 - Some energized electrical panels were found unlocked and open; keys were routinely left in the locks rather than being controlled, such as in a separate key locker.
 - Efficient and safe maintenance of motor vehicles was not supported in that the number of bays and lifts was so low that a significant amount of work was being accomplished outside the bays with the use of jacks.
 - Training programs for maintenance personnel were not comprehensive, documented, or effective. Training and indoctrination of researchers and students regarding electrical and mechanical systems and limitations on modifications do not exist.
 - The LBL self-assessment documents weaknesses in a range of maintenance-associated activities, but statements regarding corrective actions are not specific.

CONCERN: System configuration control, administrative procedures,
(MA.2-2) training, and support facilities do not provide for comprehensive
(H2/C2) control of maintenance and modification activities at the
Lawrence Berkeley Laboratory. (Also see Concern TC.1-4 and
Section 4.5.5, TC.5, in this document; and Concerns TC.3-1 and
TC.3-2, Technical Safety Appraisal of the Lawrence Berkeley
Laboratory (DOE/EH-0096, February 1990).)

MA.3 MAINTENANCE FACILITIES, EQUIPMENT, AND MATERIAL

PERFORMANCE OBJECTIVE: Facilities, equipment, and material should effectively support the performance of maintenance activities.

- FINDINGS:**
- In some shops, storage facilities are not provided for tools, equipment, and supplies.
 - The vehicle maintenance shop physical facilities have too few bays and lifts to support the safe and efficient maintenance of LBL vehicles.
 - The LBL self-assessment indicates a general understanding of these deficiencies, but no specific corrective actions are proposed.

CONCERN: Facilities, equipment, and material needed to support safe maintenance are not provided and maintained in all Lawrence Berkeley Laboratory shops.
(MA.3-2)
(H2/C2)

MA.4 PLANNING, SCHEDULING, AND WORK CONTROL

PERFORMANCE OBJECTIVE: The planning, scheduling, and control of work should ensure that identified maintenance actions are properly completed in a safe, timely, and effective manner.

- FINDINGS:**
- Hazards associated with authorized work activities are not systematically evaluated by a knowledgeable, independent person. Work is sometimes authorized and conducted without a formal assessment of potential hazards.
 - Modifications are sometimes accomplished without review for engineering adequacy of the final installation and without removal of superseded equipment or components.
 - "Blanket job orders" are being used without administrative criteria that ensure safety is not compromised. Approximately 50 blanket job orders were reported to be effective at the time of this assessment; no formal policy or controls are established to ensure the safety of maintenance performed under these blanket job orders.
 - Contractors, research staff, and students are not prevented from modifying electrical or mechanical support systems in an informal manner.
 - Work on electrical equipment at LBL is not conducted systematically in that no lifted-lead marking or control program is used, sometimes resulting in reassembly problems such as changes in motor phase rotation.
 - This concern is not fully addressed by the LBL self-assessment.

CONCERN: Work control systems and control of modifications of plant support systems do not place priority on safety.
(MA.4-2)
(H2/C2)

MA.5 CORRECTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: The material condition of components and equipment should be maintained to support safe and effective operation of all facilities on the site.

- FINDINGS:**
- The natural gas system and physical supports have deteriorated significantly in some areas and are not being maintained or systematically inspected. No compensatory actions have been taken.
 - Operating devices were not always available at natural gas shut-off valves, although the valves were clearly marked. No compensatory actions have been taken.
 - Drum storage racks containing hazardous materials were not being maintained. Plans for replacement had been approved but not implemented as of the time of this assessment. No compensatory actions have been taken.
 - Valves at LBL are not labeled in accordance with DOE 5480.19, "Conduct of Operations Requirements for DOE Facilities."
 - Machinery in some shops was not being maintained or placed out-of-commission pending maintenance.

CONCERN: See Concern MA.2-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

MA.6 PREVENTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: Preventive maintenance should contribute to optimum performance and reliability of systems and equipment important to operations.

- FINDINGS:**
- Preventive maintenance is not performed on the natural gas system, including preservation of exposed piping and maintenance of supporting foundations.
 - Roadway maintenance, especially for cracked and shifted concrete, has not been systematically undertaken at LBL or adequately funded. Compensatory actions such as warning signs and road closures have not been undertaken or planned.
 - Communications equipment used for emergency notifications (public announcing system) is routinely maintained in a reactive mode; and extensive overtime efforts are required to maintain the system, which still does not reach all work areas at LBL.

CONCERN: See Concerns MA.4-1 and OA.1-2, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

MA.7 PREDICTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance history evaluation and systematic root cause analyses should be used to support maintenance activities and optimize equipment performance.

- FINDINGS:**
- Although some effort has been made in this area, plant equipment, systems, and facilities have not been systematically assessed for predictive maintenance opportunities.
 - The LBL self-assessment recognizes this deficiency.

CONCERN: A predictive maintenance program has not been fully implemented or systematically addressed and planned at the Lawrence Berkeley Laboratory.
(MA.7-2)
(H3/C2)

MA.8 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Maintenance procedures and related documents should provide appropriate directions and guidance for work and should be used to ensure that maintenance is performed safely and effectively.

- FINDINGS:**
- Operator logbooks that reflect component failures or maintenance requirements are often not updated to reflect corrective actions in progress or completed.
 - Maintenance procedures often do not provide detailed guidance; they are often only general checklists and do not reflect coordination with safety support organizations or the operating organization.
 - Documentation of contractor changes is often not coordinated with maintenance and operating personnel.
 - The LBL self-assessment does not fully address this concern.

CONCERN: Records and activities for operations, modifications, and maintenance are not coordinated at the Lawrence Berkeley Laboratory. (Also see Concern MA.1-2 in this document; and Concern OP.2-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).)
(MA.8-2)
(H3/C2)

4.5.5 Training and Certification

4.5.5.1 Overview

Seven performance objectives in the Training and Certification functional area were addressed in this appraisal. Specifically, these are: TC.1 Organization and Administration, TC.4 General Employee/Personnel Protection Training, TC.5 Maintenance Personnel, TC.7 Training Facilities and Equipment, TC.8 Quality Control Inspector and Nondestructive Examination Technician, TC.9 Radiological Protection Personnel, and TC.10 Training for Supervisors, Managers, and Technical Staff.

This appraisal was performed by interviewing selected Lawrence Berkeley Laboratory (LBL) managers, safety coordinators, researchers, students, staff, and technical trainers. The Director for the Environmental and Safety Support Division within the San Francisco Operations Office (SAN) and a Lawrence Berkeley Laboratory Site Office (LBLSO) Facility Operations Engineer with LBL oversight responsibilities were also interviewed. In all, 21 interviews were conducted. Documents reviewed include training programs (syllabus, lecture notes, visual aids, etc.) and training records for all persons interviewed and selected others. The training policy developed by LBL and the LBL and SAN self-assessment reports were also reviewed.

The training provided at LBL could be best characterized as being informal. For example, training needs based on job requirements have not been established; training programs do not generally have clearly stated course objectives; tests are not routinely used to monitor employee understanding of course material; feedback is not routinely solicited to determine the effectiveness of the training; training records are not complete, up-to-date, or readily accessible to supervisory personnel.

One of the areas where this is evident is the lack of a Nondestructive Examination Technician certification program. Some of the informality surrounding the training program has occurred as a result of the limited resources assigned to this function. Despite the limited resources, a substantial amount of training does occur at LBL. All new employees and visitors receive 2 hours of orientation training. It was also evident that a significant effort had been made to provide laboratory employees with training and information about the Tiger Team and its processes.

The Tiger Team members received the orientation and training on radiation protection for accelerator programs. The training appears informative, but some of the material illustrated unsafe work practices without them having been identified as such.

The majority of the more formal training courses are provided by the Environmental and Safety Hazards Control (ESHC) Department. Some of the training courses such as Radiation Protection use tests to monitor employee understanding of course material, but this appears to be the exception rather than the rule. Within the various divisions at LBL, specific safety training is given. Some divisions such as Cellular and Molecular Biology have very good programs. Other divisions such as Physics and Accelerator and Fusion Research have begun the process of identifying training requirements based on potential hazards in the workplace.

The LBL program for providing hazard communication training to supervisory personnel won a Department of Energy-sponsored Training Resources and Data Exchange (TRADE) award. However, inconsistent implementation of the hazard communication program by many supervisors has resulted in less than complete compliance with Occupational Safety and Health Administration (OSHA) requirements.

Other functional areas within this Technical Safety Appraisal having findings and concerns relating to training are Fire Protection, Packing and Transportation, Maintenance, Industrial Hygiene, Operations, Worker Safety and Health (OSHA) Compliance, Occupational Safety, and Emergency Preparedness.

The substance of the major concerns regarding training were also identified by LBL in their self-assessment. Although SAN has provided their personnel with substantial training, there is no formal training program for their onsite personnel. This was identified by SAN in their self-assessment.

Corrective actions taken on the concerns identified in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) were reviewed for adequacy and completion. None of the six concerns in the Training and Certification functional area in DOE/EH-0096 are recommended for closure.

4.5.5.2 Findings and Concerns

TC.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The training organization and administration should ensure effective implementation and control of training activities.

- FINDINGS:**
- The LBL Health and Safety Manual (PUB-3000) states that managers are responsible for ensuring that employees and Laboratory guests under their supervision receive safety training. Training not provided by ESHC, such as on-the-job training is the responsibility of line management. This includes information on procedural changes or system modifications that impact safety.
 - ESHC training coordination at LBL is handled by a single individual. This training coordinator indicated that a staff size of four to five persons is necessary to develop and implement new training programs, to help supervisors provide safety training, do record keeping, and define training requirements to meet current regulations.

CONCERN: See Concern OA.2-3.

- FINDINGS:**
- The LBL Health and Safety Manual (PUB-3000) indicates that all health and safety training must be documented and that supervisors are responsible for maintaining training records.
 - There is no Laboratory-wide system for keeping up-to-date training records. The Safety and Health (S&H) Subteam found that training records are maintained differently by different divisions. Training records examined within the Physics Division appeared to be complete and up-to-date. Training records maintained in the Accelerator and Fusion Research Division were found to be incomplete and not up-to-date. The Head, Electrical Engineering Department was unable to readily assess the status of training for personnel working in or matrixed from this Department.
 - ESHC does maintain a computerized database of personnel attending courses taught by ESHC. Attendance records for employees taking courses not taught by ESHC are not generally entered into the ESHC database.

CONCERN: See Concern TC.1-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

- FINDINGS:**
- Many training courses such as Radiation Dosimeter Training and the Safety Orientation for Visitors and Guests are presented to LBL personnel. Attenders must sign an attendance roster but are not tested on their understanding of the material.

- The effectiveness of LBL-provided training courses is not formally and routinely evaluated by soliciting feedback from course attendees.
- The substance of this concern was identified in the LBL self-assessment.

CONCERN: Neither the effectiveness of training nor the trainees' understanding of material presented is routinely assessed.
(TC.1-3)
(H3/C2)

FINDINGS:

- LBL does not perform Job Task Analyses to determine training needs. Although supervisors are responsible for implementing a safety training program for their employees, most had not fully developed a set of training requirements for various job categories. Some divisions such as Cellular and Molecular Biology, Physics, and Accelerator and Fusion Research have begun the process of identifying training requirements based on potential hazards in the workplace.
- See Concerns FP.6-2, PT.2-1, and MA.2-2.
- See Sections 4.5.3, OP.6, 4.5.5, TC.5 and 4.5.5, TC.10.
- The substance of this concern was identified in the LBL self-assessment.

CONCERN: The Lawrence Berkeley Laboratory has not formally identified or established requirements for initial and continuing training.
(TC.1-4)
(H3/C2)

TC.4 GENERAL EMPLOYEE/PERSONNEL PROTECTION TRAINING

PERFORMANCE OBJECTIVE: General employee and personnel protection training programs should ensure that site/facility personnel, subcontractors and visitors have and understanding of their responsibilities and expected safe work practices, and have the knowledge and practical abilities necessary to effectively implement personnel protection practices associated with their work.

- FINDINGS:**
- LBL is not in compliance with all of the OSHA requirements for hazard communication training. ESHC has prepared a program for training supervisors. This program won a DOE-sponsored Training Resources and Data Exchange (TRADE) award. However, implementation by supervisory personnel for their employees at LBL is inconsistent.
 - See Section 4.5.13, WS.6.
 - See Concern IH.6-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0069, February 1990).
 - The substance of this concern was identified in the LBL self-assessment.

CONCERN: Lawrence Berkeley Laboratory is not in compliance with all of the requirements for hazard communication training as specified in 29 CFR 1910.1200.
(TC.4-1)
(H2/C1)

- FINDINGS:**
- The ESHC Operations Group does not have formalized training requirements nor have Job Task Analyses been performed for positions within this group.
 - LBL has indicated that safety training oversight will be provided by their Independent Review and Assurance Department (IRAD). This Department is not fully functioning and their mission and charter were still under development during this Technical Safety Appraisal (TSA).

CONCERN: See Concern TC.2-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

TC.5 MAINTENANCE PERSONNEL

PERFORMANCE OBJECTIVE: The maintenance personnel training qualification programs should develop and improve the knowledge and skills necessary to perform assigned job functions.

- FINDINGS:**
- The Machine Shops Department does not have a training program. There are no formal training requirements for positions in this Department. The Department Superintendent attempts to hire qualified personnel. Qualifications are indicated on the job requisition form. New hires are put on probation for 6 months while they demonstrate proficiency in using the various machine tools.
 - The Construction and Maintenance Department has a training program under development but is not fully implemented. Training requirements are being established in the form of checklists for each discipline. Draft plans were available for review by the S&H Subteam.
 - Both the Machine Shops and Construction and Maintenance Departments use monthly safety meetings to convey relevant information to personnel.
 - S&H Subteam members found the maintenance and shops personnel to have the technical knowledge in their areas although personnel in the Machine Shops plating areas were not aware of the proper response for handling chemicals in their area.
 - See Concerns IH.2-2, MA.2-2, and TC.1-4.

CONCERN: See Concerns TC.3-1 and TC.3-2, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

TC.8 QUALITY CONTROL INSPECTOR AND NONDESTRUCTIVE EXAMINATION TECHNICIAN

PERFORMANCE OBJECTIVE: The quality control (QC) inspector and nondestructive examination (NDE) technician training and qualification programs should develop and improve the knowledge and skills necessary to perform assigned job functions.

- FINDINGS:**
- There are no Quality Control Inspectors at LBL. There is one Nondestructive Examination (NDE) Technician certified as a Level 2 Technician for performing magnetic particle testing of lifting and hoisting equipment.
 - There is no formal NDE training program, but the Group Leader of the Occupational Safety and Engineering Services Group that supervises the NDE Technician indicated that the American Society for Nondestructive Testing Recommended Practice SNT-TC-1A, December 1988, is followed.
 - The NDE Technician was initially certified in 1984. Although the supervisor of the NDE Technician thought that the recommended practice was to be recertified every 3 years, no recertification has been made of the Technician.
 - See Sections 4.5.2, QV.7, and 4.5.13, WS.4.
 - See Concern OS.2-2.
 - The substance of this concern was identified in the LBL self-assessment.

CONCERN: Lawrence Berkeley Laboratory has no formal program for
(TC.8-1) certification of Nondestructive Examination Technicians.
(H3/C2)

TC.9 RADIOLOGICAL PROTECTION PERSONNEL

PERFORMANCE OBJECTIVE: The radiological protection personnel training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

- FINDINGS:**
- Videotapes used in the accelerator safety training course include scenes where workers are not following good safety practices. These scenes are not identified as illustrating inappropriate safety practices. These videotapes are sent offsite to be viewed by persons planning visits to LBL.
 - The substance of this concern was not identified in the LBL self-assessment.

CONCERN:
(TC.9-1)
(H2/C2) Training materials which illustrate unsafe work practices, without being identified as such, are in use at Lawrence Berkeley Laboratory.

- FINDINGS:**
- Learning objectives were neither discussed nor available in the course documentation of a radioisotopes training course given during this TSA.
 - The radioisotope training course did not include hands-on demonstrations of survey techniques for hidden radiation sources or of contamination smear survey techniques.
 - The instructor for the radioisotope training course did not explain the requirement to perform a survey for radioactive contamination prior to egress from a radioisotope work area.
 - Some personnel working with radioisotopes were not proficient in the use of contamination survey instruments. Many were unaware of contamination limits.
 - There is no documented review to ensure that LBL radiation protection training for either radiation workers or Radiation Protection Technicians includes all topics delineated in DOE 5480.11.
 - The substance of this concern was identified in the LBL self-assessment.

CONCERN:
(TC.9-2)
(H2/C1) Lawrence Berkeley Laboratory radiation protection training does not communicate the contamination control requirements required by DOE 5480.11.

TC.10 TRAINING FOR SUPERVISORS, MANAGERS, AND TECHNICAL STAFF

PERFORMANCE OBJECTIVES: Training programs for supervisors, managers, and the technical staff should broaden overall knowledge of processes and equipment and develop supervisory and management skills.

NOTE: This performance objective applies to those managers and supervisors to whom operations, maintenance, engineering, or technician personnel report. Technical personnel are those individuals whose job responsibilities affect the safe and reliable operation of each facility on the site, but who are not operators, maintenance, or quality control inspectors and non-destructive examination technical personnel. Examples of such positions are: engineers, engineering technicians, test/surveillance personnel, and chemists/chemistry technician.

- FINDINGS:**
- According to the LBL ESHC Training Coordinator, there is currently no supervisory training program nor a detailed plan to develop such a program.
 - The LBL Emergency Preparedness Coordinator has not had formal emergency preparedness training. See Section 4.5.7, EP.3.
 - See Concerns EP.1-2 and EP.3-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
 - According to a December 5, 1990, memorandum from the Director, Chemical Biodynamics Division, personnel spending less than 2 hours per week in LBL facilities are not considered part of the Division. This has been interpreted to mean that safety training is not required for persons in that category. This includes professors and students from University of California at Berkeley that use LBL equipment and facilities.
 - Senior staff have considerable latitude in selecting the training that they will receive. For example, a Research Director in the Chemical Sciences Division responsible for 14 graduate students, staff, and guests at LBL has not had any safety training since the early 1960s.

CONCERN: See Concern TC.1-4.

- FINDINGS:**
- The Director of the Environmental and Safety Support Division, SAN indicated that there are no formally implemented requirements for technical training of supervisors at SAN. Supervisors at SAN do receive supervisory personnel management training. Each SAN employee has an Individual Development Plan which could include plans for future training.
 - Two of the three Lawrence Berkeley Laboratory Site Office (LBLSO) Facility Operations Engineers permanently assigned to LBL have not had detailed LBL safety training appropriate for their oversight responsibilities. One of the engineers had been at LBL for 4 months before receiving accelerator safety

training. He had received other SAN training relating to his oversight responsibilities. This engineer indicated that he would request an LBL escort for any facility in which he had not received training.

- Until the start of this TSA, the LBLSO Facility Operations Engineers were not aware of the schedule for LBL ESHC safety training courses.
- The substance of this concern was identified in the SAN self-assessment.

CONCERN: The San Francisco Operations Office has not formally established
(TC.10-1) requirements or implemented a program for initial and continuing
(H3/C2) training for their onsite personnel.

4.5.6 Auxiliary Systems

4.5.6.1 Overview

The Auxiliary Systems Functional area was assessed against six of the nine performance objectives. Specifically, these are: AX.1 System Requirements, AX.2 Effluent Holdup and Treatment, AX.3 Solid Wastes, AX.5 Ventilation Systems, AX.6 Vital Supply Systems, and AX.7 Engineered Safety Systems. Since the Lawrence Berkeley Laboratory (LBL) has no reactor plants or significant quantities of fissile materials, auxiliary systems important to safety are limited. Auxiliary systems at LBL were considered in conjunction with the assessment of maintenance programs, and many of the problems associated with plant utilities and other auxiliary systems are addressed in Section 4.5.4.

The principal auxiliary system problem concerns the previously identified Laboratory-wide ventilation system and involves inadequate stack monitoring and failure to conduct exhaust system high-efficiency particulate air filter testing. See Concerns TS.6-1 and TS.6-2, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990), which continue to be active.

During the present assessment, it was noted that one LBL divisional requirement on control of solid hazardous wastes was not implemented. This was an administrative deficiency and did not result in an actual hazard.

LBL has also failed to provide inter-divisional coordination and design control for electrical systems and the public announcing system. Improvements in control, coordination, and documentation of the as-built design and the ongoing modifications to these systems will result in a significant reduction in risk to plant workers.

4.5.6.2 Findings and Concerns

AX.3 SOLID WASTES

PERFORMANCE OBJECTIVE: Solid hazardous wastes (including radioactive wastes) should be controlled to minimize the volume generated and handled in a manner that provides safe storage and transportation.

- FINDINGS:**
- The inventory requirements of solid hazardous wastes required by the LBL "Research Medicine and Radiation Biophysics Division Safety Document," dated November 26, 1990, were not implemented.
 - The self-assessment did not identify this problem.

CONCERN: Solid hazardous waste control requirements contained in
(AX.3-1) Laboratory safety documents are not implemented. (Also see
(H2/C2) Concern OA.1-4.)

AX.5 VENTILATION SYSTEMS

PERFORMANCE OBJECTIVE: Ventilation systems should reliably direct all airborne effluent from contaminated zones or potentially contaminated zones through cleanup systems to ensure that the effluent reaching the environment is below the maximum permissible concentration and is ALARA.

- FINDINGS:**
- High-efficiency particulate air filter testing and ventilation sampling issues have not been assessed by the Mechanical Safety Subcommittee.
 - The Mechanical Safety Subcommittee responsibilities as summarized in the Health and Safety Manual (PUB-3000) are restricted to reviews of research-related equipment, so plant equipment requiring mechanical expertise is not addressed by the Mechanical Safety Subcommittee. The Electrical Safety Subcommittee, in contrast, has Laboratory-wide responsibilities.
 - This issue is not addressed by the self-assessment.

CONCERN: Laboratory mechanical safety expertise is not applied to non-experimental equipment such as ventilation systems. (Also see Concerns TS.6-1 and TS.6-2, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).)
(AX.5-1)
(H2/C2)

AX.6 VITAL SUPPLY SYSTEMS

PERFORMANCE OBJECTIVE: The electric, water, and emergency power systems should reliably provide vital services as required by all facilities on the site.

FINDINGS:

- Access to high voltage distribution breaker panels had not been coordinated with the local utility company.
- Secondary electrical distribution panels and their loads are routinely modified by various LBL organizations without formal coordination.
- The public announcing system is routinely modified by various LBL organizations and individuals without formal coordination, resulting in reduced reliability and capability for emergency use.

CONCERN: See Concerns MA.1-2, MA.8-2, and TS.3-2; and Concern OA.1-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

4.5.7 Emergency Preparedness

4.5.7.1 Overview

The appraisal addressed all seven performance objectives in the Emergency Preparedness functional area. One additional area that will be addressed in this appraisal is the LBL Emergency Public Information Program.

The appraisal was accomplished through interviews with supervisors, Building Managers, the Lawrence Berkeley Laboratory (LBL) Emergency Preparedness Coordinator, and other members of the LBL Emergency Response Organization. These interviews were used to ascertain how LBL emergency response activities and the Emergency Preparedness Program were conducted, managed, and controlled. The team conducted an extensive review of emergency preparedness administrative documents, including exercise records, training programs, and supporting documents against DOE 5000.3A, the DOE 5500 series and the DOE 5480 series, ANSI Standards, and industry good practices.

The LBL Emergency Preparedness Program has a limited capability to detect accidents and incidents, to respond to them, and to provide guidance and protection to onsite employees. It was also observed that there is little or no concern regarding the possibility of having an emergency situation that could affect the public or offsite area surrounding LBL. LBL has developed a Master Emergency Plan (MEP) but this document is not sufficiently detailed and is not responsive to all the guidance in the DOE 5500 series. The San Francisco Operations Office (SAN) has developed a draft "SAN/LBL Emergency Operating Plan," dated January 16, 1991, and a draft "Emergency Communication and Information Center Plan," dated December 1990; however, these plans are in conflict and do not conform to guidance contained in DOE 5000.3A, the DOE 5500 series, and the DOE 5480 series.

The Federal Radiological Monitoring Assessment Plan for Region 7, was issued in February 1986 and has not been revised. In addition, there are no emergency plan implementing procedures (EPIPs) in place at LBL to support this plan.

The LBL EPIPs that are in place, do not provide sufficient instructions or assign responsibilities, particularly with regard to activation of Emergency Response Facilities, required notifications, protective action recommendations, emergency action levels, and other requirements as required by the DOE 5500 series. Emergency planning lesson plans have not been developed due to the lack of emergency information, instructions, and responsibilities contained in these EPIPs. In addition, SAN has not developed EPIPs to support the SAN Emergency Plan involving LBL.

The Emergency Preparedness Training Program consists of first aid, cardiopulmonary resuscitation, fire fighting, and Building Manager Orientations and is supposed to be conducted on an annual basis. LBL had not provided required formal emergency response training to incident commanders, emergency support staff, and emergency response teams in accordance with DOE 5500.3. The need to provide the emergency management organization with an in-depth training program was made evident during the Technical Safety Appraisal (TSA) Emergency Response Exercise. LBL should develop an Emergency Planning Training Program description document that addresses requirements for

approved lesson plans, training matrix, written examinations, passing test scores, certification of instructors, and required documentation as outlined in the DOE 5500 series and DOE 1324.2. Another area of training that needs attention is orientations and briefings on LBL emergency response functions for SAN and offsite State and local emergency management. Any offsite organization that will respond to an LBL emergency, to include the hospital staff that have entered into letters of agreement, should be included in this training program.

The unannounced Emergency Preparedness Exercise, conducted for the S&H Subteam did not have sufficient cue cards to present the participants with the necessary information and had some scenario problems. The exercise scenario was designed to test LBL capability to respond to an earthquake emergency which involved severe structural damage to three LBL facilities, radiological and hazardous materials, injuries to several employees, and activation of the LBL Emergency Response Organization. See EP.4 for more details on the exercise.

Only one individual is formally assigned to the LBL Emergency Preparedness Section; a recent retiree and summer student provide some part-time additional assistance. The full-time individual is assigned additional duties as a Safety Coordinator and Safety Committee Chairman which takes up approximately 25 percent of the employee's time with duties not directly related to emergency preparedness. In addition, additional duties for this individual include earthquake safety training and providing seismic safety advice. Consequently, the LBL Emergency Preparedness Section is not as effective in addressing emergency preparedness program issues and planning.

The public announcing system continues to be a severe problem with regard to its capability to disseminate emergency instructions to LBL employees during an emergency situation. This public announcing system should be designated as a safety-related system. LBL management has requested that an action plan be prepared to address this and other problem areas and to provide management with a corrective action document by March 1, 1991.

Some of the more serious items of concern are the needs for: revising the existing MEP and EIPs to be in accordance with DOE Orders; development of an Emergency Preparedness Training Program for all members of LBL Emergency Response Organization, support teams, and field response teams; development of job task analysis; development of a more effective emergency response training program for Building Managers and support staff assigned emergency responsibilities; expediting resolutions of all cited improvements; conducting quarterly drills and exercises to ensure that LBL has the ability to respond, mitigate, and effect appropriate recovery operations; and conducting an in-depth review of DOE Orders to determine that LBL is in compliance with these directives. Improvement to achieve an acceptable emergency preparedness program will require allocation of appropriate resources, manpower, and management support.

There are three outstanding concerns from the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) which remain as open concerns.

The LBL self-assessment did not address all areas identified in this emergency preparedness appraisal.

4.5.7.2 Findings and Concerns

EP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Emergency preparedness organization and administration should ensure effective planning for, and implementation and control of, site/facility emergency response.

- FINDINGS:**
- The LBL Emergency Preparedness Program did not meet the criteria established in DOE 5500.1A and DOE 5500.3. for planning purposes.
 - LBL had not developed job task analysis for each member of the Emergency Response Organization, support staff, and specialized support teams and had not identified their emergency responsibilities as outlined in DOE 5500.3.
 - The LBL Master Emergency Plan (MEP) did not address all LBL Emergency Management Organizations, support staff and emergency response teams.
 - LBL had not established an effective 24-hour, 7-day-a-week on-scene command and control system. The existing on-scene control is managed by the affected Building Manager who normally works 0800 to 1700 hours. There is a need for a professional 24-hour, on-scene command structure.

CONCERN: See Concern EP.3-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

CONCERN: The Lawrence Berkeley Laboratory has not developed an effective management and response organization that can detect, react to, and mitigate protracted emergency situations as required by DOE 5500.1A.
(EP.1-1)
(H2/C1)

- FINDINGS:**
- Building Managers, Assistant Building Managers, and Deputy Building Managers had not received sufficient emergency response training to completely qualify them to perform their emergency duties.
 - The emergency preparedness Building Manager Program has a very informal approach to a key emergency function at LBL. There is no formal written appointment for Deputy and Assistant Building Manager positions signed by LBL management.
 - Facility-specific drills have not been held in all facilities to test the capabilities of the Building Managers and support staff to react to simulated emergency situations involving LBL Emergency Response Organization.
 - The above findings were partially identified in LBL self-assessment; the corrective action plan and schedule for

resolving this partial finding was acceptable to correct the issue.

- See Section 4.5.5, TC.10.

CONCERN: The Building Manager Program has not been formalized through written appointments for the Deputy and Assistant Building Managers in accordance with DOE 5500.1A.
(EP.1-2)
(H2/C1)

FINDINGS:

- LBL had not developed an in-house, totally-independent, emergency preparedness appraisal for evaluation of LBL readiness capabilities, training programs, and onsite and offsite emergency response programs as required by DOE 5500.3 and Draft DOE 5500.3A.
- LBL had not developed a timely and effective action plan to track and correct identified emergency preparedness and response deficiencies and ensure adequate resolution of these cited improvement items.
- The above findings were partially identified in LBL self-assessment; the corrective action plan and schedule for resolving this partial finding was acceptable to correct the issue.

CONCERN: Lawrence Berkeley Laboratory has not developed an independent, in-house emergency preparedness appraisal capability and action tracking system to ensure compliance with DOE 5500.1A, DOE 5500.3, and Draft DOE 5500.3A.
(EP.1-3)
(H3/C1)

FINDINGS:

- SAN had not conducted routine emergency preparedness appraisals of LBL as required by DOE 5500.1A.

CONCERN: See Concern OA.1-5.

FINDINGS:

- Procedures had not been developed for emergency management to make decisions and provide protective action recommendations that cover the complete spectrum of operational emergencies for LBL facilities, including emergencies involving both security and operational aspects and provisions for shifting from one type of emergency to another in accordance with DOE 5500.1A.
- Responsibilities and authority for each member in the emergency preparedness and Emergency Response Organization had not been defined in the LBL MEP and EPIPs.
- The existing LBL emergency preparedness organization did not have adequate manpower, resources, and management support to complete its assigned emergency preparedness and emergency response mission.
- The above findings were addressed in the LBL self-assessment.

CONCERN: The existing Lawrence Berkeley Laboratory Emergency Preparedness
(EP.1-4) Program has not been established in accordance with DOE 5500.1A,
(H3/C1) DOE 5500.3, and Draft DOE 5500.3A.

- FINDINGS:**
- The LBL MEP had not defined the existing emergency preparedness interfaces between the Laboratory, the Lawrence Berkeley Laboratory Site Office (LBLSO), and the Headquarters, DOE EOC as directed in DOE 5500.1A.
 - The position which has overall responsibility and authority for the coordination of all LBL emergency response groups had not been clearly defined in the LBL MEP.
 - Individuals and alternates have been designated to perform the majority of LBL emergency roles, however there were no clear lines of succession defined in existing MEP or in the EPIPs.
 - Technical support, operations, and maintenance personnel are identified in the MEP, but require more defined responsibilities listed in the LBL EPIPs.
 - The above findings were not addressed in LBL self-assessment.

CONCERN: See Concern EP.2-1.

EP.2 EMERGENCY PLAN AND IMPLEMENTING PROCEDURES

PERFORMANCE OBJECTIVE: The emergency plan, the emergency plan implementing procedures, and their supporting documentation should provide for effective response to operational emergencies.

- FINDINGS:**
- LBL Master Emergency Plan (MEP) did not consider all credible onsite emergencies in sufficient detail.
 - All aspects of severe accidents which involve unusual initiating events, multiple failures, natural phenomenon, and other types of emergency situations have not been considered.
 - The emergency plan is not a concise and useable document. It did not include the following elements: well-defined Emergency Response Organization with specific responsibilities, emergency assessment functions, emergency classifications per DOE 5500.2A, or emergency action levels related to specific emergency or accident conditions. In addition, it does not address protective actions for onsite personnel or offsite populations, emergency planning zones and ingestion pathways, agreements with offsite emergency response agencies defining emergency services, and recovery and re-entry programs.
 - Safeguards and security emergencies and their emergency actions levels had not been addressed in the LBL MEP.
 - The MEP has not been coordinated with State and local emergency response agencies as directed in the DOE 5500 series.
 - Detailed actions, instructions, and assigned responsibilities required to carry out the MEP were not specified in the implementing procedures. These procedures were not consistent with the MEP, not cross-referenced with the MEP, and not cross-referenced with other operating (normal/emergency) procedures, and reference documents.
 - See Concern MS.2-1.
 - The above findings were not addressed in LBL self-assessment.

CONCERN: (EP.2-1)
(H3/C1) The existing Lawrence Berkeley Laboratory Master Emergency Plan is not in compliance with the DOE 5500 series, the DOE 5480 series, and DOE 5000.3A in many areas.

- FINDINGS:**
- The existing emergency plan implementing procedures (EPIPs) do not address the following activities in sufficient details; emergency assessment, emergency action levels, classification of emergency, special instructions for field monitoring and sampling teams, notification requirements, protective actions for onsite and offsite personnel, safe shutdown of equipment,

dose assessment functions, personnel evacuation and assembly, and recovery and re-entry procedures.

- EIPs do not specify or assign individual responsibilities to ensure specific actions assigned to individual members of the Emergency Response Organization.
- EIPs did not have a cover sheet attached or space provided for the developer/drafter, reviewer, and senior managements approval signature. These EIPs had not been reviewed annually by the Emergency Preparedness Subcommittee and formal documentation established.
- Emergency Preparedness Administrative Procedures had not been developed to provide special instructions on conducting surveillance of emergency preparedness resources, testing of equipment, and the method of followup action to resolve emergency preparedness action items or cited program deficiencies.
- Checklists had not been developed to support all EIPs and to ensure all appropriate emergency response actions are taken by the emergency management team and support staff.
- There is no formalized method established to include feedback from evaluations, appraisals, and simulated drills and exercises to make improvements and revisions MEP and EIPs.
- The above findings were not addressed in LBL self-assessment.

CONCERN:
(EP.2-2)
(H3/C1)

The Lawrence Berkeley Laboratory emergency plan implementing procedures are not in compliance with the DOE 5500 series and do not address individual emergency position responsibilities in sufficient detail. (Also see Concern OA.1-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).)

FINDINGS:

- LBL had not developed an emergency preparedness job task analysis study to identify the responsibilities of the Emergency Response Organization, (i.e., emergency management, support staff, specialized field teams and radiation assistance teams).
- The above findings were not addressed in LBL self-assessment.

CONCERN:
(EP.2-3)
(H2/C2)

Lawrence Berkeley Laboratory had not developed a job task analysis study of their Emergency Response Organization to identify assigned emergency responsibilities as directed in DOE 5500.3 and Draft DOE 5500.3A.

FINDINGS:

- The LBL Emergency Public Information Plan is not in compliance with DOE 5500.4A. It lacked appropriate reporting criteria and did not contain necessary directions.

- LBL Public Affairs had not developed preformatted emergency news releases for dissemination to the local news media during emergencies.
- The above findings were not addressed in LBL self-assessment.

CONCERN:
(EP.2-4)
(H3/C1)

The Lawrence Berkeley Laboratory Public Affairs Office did not comply with the provisions of DOE 5500.4A with respect to format, content, annual orientations and reporting.

FINDINGS:

- The Draft "SAN/LBL Emergency Operating Plan," dated January 16, 1991, is not in compliance with DOE 5000.3A and requires revisions.
- Definitions and titles used in "SAN/LBL Emergency Operating Plan" are not in compliance with the DOE 5500 series.
- This SAN/LBL plan did not have a listing of abbreviations used in the plan, references, revision numbers, abbreviated listing of assigned responsibilities on activation, and EPIPs.
- The Federal Radiological Monitoring and Assessment Plan (FRMAP) for Region 7 developed by SAN had not been upgraded or revised since February 1986. The existing FRMAP did not have revision numbers on each page and contains outdated information.
- Telephone numbers, names, addresses of agency contacts, and resources are not listed in an FRMAP Procedure but are in the plan. These contact telephone numbers are not being verified on a quarterly basis by SAN.
- The FRMAP did not have supporting procedures to include team activation; equipment, resources, and supplies; the location of supplies; listing of qualified team members to be deployed plus alternates; activation and deployment; etc.
- The above findings were not addressed in LBL self-assessment.

CONCERN:
(EP.2-5)
(H2/C1)

The San Francisco Operations Office has not developed emergency response plans and emergency plan implementing procedures in accordance with DOE 5500.1A, and DOE 5500.3 and Draft DOE 5500.3A.

EP.3 EMERGENCY RESPONSE TRAINING

PERFORMANCE OBJECTIVE: Emergency response training should develop and maintain the knowledge and skills for emergency personnel to respond to and control an emergency effectively.

- FINDINGS:**
- LBL had not developed a written emergency preparedness training program description as required by DOE 5500.3.
 - Initial and annual emergency response training has not been conducted for each member of the emergency management organization, support staff, emergency response teams and radiation assistance team as required by the DOE 5500 series.
 - Emergency preparedness lesson plans had not been developed.
 - LBL had not developed an annual training schedule for all members of the LBL Emergency Response Organization.
 - LBL had not developed emergency response training documents in accordance with DOE 1324.2, Records Disposition.
 - Also see Section 4.5.5, TC.10.

CONCERN: See Concern EP.3-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

- FINDINGS:**
- LBL had not conducted drills on regularly scheduled basis to ensure and test capabilities and knowledge of emergency support staff and specialized teams (i.e., field monitoring and sampling teams, dose assessment teams, offsite response teams, damage and repair teams and assessment teams).
 - The effectiveness of the emergency preparedness training program has not been periodically evaluated to make training program improvements.
 - LBL does not have any formal training documents that allude to specialized training for offsite medical treatment facilities and their medical staff.
 - SAN personnel designated as DOE liaison or support staff, or Emergency Duty Officer for LBL emergency response operations had not been trained to participate in emergencies.
 - See Section 4.5.3, TC.10.
 - The above findings were partially identified in LBL self-assessment.

CONCERN: The Lawrence Berkeley Laboratory emergency planning and training
(EP.3-2) program is not properly documented, evaluated, upgraded, and
(H3/C2) maintained current as required by DOE 5500.3 and Draft
DOE 5500.3A.

EP.4 EMERGENCY PREPAREDNESS DRILLS AND EXERCISES

PERFORMANCE OBJECTIVE: Emergency preparedness programs should include provisions for simulated emergency drills and exercises to develop and maintain the knowledge and skills for emergency personnel to respond to and control an emergency effectively.

NOTE: The drills and exercises referred to in this section are related to tests of and training on the emergency preparedness program. In many cases, these drills and exercises are best initiated using an operational situation. If accomplished that way, an additional benefit is gained by exercising the operations personnel and the interface between operations and emergency preparedness. Therefore, for maximum benefit, an operational drill or exercise can be used to lead into the emergency preparedness event, providing a drill or exercise to each program.

- FINDINGS:**
- An exercise scenario development committee had not been organized.
 - LBL had not developed an emergency preparedness administrative procedure to address scenario development, format, annual training requirements for controllers and evaluators, development of exercise objectives, and post-exercise activities (i.e., critiques both verbal and written reports).
 - LBL had not held frequent drills for small organizational units, (i.e., facility maintenance/repairs, radiological, and hazardous materials sampling and monitoring teams) to train personnel and to perfect procedures and communications. These drills should be of sufficient scope and frequency to ensure adequate response capability in all areas applicable to LBL operations.
 - Emergency drills had not been held to simulate emergency situations that could affect the onsite organization and offsite agencies.
 - Documentation that was received indicated that LBL did not perform timely and effective action to resolve all cited improvements and deficiencies following exercises, drills, and appraisals.
 - Quarterly communication drills are not being conducted.
 - LBL drills and exercises had not been conducted in accordance with a master plan schedule such that over a period of time all the procedures, personnel, facilities, and onsite and offsite response groups are involved and tested per the criteria of DOE 5500.3 and Draft DOE 5500.3A, and DOE 5500.9.

- CONCERN:** See Concern EP.4-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** The Lawrence Berkeley Laboratory exercise/drill program is not in compliance with DOE 5500.1A, DOE 5500.3, and Draft DOE 5500.3A.
(EP.4-2)
(H2/C1)
- FINDINGS:**
- Findings listed below are exercise deficiencies identified by members of the S&H Subteam during the emergency preparedness exercise. These exercise findings were not part of the LBL verbal or written critique and points out a weakness in the evaluators and controllers used by LBL.
 - Support staff in the Emergency Operations Center (EOC) did not follow up on the simulated injured persons' conditions, obtain their names, and simulate the notification of the relatives.
 - At the start of the exercise, only the primary members of the Emergency Response Organization responded to the LBL EOC.
 - Limited manpower resources of the Fire Department and the Security Force hampered their reaction and response to the three buildings depicted in the exercise scenario.
 - These observations were from the Bldg. 69 response area:
 - The forklift fire was reported extinguished without any action being viewed as simulating the actual event of fire extinguishing.
 - Confusion existed when mention was made of the potential that a real event emergency had developed. This occurred at two different times.
 - The Fire Department response to the scene was slow in developing.
 - Communication was poor; information transfer was also very poor.
 - The assumption of command by the Assistant Fire Chief at the event site was tentative and was not forceful.
 - The response by the fire truck and crew to the propane gas tank that was on fire was not done in a professional manner. Provisions for fighting a propane fire were not carried out in the correct manner. The responding auxiliary fire fighters did not use safe tactics to approach a propane tank fire that was fully involved.
 - All the responders on the fire truck were not trained fire fighters.

- Building Managers did not exhibit good command and control over their respective building occupants.
- Building Managers and emergency response teams did not display good and effectively coordinated response to the simulated emergency situations.
- Floor Managers in various involved buildings had considerable difficulties in locating simulated injured victims during the exercise.
- Building Managers demonstrated a very poor method of conducting accountability for building occupants.
- Building Managers were frequently bypassed by responding professional emergency response teams during the exercise.
- Very poor use of portable bullhorns by the Building Managers to provide directions to building occupants.
- Portable radios being used by the Building Manager (Bldg. 70A) failed 2-1/2 hours into the exercise.
- Health physics teams did not arrive at Bldg. 70A for over 1-1/2 hours.
- Decontamination equipment did not arrive on-scene for 2 hours.
- Building Managers did not control access or egress from their assigned buildings.
- Many transmissions over the radios and telephones during exercise did not use the terminology "this is an exercise."
- Building Manager requested building occupants to volunteer as first-aid responders; very few people volunteered to assist during the exercise.
- Building occupants were observed departing the immediate area by foot and car during the exercise.
- LBL emergency response teams would depart the building and drive away without briefing the Building Manager.
- Monitoring personnel had donned protective clothing. When they arrived at Bldg. 70A, one team member's Protective Clothing was torn and not taped up properly. Also, monitors were not carrying self-contained breathing apparatus (SCBA) or respiratory protective masks. One monitor had a beard which would not allow him to don any respiratory protection equipment. In addition, they did not wear hoods and hard hats during their entry into Bldg. 70A.

- At one point, the Building Manager was advised by the LBL EOC to move building occupants away from Bldg. 70A to the Bevalac area due to wind change. However, the Building Manager did not receive this message.
- One monitoring team requested extra SCBA cylinders. However, no reply to this request was received from the EOC.
- One Building Manager was requested to obtain names of building occupants that might have been exposed to ensure that bioassay could be taken following the simulated emergency. However, due to the number of people departing, and the poor command and control over personnel, this could not be accomplished.
- The initial report to the Headquarters, DOE EOC was not made in accordance with DOE 5000.3A. The FAX copy did not use the required form or format; it was a handwritten note.
- The first hard copy FAX message from public information was transmitted 1-1/2 hours after the declared emergency and it was transmitted on a lined sheet of paper.
- This exercise did not have sufficient exercise controllers to issue scenario instructions, advise players on existing site conditions, and sufficient evaluators to adequately note areas of deficiencies during the exercise.
- One incident of poor handling of simulated accident-injured victims was observed; i.e., personnel not secured prior to transport and too much time to get professional medical assistance.
- Ambulance was released at medical facility without being monitored for contamination.
- The Incident Commander did not receive an immediate briefing from his support staff.
- As emergency support staff arrived at the EOC, no one signed in on a log sheet or status board as to what their emergency function would be in the EOC.
- The initial message to offsite authorities, emergency management agencies and the Headquarters, DOE EOC was not transmitted within 15 minutes after classification of the emergency as required by DOE 5000.3A.
- There was no time indicated on events put on the status boards, and during revisions to the status board information.
- The EOC support staff did not utilize the EIPs or Emergency Plans, only three out of 12 staff had them on their tables.

- Public information status boards were difficult to read as they used cryptic writing.
- Protective actions for offsite personnel and public were poorly handled and late in their transmission.
- Access control in the EOC had not been established.
- At the exercise start, radios in the in EOC were not operable. Excessive background noise is created by these radios in the EOC.
- Too much walking around and talking were observed during this exercise by the support staff. During briefings, the staff should not be talking on the telephones.
- The EOC does not have sufficient building maps, manuals, reference documents, etc.
- The LBL EOC did not have sufficient status boards to depict required information, did not ensure formal presentation of information, and did not copy status boards prior to erasing information.
- Support staff were reacting to various events but not keeping the emergency director informed on events as they occurred.
- The existing LBL EOC is too small to accommodate the existing emergency management staff.
- The EOC is used as a training facility but should be set up on a 24-hour, 7-day-a-week basis for emergency function.
- General improvement is needed to assist in the dissemination of information to emergency response centers during emergencies.
- The LBL EOC support staff did not use any emergency classification system to depict or classify the simulated emergency event.
- All training materials should be removed from the EOC after training courses are completed, and the EOC set up for emergency operation according to an approved floor plan.
- The support staff do not use logbooks for recording exercise information.
- During the exercise, uncontrolled emergency preparedness checklists were being used by support staff.
- There is no protective equipment, clothing, or respirators stored in the EOC for the support staff.

- During exercise, some of the support staff were sharing a telephone; there should be one telephone per staff member.
- Scenario did not contain a listing of authorized exercise simulations nor instructions for Building Managers for their building occupants, and emergency response teams; i.e., use of protective clothing, SCBAs, etc.
- During the exercise, too much free play was allowed to be injected into the exercise by controllers, which was not identified in the scenario.
- The above findings were not addressed in LBL self-assessment.
- See Concern TS.3-2.

CONCERN:
(EP.4-3)
(H3/C1)

The Lawrence Berkeley Laboratory is not in compliance with DOE 5500.1A, DOE 5500.2A, DOE 5500.3, Draft DOE 5500.3A, and industry good practices in its planning development, conduct, and critique of emergency exercises.

EP.5 EMERGENCY FACILITIES, EQUIPMENT, AND RESOURCES

PERFORMANCE OBJECTIVE: Emergency facilities, equipment, and resources should adequately support site/facility emergency operations.

- FINDINGS:**
- Adequate work space had not been provided in the LBL Emergency Operations Center (EOC). The EOC did not have sufficient documentation available to assist EOC support staff in performing their emergency response function (i.e., Safety Analysis Documents; Materials Safety Data Sheets; as built drawings; Department of Energy (DOE) and SAN Orders; and LBL procedures for health physics, maintenance radiological and nonradiological hazardous/toxic materials).
 - LBL had not developed surveillance procedure to ensure that all emergency response facilities, communication systems, and resources are inventoried and tested on a periodical basis per DOE 5500.3 and Draft DOE 5500.3A.
 - A system had not been developed which could disseminate emergency data, chronological listing of events, offsite notification, and emergency status/classifications to all emergency facilities (i.e., security dispatcher, fire dispatch, maintenance, medical facility, health physics, etc.).
 - The LBL public announcing system audio survey did not ensure complete coverage of all LBL property. During the TSA exercise, several teams members reported that the public announcing system at their locations had the volume turned down or the public announcing system could not be heard outside the building.
 - LBL had not established emergency control centers (ECCs) for their emergency response teams (i.e., radiation/hazardous materials monitoring, medical treatment facility, etc). These ECCs would be the point of contact to dispatch emergency teams and for the EOC support staff to provide directions and instructions to these emergency response teams.
 - LBL existing EOC is being used on a periodical basis as a training center and conference room and is not a dedicated emergency response facility.
 - LBL did not have word processing capability available in the EOC. All messages transmitted by facsimile machine were handwritten.
 - LBL Public Affairs did not have a media briefing center location available or identified as directed in "SAN/LBL Emergency Operating Plan" and DOE 5500.4.

- EOC status boards do not address all information needed to be presented to EOC Incident Commander and support staff.

CONCERN: See Concern EP.5-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

CONCERN: The emergency response facilities at Lawrence Berkeley Laboratory
(EP.5-2) do not contain sufficient resources, equipment, and materials,
(H3/C1) and are not in compliance with DOE 5500.1A, DOE 5500.2A, and
DOE 5500.3.

EP.6 EMERGENCY ASSESSMENT AND NOTIFICATION

PERFORMANCE OBJECTIVE: Emergency assessment and notification procedures should enable the emergency response organization to correctly classify emergencies, assess the consequences, notify emergency response personnel, and recommend appropriate actions.

- FINDINGS:**
- LBL had not developed the emergency actions levels (EALs) as required by DOE 5500.3 and DOE 5500.2A.
 - Classification of emergency events and definitions of emergency classification are not consistent with DOE 5500.2A.
 - Terminology and emergency titles are not in compliance with the DOE 5500 series as depicted in the Master Emergency Plan (MEP) and emergency plan implementing procedures (EPIPs).
 - The emergency classification system and EALs are not coordinated with the State or local emergency management agencies.
 - The above findings were not addressed in LBL self-assessment.

CONCERN: Lawrence Berkeley Laboratory did not develop emergency action levels and their emergency classification is not in accordance with the definitions in DOE 5500.2A.
(EP.6-1)
(H3/C1)

- FINDINGS:**
- Dissemination of emergency instructions and information to all LBL site personnel via the public announcing system was hampered by the poor quality, volume, and lack of speakers throughout LBL.
 - The Building Managers affected during the exercise were using portable radios; however, several radios did not function properly. There was too much voice traffic observed on the emergency channel.
 - EPIPs and checklists of actions had not been developed to address re-entry and recovery operations.
 - LBL did not have the capability for assessing the release of hazardous materials (both radiological and non-radiological) and for determining the source term.
 - Protective action guidance was not available to the EOC support staff.
 - Detailed EPIPs had not been developed to address the notification and reporting requirements of DOE 5500.2A and DOE 5000.3A.

CONCERN: Lawrence Berkeley Laboratory had not revised the Master Emergency
(EP.6-2) Plan and did not develop emergency plan implementing procedures
(H3/C1) to address notifications and reporting criteria during emergency
situations in accordance with DOE 5500.2A and DOE 5000.3A.

EP.7 PERSONNEL PROTECTION

PERFORMANCE OBJECTIVE: Personnel protection procedures should control and minimize personnel exposure to any hazardous materials during abnormalities, ensure that exposures are accurately determined and recorded, and ensure proper medical support.

- FINDINGS:**
- LBL did not have emergency plan implementing procedures (EPIPs) that address the requirements of DOE 5480.14, Chapter XI, Section 4.9, and DOE 5480.10 for establishing (radiation and toxic chemical) exposure limits for life saving, emergency repairs, and protection of vital equipment under emergency conditions.
 - LBL EPIPs did not address or designate senior emergency management responsibilities which authorize management to exceed DOE 5480.14, Chapter XI limits for radiation exposures during emergencies.
 - A decontamination EPIP had not been developed to establish emergency limits for decontamination of personnel, equipment, and facilities.
 - A site evacuation plan or procedure had not been developed to provide for effective traffic control and egress during emergency conditions for all LBL personnel.
 - Letters of agreement had not been identified in the LBL Master Emergency Plan.
 - Building Managers did not have radiological instruments to measure expected exposure rates. Health physics personnel did not respond to the involved buildings for a period of 1-1/2 hours after the start of this exercise.
 - The above findings were not addressed in LBL self-assessment Plan and there was no corrective action plan.

CONCERN:
(EP.7-1)
(H2/C1)

Lawrence Berkeley Laboratory Personnel Protection Program does not provide guidance in making protective action recommendations as required in DOE 5500.1A, DOE 5500.3, DOE 5480.1A, and DOE 5480.10.

4.5.8 Technical Support

4.5.8.1 Overview

Five of the eight performance objectives in the Technical Support functional area were assessed. Performance objective TS.6 Packaging and Transportation of Hazardous Materials is covered in a separate section of this report. Performance objectives TS.7 Reactor Engineering and TS.8 Criticality Safety are not applicable to the Lawrence Berkeley Laboratory (LBL).

The appraisal was conducted by reviewing pertinent documents and procedures, by discussions with facility managers and various levels of their subordinates, and by visits to representative facilities. In addition, applicable Department of Energy (DOE) Orders, San Francisco Operations Office (SAN) management directives, Safety Analysis Documents, Operational Safety Procedures (OSPs), miscellaneous memoranda specific to areas of the appraisal supplied by LBL personnel, and the results of specific tests were reviewed. Personnel in the Construction and Maintenance Department, the Plant Engineering Department, the Engineering Division, Environment and Safety Hazards Control Department (ESHC), the Independent Review and Assurance Department (IRAD), and the Accelerator and Fusion Research Division were interviewed. In addition, discussions were also held with the chairman of the Safety Review Committee (SRC) as well as the chairman of one of its subcommittees. Visits were made to the Advance Light Source facility, the Bevatron, and various department file locations where data were reviewed.

Division organization charts clearly show the structure of the engineering technical support groups. The Plant Engineering Department has issued a Design Management Procedures Manual, a Project Management Policy Memoranda manual, and a Project Management Procedures manual. These describe and prescribe how project management design work is performed. The Mechanical Engineering Department of the Engineering Division has issued a similar Mechanical Engineering Department Information Manual. During a review of files in the Plant Engineering Department, it was revealed that records of completed projects are not maintained in a single repository but are spread among the various engineers who participated in the design. A program exists to standardize and centralize these files, but it is awaiting additional staff to implement. The Plant Engineering Department provides Laboratory-wide assistance for modification work while the Engineering Division provides design assistance for major experiments.

A formal procedure system does not exist, but some organizations have a program to correct this as evidenced by the extensive list of procedures planned and under preparation at the Bevatron facility. A Laboratory policy on preparation, use, and control of procedures is being formulated. Until that formal policy is implemented, individual policy memoranda are being issued to provide direction such as a recent letter on OSP review and approval.

A document control system has not been established although one is to be provided in the near future. Very few manuals are controlled copies. Obsolete copies of OSPs found during the appraisal were for facilities that had been removed or relocated. Copies of superseded OSPs were found which should have been destroyed when the new version was issued.

The hazard class of all facilities at LBL is listed as low. This is probably correct for the radiation hazards associated with the accelerators. However, the hazards associated with very high voltages, presence of flammable fluids and hazardous chemicals, and potential radiation exposure need to be reassessed to ensure that the hazard ratings are correct.

There are some instances where unauthorized changes have been made to the public announcing system. These changes occurred during planned building modifications. The concern here is that if an unauthorized change to the public announcing system could be made because modifications are not being closely controlled, then it is possible that other important or even dangerous unauthorized changes could also be made.

The fume hoods were tested over a 2-month period in the summer of 1990. There is no approved procedure to perform these tests and some data were recorded on loose pages with no evidence of it having been checked. There is no list of personnel who have been trained and qualified to perform these tests; the 1990 tests were performed by a summer student.

The LBL Environment, Safety, and Health Self-assessment Report fully recognized three of the concerns in the Technical Support functional area. One other concern was partially addressed and the other was not covered. The self-assessment report did not include a program to correct the identified deficiencies.

Corrective actions taken on the concerns identified in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) were reviewed for adequacy and completion. One of the eight concerns in the Technical Support functional area in DOE/EH-0096 is recommended for closure.

Concern TS.2-3 was recommended for closure because Concern OA.7-1 covers the same deficiency. Concern OA.7-1 remains open.

4.5.8.2 Findings and Concerns

TS.2 PROCEDURES AND DOCUMENTS

PERFORMANCE OBJECTIVE: Technical support procedures and documents should provide appropriate direction, allow for adequate record generation and maintenance for important activities, and should be properly and effectively used to support safe operation of all facilities on the site.

- FINDINGS:**
- Safety Analysis Documents (SADs) exist for only the Advanced Materials Laboratory and the Hazardous Waste Facility. There is a preliminary SAD for the Advanced Light Source which is now under construction.
 - An Operational Safety Requirement (OSR) section is included as Section 5 of the published SADs as specified in SAN MD 5481.1A, Chapter II. The requirements that establish and define limits of operation for the facility and its operation are required to be listed in OSRs by SAN MD 5481.1A Chapter II. This normally specifies safety equipment that has to be provided, how frequently it has to be tested, limiting conditions of operation (LCOs), and actions to be taken if LCOs are not met. These parameters are not completely covered in the existing SADs.
 - The Lawrence Berkeley Laboratory Environment, Safety, and Health Self-assessment Report recognizes in Section TS.2-1 the need for SADs for new facilities and that existing SADs do not reflect some current configurations. However, the self-assessment report does not recognize the deficiencies in the OSR Section of the SADs.

CONCERN: Safety Analysis Documents at Lawrence Berkeley Laboratory do not completely cover the safety information required by
(TS.2-4)
(H2/C1) SAN MD 5481.1A.

- FINDINGS:**
- OSPs are not controlled.
 - A copy of OSP "AK-2500 Van de Graaff Accelerator-Building 6," April 1984, still exists in some files even though the accelerator has been removed from Bldg. 6. A current OSP exists for the accelerator at its present location.
 - Copies of other OSPs were found for facilities that either no longer exist or have been modified for other use:
 1. OSP "Building 6 Neutral Beam Engineering Test Facility (NBETF)."
 2. OSP "Hydrogen Furnace Facility - Building 80," and
 3. OSP "B6 Operations of 500 ATM Argon Test Vessel."

- Other OSPs were found to be deficient:
 - Some contained names of people who had been qualified to operate the facility but who were no longer at the Laboratory.
 - Telephone numbers of emergency personnel were incorrect.
 - Some OSPs had pages that were dated subsequent to the approval date.
 - The OSP "Catalyst Activity Test Unit-Building 62" had no approval date.
 - The OSP "1,500 PSI Rapid Flow FGD-S(IV) MIX System-Building 70" had no date and no approval signature.
 - Also see Sections 4.5.1, OA.3; 4.5.1, OA.7; and 4.5.3, OP.3.
- The need to review and update OSPs is recognized in Sections OA.5-4 and TS.2-1 of the Lawrence Berkeley Laboratory Environment, Safety, and Health Self-assessment Report. There is neither an action plan nor a schedule in the self-assessment report to respond to this concern.

CONCERN: Operational Safety Procedures are not being kept current.
 (TS.2-5)
 (H2/C2)

CONCERN: See Concern TS.2-3, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

FINDINGS:

- All facilities at LBL are rated as "low hazard facilities."
- The hazards associated with non-accelerator operations appear to have hazard levels that could result in a "moderate" rating as defined in DOE 5481.1B and SAN MD 5481.1A.
 - DOE 5481.1B Chapter II states that the Order applies "to those DOE operations that involve hazards that are not routinely encountered and accepted in the course of everyday living by the vast majority of the general public."
 - DOE 5481.1B defines Moderate-Risk facilities as "those which present considerable potential onsite impacts to people or the environment, but at most only minor offsite impacts."
- This concern was not identified in the Lawrence Berkeley Laboratory Environment, Safety, and Health Self-assessment Report.

CONCERN: Hazard analyses for laboratory facilities should be reviewed for consistency with the requirements of DOE 5481.1B and SAN MD 5481.1A.
 (TS.2-6)
 (H2/C1)

TS.3 FACILITY MODIFICATIONS

PERFORMANCE OBJECTIVE: Technical support services required by each facility on the site to execute modifications should be carried out in accordance with sound engineering principles that should ensure proper design, review, control, implementation, and documentation in a timely manner.

- FINDINGS:**
- Public announcing system speakers, without authorization, have been removed and sometimes discarded and signal wires have been found shorted. Some of these instances were associated with unrelated modification work in Bldgs. 70 and 70A. Other instances appear to have been the result of personnel, who were bothered by the public announcing system, making the speakers inoperable. The shorting of one pair of speaker wires can deactivate a number of associated speakers. One such instance occurred in Bldg. 70A where a shorted wire pair rendered the whole building speaker system inoperable.
 - All deactivations of public announcing system components result in reducing the effectiveness of emergency response communications.
 - The potential exists for unauthorized modification of other critical systems if control of modification work is not effective.
 - Also see Concerns MA.1-2 and MA.8-2 and Sections 4.5.6, AX.6 and 4.5.7, EP.4.
 - The need to strengthen control of modification work is recognized in Section WS.3-6 of the Lawrence Berkeley Laboratory Environment, Safety, and Health Self-assessment Report. There is neither an action plan nor a schedule in the self-assessment report to respond to this concern.

CONCERN: Some modification work that is important to safety is not controlled.
(TS.3-2)
(H2/C2)

TS.4 EQUIPMENT PERFORMANCE TESTING AND MONITORING

PERFORMANCE OBJECTIVE: Effective equipment performance testing and monitoring should be performed by technical support groups to ensure that equipment and system performance is within established safety parameters and limits.

- FINDINGS:**
- The fume hoods were last tested in mid-1990. The following deficiencies in the records of these tests were noted during this appraisal.
 - A written procedure to perform the tests does not exist.
 - Tests were conducted by a summer student who had minimal training.
 - A list of people qualified to perform these tests does not exist.
 - Some test data were recorded on loose papers and other data were recorded in a steno notebook.
 - The only date recorded was for the first hood that was tested. There are more than 100 active hoods in use at the Laboratory. Testing was conducted over a period of several months. A tag, which shows the date of the last test, is affixed to some but not all hoods.
 - There was no indication on the data showing who performed the tests and no indication that the test results had been checked to verify that continued operation of the hoods was acceptable.
 - Tests of the Advanced Light Source (ALS) Linac Injector were stopped on January 17, 1991, because of a question by this appraisal team of the adequacy of the interlock functional test documentation.
 - The test procedure in Appendix H of the ALS OSP did not provide for proper documentation. The fact that the tests had been conducted was entered in the Linac Operations Log #1, on page 39.
 - The procedure was subsequently rewritten to make it more thorough.
 - A list of personnel qualified to perform interlock tests for the system did not exist.
 - The need for written procedures is recognized in the LBL Environment, Safety, and Health Self-assessment Report in Section QV.7-1. Section TS.4-1 of the self-assessment report recognizes the need for test data analysis. There is no recognition in the self-assessment report of the need to

maintain lists of personnel who are qualified to perform tests. There is neither an action plan nor a schedule in the self-assessment report to respond to this concern.

- Also see Concern TS.4-2, Technical Safety Appraisal of The Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

CONCERN:
(TS.4-3)
(H2/C2)

Safety-related equipment has been tested without proper procedures by personnel whose qualifications to perform the tests have not been documented and resultant data have not been reviewed for acceptability by supervision.

4.5.9. Packaging and Transportation

4.5.9.1 Overview

All 12 of the performance objectives in the Packaging and Transportation functional area were addressed in this appraisal. Information was obtained by (1) reviewing policies, procedures, the Health and Safety Manual, the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990), recent San Francisco Operations Office (SAN) appraisals, consultant audits, action plans for correction of deficiencies, records of shipments and receipts of hazardous materials, and draft quality assurance (QA) plans; (2) interviewing packaging and transportation personnel in the Materiel Management Department, Operations Group in the Environment and Safety Hazards Control Department (ESCH), and SAN personnel; (3) visiting packaging and transportation activities in Bldg. 901, Emeryville; Bldg. 69, Shipping and Receiving; Bldg. 75, Waste Management complex; Bldg. 70, PIT Room, and typical generator areas; and (4) observing the Lawrence Berkeley Laboratory (LBL) hazardous waste handling contractors: International Technology (IT) Corporation, United States Pollution Control Inc. (USPCI), and Romic Corporation.

The packaging and transportation operations observed were being performed safely; however, there is great potential for error as attested by the recent SAN appraisals, DOE/EH-0096, consultant audit, and the LBL self-assessment. Serious deficiencies were identified in these appraisals and there were action plans in progress to correct the deficiencies. Some good things are being done in packaging and transportation. This is a credit to the experienced people, but there are not enough of them.

A summary of the deficiencies are (1) packaging and transportation activities are fragmented, and no single person or organization is responsible; (2) QA plans and audits have not been implemented; (3) there is no independent safety oversight; (4) there is no formal training program; (5) procedures are not up-to-date, not coordinated, and not controlled; (6) there is no Transportation Safety Committee for packaging and transportation; (7) there is no onsite transportation policy and no onsite transportation safety manual; (8) there is no assurance that daily packaging and transportation activities are in compliance with State and Federal regulations; (9) action plans for correction of deficiencies in many cases are not adequate; (10) there is no lessons learned program; (11) the storage at the Hazardous Waste Handling Facility requires significant upgrading; and (12) there appears to be a lack of management control.

The LBL self-assessment appears to have been hurriedly accomplished and not all deficiencies were addressed. The action plans were not responsive.

In conclusion, one of the findings in the LBL self-assessment states "all recent audits and reviews have disclosed recurring problems in handling, processing and shipping hazardous and radioactive waste at HWHF. Repetitive findings made it clear that current management practices are not adequate to operate the facility in complete compliance." The onsite and offsite handling of the majority of the hazardous waste now being done by IT, USPCI and Romic Corporation should eliminate noncompliances; however, these activities should be monitored by LBL.

Corrective actions taken on the Concerns identified in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) were reviewed for adequacy and completion. Three of the five Concerns in the Packaging and Transportation functional area in DOE/EH-0096 are recommended for closure.

4.5.9.2 Findings and Concerns

PT.1 ADMINISTRATION AND ORGANIZATION

PERFORMANCE OBJECTIVE: Management should develop and implement a system of policies and directives that will provide for effective implementation of DOE Orders, particularly DOE 5480.3, DOE 1540.1, DOE 1540.2, Federal and State regulations, and good industrial practices in operations involving packaging and transportation (PT) of hazardous materials.

- FINDINGS:**
- A management policy on transportation of hazardous materials was issued on June 11, 1990.
 - LBL had a consultant review packaging and transportation activities in April-May 1990.
 - There was no central organization for packaging and transportation. Activities were carried out in two different organizations.
 - There was no procedures manual for packaging and transportation activities.
 - There was no transportation committee for packaging and transportation activities.
 - There was no independent safety oversight.
 - There was no control system to ensure that all persons involved in packaging and transportation activities had ready access to current procedures.
 - There was no onsite transportation safety manual for packaging and transportation activities.
 - Management oversight of packaging and transportation activities was lacking.
 - This concern was partially addressed in the LBL self-assessment. The action plan was not considered adequate to correct the concern.

CONCERN: Management control over the packaging and transportation activities at Lawrence Berkeley Laboratory as required by DOE 5480.3 is lacking.
(PT.1-3)
(H2/C1)

PT.2 TRAINING

PERFORMANCE OBJECTIVE: Personnel should be trained, qualified, and certified in handling hazardous materials as required by DOE 5480.3 and 49 CFR.

- FINDINGS:**
- Most packaging and transportation employees were trained in the packaging and transportation courses offered by the Department of Energy (DOE).
 - There was no formal documented training program for packaging and transportation employees engaged in hazardous materials activities.
 - There was no formal recertification documentation for packaging and transportation personnel.
 - On-the-job training requirements were not identified or documented.
 - There was no lessons learned program for packaging and transportation activities.
 - These deficiencies are generally covered in the LBL self-assessment. The action plan was not considered adequate to correct the concern.
 - See Section 4.5.5, TC.1.

CONCERN:
(PT.2-1)
(H2/C1)

The formal training program for packaging and transportation employees as required by DOE 5480.3 and 49 CFR is not complete.

PT.3 QUALITY ASSURANCE

PERFORMANCE OBJECTIVE: A system of checks and balances should exist that ensures the quality assurance (QA) requirements of the applicable DOE Orders, especially DOE 5700.6B, and ANSI NQA-1-1986 are met.

- FINDINGS:**
- A consultant provided a review of packaging and transportation activities in April-May 1990.
 - The Operations Group of the ESHC had a draft QA plan, but it had not been implemented.
 - The Materiel Management Department had a QA plan, but it required significant updating and a draft was not available.
 - The packaging and transportation program was not in accordance with DOE 5700.6B and ANSI/ASME NQA-1-1989.
 - There was no system in place for routine independent internal audits of packaging and transportation activities.
 - There were no LBL QA audits.
 - This concern was addressed in the LBL self-assessment. An action plan and schedule for completion should be provided.

CONCERN: See Concern PT.1-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

PT.4 REGULATORY COMPLIANCE

PERFORMANCE OBJECTIVE: All PT operations involving hazardous materials should be conducted in compliance with the applicable State and Federal regulations, including those of Department of Transportation (DOT), Nuclear Regulatory Commission (NRC), Occupational Safety and Health Administration (OSHA), and Environmental Protection Agency (EPA).

- FINDINGS:**
- Hazardous wastes were not always properly packaged and identified.
 - A procedure did not exist to ensure and measure compliance with applicable State and Federal regulations.
 - A number of recent SAN audits were made which pointed up numerous deficiencies in regulatory compliance; action plans for corrective actions were in progress; the most serious violations were immediately corrected.
 - International Technology Corporation, United States Pollution Control, Inc., and Romic Corporation are now handling the majority of the onsite and offsite hazardous waste.
 - Concerns were addressed in the LBL self-assessment. (Reference LBL-WM5-1, LBL-WM5-9, LBL-WM5-14, LBL-WM5-15, LBL-WM-17, LBL-TS-6-1.) The action plans in the self-assessment were not adequate.

CONCERN: There is no system to ensure that all Lawrence Berkeley Laboratory hazardous wastes are being packaged and transported in accordance with State and Federal regulations as required by DOE 5480.3.
(PT.4-2)
(H2/C1)

PT.5 ACCIDENTS AND INCIDENTS

PERFORMANCE OBJECTIVE: Accidents and incidents involving packaging and transportation of hazardous materials should be reported in a timely manner to DOE.

- FINDINGS:**
- The Occurrence Report for a drum mislabeling incident on December 12, 1990, was late due to work load and available personnel.
 - No evidence was available to determine whether the report was reviewed for lessons learned and whether the findings were made available to all LBL personnel.
 - Safety meeting minutes and other safety communications were available for the Materiel Management Department, but were not kept for the Operations Group in the ESHC. Safety meetings were not held in the Operations Group.
 - This concern was not addressed in the LBL self-assessment.

CONCERN: Safety-related information for packaging and transportation was not always retained by Lawrence Berkeley Laboratory.
(PT.5-2)
(H3/C2)

PT.6 OPERATIONS

PERFORMANCE OBJECTIVE: Sitewide operations involving packaging and transportation of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures, in conformance with applicable standards and accepted practices.

- FINDINGS:**
- Packaging and transportation procedures appear in manuals of several different organizations; not all packaging and transportation procedures were documented, controlled, and current; and the procedures were not always available or coordinated with other groups.
 - Hazardous waste is now moved on and offsite by LBL contractors who are trained in all aspects of hazardous waste packaging and transportation.
 - The LBL self-assessment did address the findings, and it did address a policy deficiency of notifying the Building Manager when toxic gases or hazardous materials are delivered. The action plan was not adequate.

CONCERN: The operating procedures for packaging and transportation of hazardous materials are not properly implemented and not uniform between organizational units.
(PT.6-1)
(H3/C2)

PT.8 ONSITE TRANSFERS

PERFORMANCE OBJECTIVE: Onsite transfers of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures, in conformance with applicable standards and accepted safety practices.

- FINDINGS:**
- International Technology Corporation, United States Pollution Control, Inc., and Romic Corporation, LBL contractors, have recently taken over the majority of the packaging and transportation of hazardous waste both onsite and offsite.
 - There was no written policy for onsite packaging and transportation of hazardous materials.
 - There was no onsite transportation safety manual for hazardous materials.
 - DOE is in process of issuing policy for onsite packaging and transportation.
 - The LBL self-assessment addressed procurement of a special vehicle for onsite use and delivery of hazardous material to unattended staging area. The findings were addressed in the self-assessment LBL-PT 1-1. The action plan was not adequate.

CONCERN: The Lawrence Berkeley Laboratory is not in compliance with the proposed Department of Energy policy for onsite transportation.
(PT.8-1)
(H3/C2)

PT.10 RECORDS

PERFORMANCE OBJECTIVE: Records of hazardous materials movements, transfers, and shipments should be prepared and maintained to ensure compliance with DOE and other regulatory requirements, and to provide an auditable trail of actions.

- FINDINGS:**
- Hazardous waste manifests were not always found to be complete as required by DOE 5480.3, 49 CFR, 172-173 and 40 CFR 262.
 - The LBL self-assessment addresses the finding on manifests and the action to correct the deficiency was satisfactory; however the schedule for completion was not adequate.

CONCERN: Preparation and maintenance of records for packaging and transportation do not meet the requirements of DOE 5480.3.
(PT.10-1)
(H2/C1)

PT.11 APPRAISALS AND INTERNAL AUDITS

PERFORMANCE OBJECTIVE: Periodic packaging and transportation safety appraisals of contractors by the Field Office, and independent internal packaging and transportation safety audits by each contractor are required by DOE 5480.3 and are conducted in accordance with DOE 5482.1B.

- FINDINGS:**
- There were some walkthrough safety inspections by the Materiel Management Department personnel, but these do not qualify as independent internal safety audits.
 - There were many appraisals made recently of the LBL Hazardous Waste Handling Facility by SAN, State and LBL contractors which included some packaging and transportation activity.
 - SAN conducted a functional appraisal of LBL packaging and transportation activities November 27 and 28, 1990. Findings of items with serious hazard potential in these appraisals were immediately corrected and the balance were included in several action plans for correction.
 - There were no independent internal safety audits of the packaging and transportation activity.
 - The LBL self-assessment did address this concern; however, the schedule for correction was not adequate.

CONCERN: There are no independent internal safety audits of packaging and transportation as required by DOE 5480.3.
(PT.11-1)
(H3/C1)

PT.12 PACKAGING AND STORAGE PROCEDURES

PERFORMANCE OBJECTIVE: All packaging and storage procedures for hazardous material are in conformance with DOE 5480.3, 49 CFR, and 40 CFR.

- FINDINGS:**
- Checklists for receipt and shipment of hazardous materials by packaging and transportation personnel are in use.
 - Packaging and storage procedures are not uniformly communicated to LBL personnel.
 - Radioactive waste containers were not always labeled properly.
 - The LBL self-assessment did address this concern. The action plan was not adequate.

CONCERN: Packaging and storage procedures do not comply with DOE 5480.3,
(PT.12-1) 49 CFR, and 40 CFR.
(H2/C1)

4.5.10 Experimental Activities

4.5.10.1 Overview

The appraisal for the Experimental Activities functional area plus that for the Site/Facility Safety Review functional area (Section 4.5.11) compose the audit for the Independent Safety Review System (ISRS) at Lawrence Berkeley Laboratory (LBL). The scope of the Experimental Activities appraisal included all four performance objectives given in that section of "Performance Objectives and Criteria for Technical Safety Appraisals at Department of Energy Facilities and Sites" (DOE/EH-0135, June 1990). Judgments were based on (1) discussions with personnel who are responsible for reviewing experiment proposals as well as those who participate in administering the overall ISRS, (2) discussions with experiment proposers (including both LBL employees and those from other organizations), and (3) reviews of the formal documentation in randomly selected experiment proposal files.

The system for receiving and reviewing experiment proposals, and for subsequent approval and authorization for conducting the proposed experiments generally meets the intent of DOE 5482.1B and standard good practices. The system rules, which are partly outlined in the LBL Health & Safety Manual (PUB-3000, Chapter 1, Appendix B, December 1990) require a determination by the host Division Director regarding whether or not an Operational Safety Procedure (OSP) is required to carry out the proposed experiment. The OSP is actually a safety analysis for the experiment; and guidance on its preparation, submission, and review is given in the Health and Safety Manual appendix referenced above.

Systems are in place, specific to the Divisions, that define the required interactions between experimenters and host division operating groups. These systems have worked well in ensuring operational safety. "Unreviewed Safety Questions" are not addressed in the formal sense, but all safety issues are resolved before the experiment is allowed to begin.

A concern (SR.4-1) that no sitewide guidance exists for performing and documenting experiment safety reviews and approvals was stated in the report of the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, p. III-81, February 1990). This concern has not been addressed adequately; moreover, the proposed action plan will not satisfy the concern. The concern cited inconsistency in the degree of documentation of safety reviews of experiment proposals by different Laboratory divisions. This appraisal reaffirmed this inconsistency and revealed additional inconsistencies in the methods used by different organizational units to process experiment proposals.

Corrective actions taken on the other concerns identified in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) were reviewed for adequacy and completion. One of the four concerns in the Site and Experiment Safety Review functional area in DOE/EH-0096 is recommended for closure.

Records for the experiments, from submission of the proposals through reviews, approvals, and performance of the experiment are in general well-documented, in compliance with requirements of DOE 5482.1B. However, inspection of the

permanent files for the experiments revealed that formal documents citing satisfactory completion of safety evaluations and authorizing conduct of experiments were not included.

The "Lawrence Berkeley Laboratory Self-assessment Report" (PUB-3090, Vol. I, January 4, 1991) addresses all performance objectives in the Experimental Activities functional area. The report is thorough; but there are inaccuracies in some of the findings, and other findings are not substantiated in the text. Root causes are not addressed per se in this section of the report. Proposed corrective actions ("Initial Response") are highly generalized and thereby difficult to assess, and corrective action schedules are not proposed. Discussions with LBL personnel active in this functional area indicated that internal review of this section of the report before publication was not extensive.

4.5.10.2 Findings and Concerns

EA.3 EXPERIMENT PROPOSALS

PERFORMANCE OBJECTIVE: Sufficient information on a proposed experiment should be submitted to permit a safety evaluation to be made.

NOTE: This performance objective may be reviewed under Site/Facility Safety Review (FR).

- FINDINGS:**
- Concern SR.4-1 in the report of the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) cited no sitewide guidance for the performance and documentation of experiment safety reviews and approvals.
 - A review of the LBL action plan proposed to respond to this concern plus discussion with Safety Review Committee (SRC) members indicated that the proposed action is not responsive to the concern. Even if achieved, the proposed action would not satisfy the concern because the action items will not produce a sitewide management directive with instructions on preparation, submission, review, approval, and authorization of proposals for experiments to be performed in LBL equipment.
 - A survey of those divisions that provide equipment and personnel to conduct most of the site experiments reaffirmed the inconsistency in the degree of documentation of safety reviews of experiment proposals cited in Concern SR.4-1, and revealed additional inconsistencies in the methods used by different organizational units within LBL to process experiment proposals. For example, the Accelerator and Fusion Research Division has published instructions on how to prepare and submit an experiment proposal in the "Bevelac User's Handbook" (PUB-3080, April 1990, pp. 12-16), although this treatment does not describe or specify the review, approval, or authorization phases of the process. In contrast, other divisions that are not as "user-facility" oriented have not published formal instructions on submitting an experiment proposal or any description of the process for reviewing, approving, and authorizing the proposed experiment.
 - The "Discussion" and "Initial Response" cited under Finding LBL-EA.2-1 in the "Lawrence Berkeley Laboratory Environment, Safety and Health Self-assessment Report" (PUB-3090, Vol. I, January 7, 1991) address the subject of the "review and approval process for experiments"; however, no new or modified action plan responsive to Concern SR. 4-1 of the report on the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) was provided.

CONCERN: See Concern SR.4-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

EA.4 OPERATION OF EXPERIMENTS

PERFORMANCE OBJECTIVE: Experiments performed in any facility on the site should not present undue risk or significantly increase the risk previously evaluated for the facility or the site.

NOTE: This performance objective may be reviewed under Operations (OP).

- FINDINGS:**
- DOE 5482.1B, 9.d.(2)(g)2 mandates independent safety reviews of "proposed experiments and results thereof having safety significance." Proper documentation of these reviews is required in order to comply with this mandate.
 - Inspection of several randomly selected LBL files of experiment proposals plus discussions with the authors and reviewers showed (1) proper documentation of safety reviews and (2) letters approving commencement of preparation for the experiment. The inspections, however, revealed no documents citing successful completion of the safety evaluations and authorizing conduct of the experiment.
 - The concern cited below is not addressed explicitly in the "Lawrence Berkeley Laboratory Environment, Safety, and Health Self-assessment Report" (PUB-3090, Vol. I, January 7, 1991), although the discussion under Finding LBL-EA.2-1 does acknowledge that documentation of the review process for experiment proposals is not always complete.
- CONCERN:** Documents citing satisfactory completion of safety evaluations of experiment proposals and authorizing conduct of experiments are not issued to the experiment proposers, as required to comply with DOE 5482.1B.
(EA.4-1)
(H3/C1)

4.5.11 Site/Facility Safety Review

4.5.11.1 Overview

The appraisal for the Site/Facility Safety Review functional area plus that for the Experimental Activities functional area (Section 4.5.10) compose the audit for the Independent Safety Review System (ISRS) at Lawrence Berkeley Laboratory (LBL). The scope of the Site/Facility Safety Review appraisal included all six performance objectives given in that section of "Performance Objectives and Criteria for Technical Safety Appraisals at Department of Energy Facilities and Sites" (DOE/EH-0135, June 1990). Judgments were based on (1) discussions with LBL personnel who participate in the administration of the ISRS, (2) discussions with persons whose activities are scrutinized by the ISRS, and (3) reviews of the formal documentation that was available from permanent ISRS files.

In general, the formal safety review system meets the intent of DOE 5482.1B, although there are cases of significant noncompliance with the detailed requirements stipulated by this Order. A Safety Review Committee (SRC) is established at LBL and has been functioning effectively for over 10 years. The SRC is appointed by management, functions in an advisory capacity to management, and is formally chartered. The charter, however, does not define the relationship of the SRC to the overall ISRS. Moreover, the functions essential to the compliance of the internal appraisal system with the requirements of DOE 5482.1B are not stipulated in the SRC charter nor in other published documents on the ISRS.

An LBL Self-assessment Program document is currently being drafted, but was not available for review. This document will reportedly define an enhanced ISRS for LBL, with details on the interaction between all organizational units (including the SRC) that function as components of the system. Currently, however, the structure and the functional plan for the ISRS are not documented and, as a result, are not well understood.

SRC activities are efficiently planned and executed, and SRC files are properly maintained and readily auditable. A set of guidelines for performing safety appraisals of every LBL division was issued recently, which significantly improved the quality of these audits; however, the guidelines do not correlate with the requirements for environment, safety, and health (ES&H) reviews itemized in DOE 5482.1B, 9.d(2)(g).

The last triennial appraisal of the ISRS (required by DOE 5482.1B) was performed in 1988. Consequently, a new triennial appraisal is due in 1991. However, no system for conducting these triennial appraisals has been established for the LBL ISRS. Because of the current transitional state of the ISRS, requesting permission to defer the system appraisal until 1992 may be appropriate.

A system operates to collect, collate, and distribute information on operating experience from facilities and sites that have programs similar to those at LBL. The information (UORs, bulletins, etc.) is obtained from both external and internal sources.

The "Lawrence Berkeley Laboratory Self-assessment Report" (PUB-3090, Vol. I, January 7, 1991) addresses all performance objectives in the Site/Facility Safety Review functional area. The report is thorough, but there are inaccuracies in some of the findings, and other findings are not substantiated in the text. Root causes are not addressed per se in this section of the report. Proposed corrective actions ("Initial Response") are highly generalized and thereby difficult to assess, and corrective action schedules are not proposed. Discussions with LBL personnel active in this functional area indicated that internal review of this section of the report before publication was not extensive.

4.5.11.2 Findings and Concerns

FR.1 SAFETY REVIEW COMMITTEE

PERFORMANCE OBJECTIVE: A Safety Review Committee should be available to review safety questions and the safety impacts of experiments. This committee is part of the "Contractor Independent Review and Appraisal System" specified in DOE 5480.5, or DOE 5480.6, and/or DOE 5482.1B., Section 9.d.

- FINDINGS:**
- The charter for the LBL SRC is undergoing revision. A revision dated December 1990 was recently published in the Health and Safety Manual (PUB-3000); a later revision is still in draft form.
 - The Office of Planning and Assurance is preparing a document entitled "Lawrence Berkeley Laboratory Self-assessment Program," which will address the Independent Safety Review System (ISRS) at the Laboratory. The draft of this document was not available for review.
 - DOE 5482.1B, 9.d.(2)(b) requires that "the internal appraisal system be clearly defined in writing."
 - The documentation projects cited above are not properly coordinated. None of the recent revisions of the SRC charter refer to Committee functions as they relate to the overall ISRS.
 - The concern cited below is not addressed in the "Lawrence Berkeley Laboratory Environment, Safety and Health Self-assessment Report" (PUB-3090, Vol. I, January 7, 1991).

CONCERN: The charter for the Safety Review Committee does not define the relationship between the Safety Review Committee and the Independent Safety Review System of the Laboratory, as required to comply with DOE 5482.1B.

(FR.1-1)
(H3/C1)

FR.2 SAFETY REVIEW TOPICS

PERFORMANCE OBJECTIVE: Items that require review by the Safety Review Committee should be well defined and understood by facility management.

- FINDINGS:**
- DOE 5482.1B, 9.d.(2)(b) requires that the "internal appraisal system be clearly defined in writing." In addition, Section 9.d.(2)(g) of this Order specifies those topics which must be included in independent reviews of ES&H functions.
 - Recent revisions to the SRC charter do not include all of the functions or responsibilities mandated by DOE 5482.1B for the internal appraisal system; e.g., the responsibility to ensure that all experiment proposals are reviewed for safety and the responsibility to review accidents, incidents, and unusual occurrences. Nor are these items currently assigned in writing to other independent appraisal groups (although they may ultimately be addressed in the LBL Self-assessment Program document, now in preparation).
 - Another recent document, "Guidelines for SRC Appraisal of Division Safety Programs," September 24, 1990, itemizes the areas to be assessed; the areas cited, however, do not correlate with those specified in DOE 5482.1B, 9.d.(2)(g).
 - The concern cited below is not addressed explicitly in the "Lawrence Berkeley Laboratory Environment, Safety, and Health Self-assessment Report " (PUB-3090, Vol. I, January 7, 1991), although Finding LBL-FR.1-1 that the SRC has not been responsible for ensuring independent safety reviews of all experiments and Finding LBL-FR.2-1 that criteria for SRC review items are not clearly defined do relate to the concern.

CONCERN:
(FR.2-1)
(H3/C1)

The functions essential to the compliance of the internal appraisal system with the requirements of DOE 5482.1B are not stipulated in the Safety Review Committee charter, the "Guidelines for SRC Appraisal of Division Safety Programs," nor elsewhere in published documents on the Independent Safety Review System.

FR.3 OPERATION OF SAFETY REVIEW COMMITTEE

PERFORMANCE OBJECTIVE: Review of site/facility activities by the Safety Review Committee should ensure achievement of a high degree of safety.

- FINDINGS:**
- DOE 5482.1B, 9.d.(2)(b) requires that the "internal appraisal system be clearly defined in writing."
 - Discussions with the Associate Laboratory Director for the Office of Planning and Assurance and the Head of the Independent Review and Assurance Department (IRAD) indicated that an enhanced Independent Safety Review System (ISRS) is now being formulated, the detailed description of which will be included in the LBL Self-assessment Program document currently being drafted (but not available for review at this time).
 - The unavailability of a definitive document describing the LBL ISRS (and all of its components) leads to a general lack of understanding of the system, as confirmed by discussions with members of the SRC. This lack of understanding contributes to the failure of the ISRS to comply with some of the requirements of DOE 5482.1B. (See Concerns FR.1-1 and FR.2-1.)
 - The concern cited below is not addressed explicitly in the "Lawrence Berkeley Laboratory Environment, Safety, and Health Self-assessment Report" (PUB-3090, Vol. I, January 7, 1991), although Finding LBL-FR.3-1 that "Laboratory management interactions with the SRC are not fully documented" does relate to the concern.

CONCERN: The structure and the functional plan for the Lawrence Berkeley Laboratory Independent Safety Review System are not documented (as required to comply with DOE 5482.1B) and are generally not understood.
(FR.3-1)
(H3/C1)

FR.5 TRIENNIAL APPRAISAL OF SITE/FACILITY SAFETY REVIEW SYSTEM

PERFORMANCE OBJECTIVE: A triennial appraisal of the safety review system should be performed by contractor management.

- FINDINGS:**
- DOE 5482.1B, 9.d.(2)(d) requires that "the internal appraisal system be reviewed by management for adequacy of performance every 3 years, or more often, as required."
 - The report of the "Technical Safety Appraisal of the Lawrence Berkeley Laboratory" (DOE/EH-0096, February 1990) cited an audit in 1988 by the Office of the President of the University of California of the LBL internal appraisal system. This audit was judged by the 1989 Technical Safety Appraisal (TSA) team to fulfill the requirement for a triennial review of the Independent Safety Review System (ISRS).
 - Discussions with the Department Head, IRAD and with the SRC Chairman and Secretary indicated the lack of a specific written plan for organizing and performing the triennial appraisals of ISRS required by DOE 5482.1B, although Section H., Chapter 1 of the Health and Safety Manual (PUB-3000, p.1-15) does cite a "program for review of health and safety programs by prominent non-LBL experts." Details of the plan for triennial appraisals of ISRS are expected to be published in the LBL Self-assessment Program document.
 - The Department Head, IRAD indicated that a group of external experts is being considered to perform the next triennial appraisal of the LBL ISRS (due to be performed in 1991), although the plan has not been formulated.
 - A serious problem with performing a triennial appraisal of the adequacy of the ISRS in 1991 derives from the fact that the system is currently undergoing major revisions (and enhancements), which are not yet in place or even defined and articulated. Further discussion with the Department Head, IRAD revealed that deferring the triennial audit to 1992 would increase its benefits. The deferral would probably require a waiver from SAN.
 - The concern cited below is not addressed in the "Lawrence Berkeley Laboratory Environment, Safety, and Health Self-assessment Report" (PUB-3090, Vol. I, January 7, 1991). The reference in Finding LBL-FR.5-1 to "triennial appraisals by the SRC" is inappropriate in that a review of the performance of the SRC would be a major objective component of the triennial appraisal.

CONCERN: A system for conducting triennial appraisals of the Lawrence Berkeley Laboratory Independent Safety Review System (required by DOE 5482.1B) has not been established.
(FR.5-1)
(H3/C1)

4.5.12 Radiological Protection

4.5.12.1 Overview

All 12 performance objectives in the Radiological Protection functional area were addressed in this appraisal. Lawrence Berkeley Laboratory (LBL) facilities both onsite and on the campus of the University of California at Berkeley were evaluated. The appraisal included review of documentation, including records of inspections and radiation measurements at LBL facilities, and discussions with radiation protection, research, and maintenance staff at all organizational levels.

The Environmental Safety and Hazards Control Department (ESHC) is staffed by well-educated, dedicated, and experienced staff. The February 1990 Technical Safety Appraisal (TSA) of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990), referred to as the previous TSA, noted that the ESHC staff lacked the manpower to perform several required functions. Staff additions since that time have been offset by losses, so the situation has not improved. Although an individual was hired to perform audits, he was diverted to fill a staff vacancy. Thus, the required audits are not being performed.

The previous TSA had 11 concerns specific to radiation protection. Progress on these was evaluated and the appraisal team is recommending that only one concern be considered closed. That concern, contamination control deficiencies at the National Tritium Labeling facility, did not require a major commitment of resources from health physics professional and technical staff. Concerns requiring major time commitments such as procedures generation, records control, and accreditation of the dosimetry programs do not reflect major programmatic improvements.

ESHC is a highly service-oriented organization, but it operates in a reactive mode. Both professionals and technicians spend much of their time responding to requests from the research community. The Laboratory-wide emphasis on safety has increased the number of requests for information and assistance, further exacerbating understaffing. Also, significant number of radiation protection personnel are eligible to retire in the near future. This will further deplete staff and reduce the institutional memory.

In large part, the health and safety organization has been developed in a manner which capitalizes on individual strengths. Unfortunately, the result is excessive demands on some individuals and overlapping responsibilities.

Radiation protection personnel are not required to participate in investigation of unusual occurrences involving radiation. They only respond to requests from the responsible organization. When an occurrence involved a potentially significant extremity exposure, the exposure was neither quantified nor entered into the exposure record.

Prior to this appraisal, a significant effort was made to ensure proper posting of controlled areas, radiation areas, etc. Radiation survey logs and visitor access logs were newly established in many laboratories. Some radiation protection procedures had recently been updated, while others were only available in draft form.

LBL has two dosimetry systems in use, a film badge system and a thermoluminescent dosimetry (TLD) system. Neither is accredited by the Department of Energy Laboratory Accreditation Program. Exemptions to allow more time to implement the TLD system, applied for in response to the previous TSA, have expired. However, there has been little actual progress on accrediting the systems. The absence of an accredited dosimetry system was so serious as to be considered a Category II Concern, requiring immediate corrective action.

The internal dosimetry program is mature and well established at LBL. It provides assurance that internal doses are significantly below the Department of Energy (DOE) limits. However, the program lacks formality and quality control in some areas. With a more comprehensive air sampling and contamination monitoring program, primary confirmation of radiation control would come from routine monitoring and air sampling. Personnel bioassay should be used to provide additional verification.

Because of the variety of work performed and the number of locations producing ionizing radiation and using radioactive materials, LBL has a large inventory of fixed and portable radiation monitoring instruments. Most instruments are old, but the Laboratory has been able to keep a sufficient number in working order for current needs. A calibration and recall program for portable instruments is in place; however, not all calibrations are performed to traceable standards, and some calibrations do not ensure proper instrument response. Calibration deficiencies resulted in a Category II concern. There were also deficiencies in the calibration of fixed radiation detection instruments and air samplers and monitors.

Air sampling is also done primarily with 1950- and 1960-era equipment. There are no documented criteria for when, how, and where to sample. No action levels have been established.

A third Category II concern was prompted by the casual surveys and the absence of documentation ensuring that material released for uncontrolled use is free of surface contamination and does not contain radioactive material. One item that was apparently activated and one sealed radiation source were discovered in the salvage yard during the appraisal.

Quantitative goals for the as low as reasonably achievable (ALARA) program were not established. The Safety and Health (S&H) Subteam has a specific concern that personnel exposures at the National Tritium Labeling facility have not been evaluated to ensure that they are ALARA.

The LBL self-assessment document did not address the majority of concerns documented in this appraisal. This appears to be primarily a deficiency in the compilation of the self-assessment document, not in the health physicists' knowledge of the needs of their program. Another important source of documentation of deficiencies is consultant reports.

LBL identification of the root cause of existing deficiencies has primarily been limited to statements that additional staff are needed. Because staffing plans are tentative at the present time, corrective actions are not well defined.

Although there appears to be a new safety climate at the Laboratory, the severe understaffing of the radiation protection organization forces has continued operation in a reactive mode. Previously identified noncompliance with DOE requirements persist, and the establishment of programs to correct the situation is put off to deal with day-to-day crises. Consequently, there is no evidence of a proactive health physics program.

4.5.12.2 Findings and Concerns

RP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site/facility organization and administration should ensure effective implementation and control of radiological protection activities on the site/facility.

- FINDINGS:**
- Most of the radiation protection responsibilities that are not assigned to programmatic divisions are within the ESHC. However, responsibility for the internal dosimetry for the program resides within the Medical Department.
 - Most of the day-to-day health physics responsibilities such as determining the location and frequencies of workplace contamination surveys are within the Operations Group of ESHC. The workplace air sampling program, although administered by the Operations Group, is designed in part by the Environmental Monitoring Group. The Health Physics Group has no role in survey program design or air sampling.
 - The inventory of sealed radiation sources and the position of Safety Officer for the National Tritium Labeling facility are within the Decontamination and Waste Disposal Section of the Operations Group. The individual who maintains the sealed source inventory was unaware of the radioisotope inventory listing maintained by the transportation component of the same group. That inventory is generated primarily from input from the researchers to the Field Safety Technicians, not from transportation records.
 - The infrastructure of ESHC appears to have been developed to capitalize on individual strengths. The result is excessive demands on some individuals and overlapping responsibilities.

CONCERN: See Concern OA.1-3.

- FINDINGS:**
- Three technicians on day shift and one on swing shift perform all routine services, collect radwaste and mixed waste, perform filter changes, bag out waste, perform some decontamination, and deliver radioisotopes to users.
 - The removable contamination survey program is behind schedule. (See Concern RP.10-3.)
 - Workplace surveillance by the Health and Safety Specialists has not detected obvious conditions, such as pencil-sized holes in glovebox gloves, in a timely manner.
 - Several operations are shut down awaiting filter changes by the Health and Safety Specialist.

- In addition to traditional health and safety duties, Specialists are involved in operations, such as operating tongs in "junior caves" and bagging out waste, as a service to researchers.
- Internal audits have not been done as required by DOE 5480.1B. (See Concern RP.2-1.)
- Neither of the external dosimetry systems in use (film and thermoluminescent dosimeters (TLD)) has been accredited under the Department of Energy Laboratory Accreditation Program. (See Concern RP.5-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).)
- Many researchers and health and safety staff contacted expressed concern that there was insufficient health and safety support. Many referred to the time when there were 10 Field Health and Safety Specialists to do a fraction of what the three current day-shift Specialists are expected to do.
- Upcoming retirements are expected to further deplete the radiation protection staff and reduce the experience level.
- The self-assessment states that ESHC does not have adequate staffing with training in radiation protection to meet the needs of research facilities and experiments. It also indicates in the response to many radiation protection findings that progress is dependent on additional staffing. The May 30, 1990, staffing plan, reviewed by the appraisal team, did not adequately address the staffing problems in health physics.

CONCERN: The resources allocated to the radiation protection program are not sufficient to bring the program into compliance with mandatory standards and industry practices. (Also see Concern OA.2-3.)
 (RP.1-1)
 (H2/C2)

FINDINGS:

- In many areas, radiation and/or contamination surveys are done both by the facility operators and the health and safety staff. In only a few locations, are results compiled to allow trend analysis.
- Some researchers indicated that they would like to receive results of periodic surveys performed by ESHC to be assured that they were being performed. (In some cases these were not done on the frequency specified.) (See Concern RP.10-3.)
- With the exception of the National Tritium Labeling facility there are no action levels for survey results. In most cases, the Head of Operations in ESHC looks at the results and initiates action for any that look high.

- The formal self-assessment did not address this concern. However, a draft "Radiation Protection Appraisal of Selected LBL Laboratories," dated December 15, 1990, did identify the concern. An action plan was not available.

CONCERN: Action levels and trend analysis are not utilized to assure
(RP.1-2) control of contamination and to promote as low as reasonably
(H2/C2) achievable goals.

RP.2 INTERNAL AUDITS AND INVESTIGATIONS

PERFORMANCE OBJECTIVE: The internal audit program for both routine operations and unusual radiological occurrences should provide adequate performance assessments.

- FINDINGS:**
- A well-qualified individual was hired to perform internal audits as required by DOE 5480.1B. After designing the program and collecting data for the first audit this individual was diverted to do day-to-day health physics coverage because of a staff vacancy.
 - Except for the self-assessment, prepared for the Tiger Team, internal audits have not been done.
 - The lack of health physics internal audits was identified in the LBL self-assessment. Correction awaits additional staff. No schedule was given.

CONCERN: Internal Audits in radiation protection have not been done as required by DOE 5480.1B. (Also see Concern RP.1-1.)
(RP.2-1)
(H2/C1)

- FINDINGS:**
- An October 1989 incident resulted in whole body radiation exposures of 508 and 832 mrem to two scientists. An investigation was performed by a committee appointed by the Facility Manager and documented as Unusual Occurrence Report Number LBL-89-13-88-2. The investigation committee had a consultant from ESHC, but this individual was not a member. The investigation and followup had the following deficiencies:
 - The dose resulted from disassembly of a small component that read 40 R/hr at 12 inches. Estimates of hand dose were not reported. Instead the committee concluded that, "there were so many uncertainties in time, distance and radiation field distribution of the beta and gamma rays that no good estimate could be made."
 - No medical evaluation of possible extremity damage was made. Instead the committee stated, "The two scientists reported that no radiation 'burns' appeared on their hands." No entries were made in medical files.
 - Exposure records for the affected employees document the whole body dose, but do not indicate or quantify extremity exposure which certainly was considerably higher.
 - Since the October 1989 occurrence (discussed above) an Occurrence Reporting Manual has been developed to implement DOE 5000.3A. Neither this manual, the Health and Safety Manual, nor the guides used by ESHC address the need to assign radiation dose from incidents and ensure that the information

is entered into the exposed employee's occupational exposure record.

- Neither unusual occurrences nor extremity doses were addressed in the radiation protection portion of LBL self-assessment.

CONCERN: Employee external radiation exposures (other than whole body) (RP.2-2) resulting from unusual occurrences have not been properly (H2/C1) evaluated and entered into the dosimetry records as required by DOE 5480.11.

FINDINGS:

- SAN received the unusual occurrence report, but did not ensure that extremity exposures were evaluated.
- See Concern OA.1-5.
- The SAN self-assessment indicates that trending and tracking is not being done. However, it does not address the specific technical issues of this concern.

CONCERN: The San Francisco Operations Office has not provided effective (RP.2-3) technical oversight to assure that the radiation exposure of (H2/C1) employees involved in incidents is documented as required by DOE 5480.11.

RP.3 RADIOLOGICAL PROTECTION PROCEDURES AND POSTING

PERFORMANCE OBJECTIVE: Radiation protection procedures for the control and use of radioactive materials and radiation generating devices should provide for safe operations and for clearly identified areas of potential consequences.

- FINDINGS:**
- The Health and Safety Manual states that ESHC must be consulted before the initial use or a significant change in use of radioisotopes, or before an operation that is likely to result in an exposure of 100 mrem. However, this may be a consultation with the Field Safety Technician or health physicist. Such consultations are generally undocumented and approvals are verbal.
 - There is not a formalized and documented system where a user submits an application to ESHC and a health physics assessment is done prior to work. There is no formalized approach which delineates (on a permit signed by both the health physics representative and the user) specifically applicable safety controls for the intended use. Past incidents, such as Unusual Occurrence LBL-89-13-88-2, have resulted when researchers failed to consult safety professionals prior to work in unusual radiological conditions.
 - LBL does not have a formal, documented Laboratory Workplace Standard (or similar document) which defines the type of controls required (i.e., hood, glovebox) for work with unsealed sources of radiation.
 - The self-assessment recognizes that the reviews required by Health and Safety Manual are not being conducted as frequently as needed and indicates that the policy will be strengthened. It also states that there are no operational procedures for users of radioisotopes. In response to this findings it states, "A system of radiation work permits is being considered for implementation in FY 1991." Such a system, if properly implemented, would satisfy this concern.

CONCERN: (RP.3-4)
(H2/C2) There is no system to assure prior review and approval by health physics professionals of work involving radiation or radioactive materials.

- FINDINGS:**
- Sealed radiation sources are separated into two categories. Those containing less than 20 times the annual limit on intake (ALI) and those containing more. Nearly 500 sealed or electroplated sources containing less than 20 ALI are inventoried by the users. Some are more than 30 years old. Leak checks are not suggested or required.
 - Most areas where sealed sources are stored and used are not on a routine contamination survey program. Thus, leaking sources would not be identified by routine surveys.

- The self-assessment has two findings relative to sealed sources: that they have been left unattended in research facilities, and that there is not a uniform policy on their storage. (The latter involves the fact that keys are left in safes where sources are stored.) The corrective actions planned for these would not satisfy this concern.

CONCERN:
(RP.3-5)
(H2/C2)

There is no contamination surveillance program for sealed radiation sources less than 20 times the annual limit of intake.

FINDINGS:

- A 20 microcurie Ra-226 sealed source in a liquid scintillation counter was found at the Bldg. 42 Salvage Yard and was not listed on the inventory maintained by ESHC.
- Only inventoried sources are leak checked.
- This concern was not addressed in the self-assessment.

CONCERN:
(RP.3-6)
(H2/C1)

An accurate inventory and periodic leak checks are not performed for all sealed radioactive sources as required by SAN MD No. 5480.11.

FINDINGS:

- An "LBL Isotope Inventory" is maintained on computer. However, it is not an inventory in the sense that the sealed source inventory is. It was said to reflect the species and maximum quantities of radionuclides that might be present at any given time. It is not updated as radionuclides are received, decayed, and disposed of. In several cases it had not been updated when operations were transferred to other rooms or facilities.
- Unlike the sealed source inventory there is no quantitative measure of the potential health hazard of the inventory in any particular location.
- Some research laboratories were labeled with the inventory of radioactive material present while others indicated only a maximum.
- A San Francisco Operations Office Management Directive (SAN MD No. 5480.11, October 6, 1989) requires LBL to inventory licensable (as defined in 10 CFR 30, 40) amounts of radioactive material in storage no less than once a year and be able to locate radioactive material at all times. Evidence of this inventory was not available and material was located that was not on the inventory.
- Individuals contacted during the appraisal indicated that SAN had rigorously audited the sealed source inventory. However, the isotope inventory has not had similar attention from them.
- The LBL self-assessment indicates the general observation that the inventory of the radioactive and hazardous materials

stored in each room or cave is not generally available and that there was a lack of control of radioactive material, mostly actinides, in the nuclear chemistry operations. (The latter deficiency had been addressed prior to the appraisal. However, one glovebox was omitted from the inventory process.) The planned actions alone are unlikely to ameliorate the concern.

CONCERN: Radioisotopes are neither inventoried nor controlled as required by SAN MD No. 5480.11.
(RP.3-7)
(H2/C1)

- FINDINGS:**
- There was no written and approved procedure for the conduct of the interlock safety checks at the 88-inch Cyclotron. A draft procedure has been prepared for interlock checks at the Bevatron. (A checklist without an associated procedure is used to document the checks.)
 - There was no written and approved procedure for the conduct of area surveys at the 88-inch Cyclotron, at the Bevatron, and the accelerators in Bldg. 58 as established by a Radiation Protection Officer.
 - See Section 4.5.1, OA.3.
 - The formal LBL self-assessment does not identify the need for improved radiation protection procedures. However, a draft "Radiation Protection Appraisal of Selected LBL Laboratory," dated December 15, 1990, accurately identified this concern. No action plan was available.

CONCERN: Radiation protection procedures do not conform with SAN MD No. 5480.11 in that some are missing and some are not properly documented.
(RP.3-8)
(H2/C1)

- FINDINGS:**
- The interlock performance check at the 88-inch Cyclotron verifies the continuity of the "safety chain" logic, but fails to demonstrate and verify that a beam can actually be shut off. The beam shutoff device(s) are not checked.
 - Deficiencies in the interlock checks were not identified in the self-assessment.

CONCERN: Tests of fail-safe interlocks at the 88-inch Cyclotron do not verify proper operation of all safety devices as required by DOE 5480.4 and ANSI N43.1.
(RP.3-9)
(H2/C1)

- FINDINGS:**
- There are gaps in the shielding of the 88-inch Cyclotron such that the accelerator beamline can be seen through the gap. Documented surveys of the areas around these gaps were not available.
 - ANSI N43.1 requires a radiation protection survey for both gamma and neutron radiation periodically and each time changes

have been made in shielding, operation, and equipment to check for unknown changes and malfunctioning equipment. Such surveys have not been performed and documented at the 88-inch Cyclotron as required.

- A documented survey of the energy spectra exterior to the shielded areas could not be produced at the 88-inch Cyclotron.
- No documented radiation surveys were available for prototype x-ray generators used in Bldg. 70A.
- The substance of this concern was addressed in the self-assessment as an example of the activities that additional staff would perform.

CONCERN: The radiation field around radiation generating devices at
(RP.3-10) Lawrence Berkeley Laboratory has not been characterized (type,
(H2/C1) energy, and dose range) as required by DOE 5480.4 and ANSI N43.1.

FINDINGS:

- The Advanced Light Source (ALS) uses electromagnets for door locks to machine areas. The power supply was not monitored by the interlock system.
- The ALS door locks for machine areas have push buttons for emergency access. The push buttons did not have devices to prevent inadvertent use.
- Although a draft LBL policy on interlocks was reviewed during the previous Technical Safety Appraisal (TSA), no policy has been issued.
- As was observed during the previous TSA, the 88-inch Cyclotron and Bevalac are equipped without dual interlocks as required by ANSI N43.1 and DOE 5480.11, Chg 6, Chapter XI. LBL has not requested a variance from DOE for these mandatory standards.

CONCERN: See Concern RP.3-3, Technical Safety Appraisal of the Lawrence
Berkeley Laboratory (DOE/EH-0096, February 1990).

RP.5 EXTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The routine and accident personnel radiation dosimetry programs should ensure that personnel radiation exposures are accurately determined and recorded.

- FINDINGS:**
- A technical basis document has not been developed to indicate how the film badge dosimeters and thermoluminescent dosimeters (TLDs) comply with required standards.
 - LBL has passed Department of Energy Laboratory Accreditation Program (DOELAP) performance tests for the current film badge dosimeter in the two high-energy photon categories. The film badge dosimeter has not been evaluated for performance in the low-energy photon, beta, and neutron categories. (The film badge is being phased out for measurement of low-energy photons and beta.) Radiations of these types exist at LBL. The DOELAP assessors have not conducted an onsite review which is required to acquire DOELAP accreditation.
 - An exemption was requested of SAN and the Office of Energy Research, Headquarters, DOE to allow temporary noncompliance with DOE 5480.11 in order for the TLDs to gain DOELAP accreditation. The exemption to allow use of TLDs for nonaccelerator work expired in June 1990. The exemption to allow use of TLDs for accelerator work expired in December 1990. Neither the film badge nor the TLD dosimeters have received DOELAP accreditation. A new request justifying another time extension has not been submitted to SAN. No exemption for the film badge has been requested.
 - The beta category applied for the 802 TLD badge was not satisfactorily passed. When film badges are used, the dose received for the deep dose equivalent is assigned as the shallow dose equivalent. Documentation does not demonstrate the validity of this technique. The TLD algorithms allow separate deep dose and shallow dose assignments.
 - Beta dose factors for the whole-body, film-badge dosimeters are not documented for the beta work environments present at LBL.
 - A procedure on "blind" quality assurance (QA) testing was available for the film badge, but had not been routinely implemented. A procedure has not been developed for the TLDs.
 - The film badge dosimetry program has not routinely participated in formally documented intercomparison studies.
 - Testing of the dosimetry system software for both TLDs and film badges has not ensured conformance to ANSI/ASME NQA-1, Supplement IIS-2, 1989, Supplementary Requirements for Computer Program Testing.

- The errors in the dose measurements from personnel and extremity dosimeters are not quantified and documented.
- The self-assessment report identified that personnel dosimetry documentation does not fully meet DOELAP requirements and is laboring under two (uncredited) dosimetry systems at the present time. It indicates outside assistance will be used to gain accreditation by spring 1991. This does not appear attainable.

CONCERN:
(RP.5-3)
(H2/C1)
CAT II

The film badge dosimeter and thermoluminescent dosimeter programs do not incorporate the requirements of DOE 5480.4 and ANSI N13.7 and N319-1976. Lawrence Berkeley Laboratory has not been able to obtain Department of Energy Laboratory Accreditation as required by DOE 5480.11. (Also see Concern QV.1-2.)

RP.6 INTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: Internal radiation exposure controls should minimize internal exposures.

- FINDINGS:**
- High-efficiency particulate air (HEPA) filtered vacuum cleaners are used to clean up spills of radioactive materials. Many of these have been in use for several years. No inspections or tests of the filters have been performed. Air sampling is not routinely performed when vacuums are in use.
 - The self-assessment addressed the failure to test HEPA filters in ventilation systems, but not in vacuum cleaners.

CONCERN: High-efficiency particulate air filters on vacuum cleaners have not been inspected or tested on a regular basis.
(RP.6-1)
(H2/C2)

RP.7 INTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The internal radiation dosimetry program should ensure that personnel radiation exposures are accurately determined and recorded.

- FINDINGS:**
- Procedures for counting and analysis were in draft form and not formally approved for either the whole-body counting facility or the in-vitro bioassay lab.
 - A procedure does not exist to report the error in determined activity associated with the whole-body counting facility.
 - There was no approved procedure to calibrate the sodium iodide and germanium detectors used in bioassay.
 - The bioassay laboratory reports dose in units of organ dose equivalent and annual effective dose equivalent. The Laboratory does not report the category of committed effective dose equivalent to the Personnel Dosimetry Office for retention in an individual's occupational exposure history. Procedures do not specify that all non-LBL "participating visitor" exposure data must be reported to the Personnel Dosimetry Office.
 - The methodology to convert bioassay results to internal doses is not documented. Even though ICRP-30 methodology is used in the case of acute intakes, the more complex methodology used for chronic intakes is not documented.
 - The self-assessment report identified recordkeeping procedures for internal radiation dose assessments. It did not identify the need to document calculational methodologies. It identified that standards need to be reviewed, but did not give a schedule.

CONCERN: Approved procedures for the in-vivo and in-vitro bioassay programs are not documented and updated periodically in accordance with DOE 5480.11.
(RP.7-2)
(H3/C1)

- FINDINGS:**
- A check of total energy range linearity is not performed each time prior to the whole-body count.
 - Minimum detectable activities were calculated for all radionuclides typically analyzed in the routine whole-body counting program with the exception of I-125 and I-131.
 - Even though the in-vitro bioassay lab has participated in the DOE intercomparison programs, blind internal audit samples have not been utilized to assess counting or bioassay sample QA.

- An attempt was made to participate in the Hanford phantom intercomparison study for whole-body counting, but participation was never achieved.
- The bioassay laboratory does not always use standards that are traceable to the National Institute for Standards and Technology.
- The primary energy-efficiency calibration of the whole-body counting technique was performed approximately 20 years ago as a result of medical studies. Since that time the primary calibration has been verified using a single radioactive check source even though the multichannel analyzer and supporting electronics have been updated.
- The self-assessment report identified the need to review the program against the DOE draft performance standard for Internal Dosimetry.

CONCERN: The quality control program for bioassay is not fully
(RP.7-3) implemented. (Also see Concern QV.1-2.)
(H2/C2)

- FINDINGS:**
- There are 214 individuals on the "bioassay list."
 - Fifty-nine of those on the bioassay list did not respond to requests for bioassay samples.
 - The Health and Safety Manual specifies "penalties for non-return of dosimeters," but does not address failure to submit a bioassay sample when requested.
 - The Operational Safety Procedure (OSP) for the National Tritium Labeling facility requires first-time experimenters to submit urine samples both before and after an experiment. A review of the dosimetry records revealed that this is not always done.
 - The LBL self-assessment report did not identify this area of concern. However, the staff was aware and it was apparent from the 1989 bioassay summary report.

CONCERN: Lawrence Berkeley Laboratory does not assure that personnel
(RP.7-4) submit bioassay samples when requested.
(H2/C2)

RP.8 FIXED AND PORTABLE INSTRUMENTATION

PERFORMANCE CRITERIA: Personnel dosimetry and radiological protection instrumentation used to obtain measurements of radioactivity should be calibrated, used, and maintained so that results are accurately determined.

- FINDINGS:**
- There are no specific procedures or checklists for instrument calibration.
 - Use of the new calibration source requires that source, distance, and shielding all be properly and manually established. During a calibration observed by the appraisal team, the exposure rate was improperly established one time out of eight.
 - During a calibration observed by the appraisal team, an instrument was calibrated using the wrong exposure rate set on the source. This error was corrected during the calibration.
 - One of the ranges of an instrument that was returned for battery replacement was found to be improperly calibrated. Because "as found" conditions are not recorded, it is not possible to assess the accuracy of instruments in the field.
 - This deficiency was not recognized in the formal LBL self-assessment document. However, it was covered in a draft "Radiation Protection Appraisal of Selected LBL Laboratories," dated December 15, 1990. An action plan was not available.

CONCERN: Portable survey instruments in use at Lawrence Berkeley Laboratory may not correctly establish radiological conditions as required by DOE 5480.4 and ANSI N323.
(RP.8-3)
(H2/C1)
CAT II

- FINDINGS:**
- Many laboratory personnel and Health Physics Technicians use Geiger-Müller type survey instruments to monitor for beta contamination. The instruments are calibrated in units of exposure rate. This unit of calibration is inappropriate for surveys which document removable and fixed contamination limits in units of dpm in accordance with DOE 5480.11.
 - Although many instruments have check sources, the normally expected response was not indicated to the user.
 - This deficiency was not recognized in the LBL self-assessment.

CONCERN: Portable instrument calibration is inconsistent with the requirements of DOE 5480.4 and ANSI N323 in that beta efficiency is not determined and check sources not properly used.
(RP.8-4)
(H2/C1)

- FINDINGS:**
- Area monitors at the 88-inch Cyclotron were not calibrated in accordance with the requirements of ANSI N323.

- The documentation of the calibrations of the area monitors at the Bevalac was insufficient to demonstrate that the requirements of ANSI N323 are met.
- The area monitor for an x-ray machine in Bldg. 70A had no evidence of calibration.

CONCERN: See Concern RP.8-2, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

RP.9 AIR MONITORING

PERFORMANCE OBJECTIVE: Air monitoring systems through selection, location, calibration, and maintenance should ensure reliable estimates of air activity for radiological control purposes.

- FINDINGS:**
- DOE 5480.11 requires ambient air monitoring for occupied areas with the potential to exceed 10 percent of the derived air concentration for any radionuclide. Such areas exist only in the National Tritium Labeling facility.
 - The National Tritium Labeling facility has continuous air monitors; however, these have not been calibrated at the frequency prescribed by the manufacture. Samples are not collected from the workers breathing zone nor between the source of airborne contamination and the worker.
 - Air sampling is addressed in the environmental portion of the self-assessment. It indicates that calibration of air samplers is informal and inadequate. The placement of workplace samplers was addressed in a draft "Radiation Protection Appraisal of Selected LBL Laboratories" dated December 15, 1990. No schedule is established.

CONCERN: Air monitor calibration and placement of sample heads at the
(RP.9-1) National Tritium Labeling facility do not conform to the
(H2/C1) requirements of DOE 5480.11.

- FINDINGS:**
- Particulate and radioiodine air samples are collected at various locations to ensure control of contamination. The particulate air samplers are a modified vacuum cleaner design that does not provide constant flow. In many cases the hose from the sample pump (which sits on the floor) to the sample head is too short to sample the workers breathing zone air. The flow measuring devices on these units are calibrated only when the motor is replaced, so some had not been done in the last 3 years. Many were observed to be operating outside of the designated flow range (high in every case).
 - Criteria have not been documented for the workplace air sampling program. Appropriate criteria would include when sampling is required and the appropriate placement of samplers.
 - Some samplers hung below hoods and often they did not face the probable source of contaminants. There was an indication that some sample heads had been moved by researchers.
 - All but one of the iodine air samplers are also of obsolete design; however, they have flow totalizers. The totalizers have not been calibrated since the units were put in service. A calibrator, traceable to the National Institute of Standards and Testing, was received during the appraisal to do this.

- The correction factor used for alpha absorption in air filters had not been verified.
- Air sampling is addressed in the environmental portion of the self-assessment. It indicates that calibration of air samplers is informal and inadequate and indicates the problem will be corrected. The placement of workplace samplers was addressed in a Draft Radiation Protection Appraisal of selected LBL Laboratories dated December 15, 1990. No schedule is given.

CONCERN:
(RP.9-2)
(H2/C2)

Workplace air sampling is not quantitative.

RP.10 RADIATION MONITORING/CONTAMINATION CONTROL

PERFORMANCE OBJECTIVE: The radiation monitoring and contamination control program should ensure worker protection from radiation exposures.

- FINDINGS:**
- The Health and Safety Manual requires that all equipment and furniture in a controlled area and all items going to reclamation must be tagged by ESHC with a "No Activity Detected" tag before removal. The tag does not contain all of the information required by DOE 5400.5.
 - There are no operating procedures to ensure that the policy given in ESHC Policy No. 730, "Instrumentation General," is implemented in the following areas:
 - Removable contamination is measured.
 - Background is low enough during the survey to ensure that DOE 5480.11 and DOE 5400.5 performance criteria are met.
 - Appropriate instruments are used for the anticipated type of radiation.
 - Historical records are kept.
 - Procedures delineating the survey techniques and methods used to monitor material which may have been activated as a consequence of accelerator operations have not been approved either by SAN (as required by SAN MD 5480.11) or the Assistant Secretary Environment, Safety and Health (EH-1) (as required by DOE 5400.5).
 - Contrary to the requirements of the Health and Safety Manual (but with the concurrence of ESHC), workers at several facilities perform their own release survey and hang "No Activity Detected" tags.
 - According to the Health and Safety Manual, gas cylinders do not require a "No Activity Detected" tag. In some isotope laboratories this has been used to allow their removal without a release survey.
 - Laboratory coats and similar items being sent to the laundry do not require survey by ESHC. They are to be surveyed by users. These surveys are not documented. Training for radioisotope users does not include experience performing such surveys. Spot checks are not performed by ESHC.
 - Inspection of the Bldg. 42 Salvage Yard revealed an instrument containing a 20 microcurie Ra-226 sealed radiation source and an activated pipefitting exhibiting a radiation dose above LBL and DOE 5400.5 release limits. The radium source was detected by the LBL staff during their routine survey.

- Some surveys for removable alpha contamination were performed with portable survey instrument that did not have the sensitivity required to ensure compliance with the release limits of DOE 5480.11 and DOE 5400.5.
- The release of material to uncontrolled areas was not addressed in the LBL self-assessment process.

CONCERN: Lawrence Berkeley Laboratory has not assured that material released for uncontrolled use is free of radioactive materials and radioactive contamination in accordance with the requirements of DOE 5480.11 and DOE 5400.5.
 (RP.10-2)
 (H2/C1)
 CAT II

- FINDINGS:**
- The Health and Safety Manual requires employees using radioactive materials to perform and record surveys to ensure that radiation controls are adequate. While surveys are performed by the employees in most areas, complete contamination surveys with the documentation recommended by DOE 5480.11 (referring to ANSI N 13.6 1972) are rare.
 - According to the Health and Safety Manual, monthly contamination surveys of all radioisotope work areas are made by ESHC Operations Group personnel. However, at the time of the appraisal some buildings had not been surveyed in the previous 4 months.
 - The self-assessment acknowledges that radiation control requirements have been placed on isotope users but have not been subject to ESHC review. It also acknowledges that monthly radiation surveys are falling behind. Establishment of logbooks (now in place) and increased technical staff are the identified corrective actions. The May 30, 1990, staffing plan, reviewed by the S&H Subteam, did not adequately address radiation protection staffing.

CONCERN: Contamination surveys of radioisotope areas are not being performed and documented on a regular basis. (Also see Concern RP.1-1.)
 (RP.10-3)
 (H2/C2)

- FINDINGS:**
- The Health and Safety Manual requires personnel leaving a "radioisotope work area" to use a hand and foot monitor if provided or to survey their feet with portable survey instruments. "Radioisotope work area" is not defined. During the appraisal hand and foot monitor use was enforced by signs and their use was consistent. However, when leaving controlled areas where hand and foot monitors were not available, no signs requiring instrument surveys were noted and the instruments were rarely used.
 - No discussion of egress monitoring was included in the isotope user training session attended by a member of the appraisal team.

- Compliance with personal survey requirements was not addressed in the self-assessment.

CONCERN:
(RP.10-4)
(H2/C2)

Lawrence Berkeley Laboratory requirements for hand and foot surveys are neither clearly defined nor consistently applied.

RP.11 ALARA PROGRAM

PERFORMANCE OBJECTIVE: A formally structured, adaptable program should be in place with established milestones to ensure that exposures are maintained as low as reasonably achievable (ALARA).

- FINDINGS:**
- Occupational radiation exposures to individuals at the National Tritium Labeling facility exceed 100 mrem/yr from internally deposited tritium.
 - There has not been a formally documented as low as reasonably achievable (ALARA) evaluation of this exposure. The Safety Officer for the facility stated that he believed that 90 percent of this occurred while changing vacuum pump oil. The results of bioassay sampling from facility workers is inconsistent with this explanation because the concentrations of tritium in urine are relatively constant while pump oil is changed twice per year.
 - Much of the equipment is within gloved enclosures. Contrary to the Health and Safety Manual, industrial hygiene had not measured or specified the flow rate of these enclosures. Measurements made at the request of the S&H Subteam team showed very low flow rates and pressure drops, indicating minimal containment.
 - The self-assessment noted the lack of a formally structured, creditable program for ALARA. It did not mention specific deficiencies or schedules.

CONCERN: The Lawrence Berkeley Laboratory has not ensured that internal exposures at the National Tritium Labeling facility are as low as reasonably achievable, as required by DOE 5480.11.
(RP.11-1)
(H2/C1)

RP.12 RECORDS

PERFORMANCE OBJECTIVE: Records related to occupational radiation exposure should be maintained in a manner that permits easy retrievability, allows trend analysis, and aids in the protection of an individual and control of radiation exposure.

- FINDINGS:**
- The "committed effective dose equivalent" and the "committed dose equivalent to organ or tissue" categories are not maintained in the individual's occupational exposure file as required by DOE 5480.11.
 - The "annual dose equivalent to the lens of the eye" category is not recorded for individuals working with beta and/or gamma-emitting radionuclides as required by DOE 5480.11.
 - Comprehensive survey records related to occupational radiation exposure are not systematically generated and maintained consistent with ANSI N13.6.
 - Records are maintained by those individuals who have responsibility for specific disciplines. Survey results, internal and external dosimetry results, calibration, inventory and waste records are dispersed among six separate buildings onsite.
 - The "No Activity Detected" tags and associated historical records are not retained as required by DOE 5400.5.
 - The self-assessment addressed recordkeeping for design documents, technical notes, and the bioassay program. It did not address other mandatory records discussed in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** See Concerns OA.7-3 and RP.10-2 in this document. Also see Concern RP.12-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

4.5.13 Worker Safety and Health (OSHA) Compliance

4.5.13.1 Overview

All performance objectives for Worker Safety and Health (OSHA) Compliance functional area were evaluated. A comprehensive safety and health compliance appraisal covering general industry and construction standards was conducted at the Lawrence Berkeley Laboratory (LBL) to determine compliance with existing Occupational Safety and Health Administration (OSHA) regulations as adopted by Department of Energy (DOE). Noncompliance and hazards were documented and discussed with management at the end of each day. Repeated noncompliance with the same standard in a department was only noted once on the inspection report form (see Appendix F).

Thirty buildings, with more than 1.1 million square feet and 1,947 employees, were inspected for compliance with OSHA regulations. Evaluation criteria were based, in part, on OSHA General Industry and Construction Standards: 29 CFR 1910 and 29 CFR 1926, respectively.

The areas selected were primarily those where most employees work, or those in which workplace safety and health were judged to be difficult to attain because of the presence of hazardous materials or activities. Facilities satisfying one or more of these criteria are the maintenance shops, craft shops, and laboratories. These buildings included a large fraction of the nonoffice workplaces and many of the hazardous workplaces. A less comprehensive sample of office buildings and other low hazard areas was also inspected.

During this appraisal, the team primarily looked for "serious" noncompliances; therefore, there is a higher percentage of "serious" versus "other than serious" noncompliances. (Note: "Serious" and "other than serious" are OSHA classifications and are formally defined in the OSHA Field Operations Manual.)

A total of 456 noncompliance issues was identified. Of these, 420 were considered "serious" and 36 were classified as "other than serious." Table WS-1 provides a summary of the buildings inspected, the number of noncompliance issues noted, and the OSHA violation classification of each. Appendix F is a tabulation, by department, of all noncompliance with OSHA regulations and standards. Collectively, the findings indicate deficiencies in the following:

- Regulated carcinogens are not consistently stored and handled properly and storage areas are not properly labeled as containing carcinogens;
- There was no fire suppressant system at the grill in the cafeteria;
- LBL has an ineffective program for inspection of slings, chokers, and related rigging;
- Improper and unsafe rigging was used to move heavy sheets of steel plate;

- Unalloyed copper tubing was used to plumb acetylene gas. Acetylene and copper react to form explosive cuprous acetylides;
- Perchloric acid was used in laboratory hoods not designed for that use;
- Workers did not use the appropriate fall protection on elevated walking/working surfaces, such as scaffolds and aerial lifts and roof tops;
- Machine guarding for flying chips, rotating parts, in-going nip points and point-of-operation has not been implemented;
- The LBL Hazard Communication Program is deficient with regard to Materials Safety Data Sheets, labeling of hazardous materials, written program at each work site, and employee training;
- Indoor methods of storage of combustible and flammable materials were not in accordance with 29 CFR 1910.106, Flammable and Combustible Liquids;
- LBL has not conducted sampling of personnel involved in asbestos work. They also have not identified all sources;
- LBL has not effectively implemented the new laboratory standard, 29 CFR 1910.1450, for occupational exposures to hazardous chemicals in laboratories;
- Fire protection standards such as means of egress and portable fire extinguisher are not being fully met; and
- LBL has many electrical noncompliances related to the use of ground fault circuit interrupter devices, fixed wiring, and guarding of live parts.

It was not necessary to do any air sampling for this appraisal because most of the potential air quality problems would result from actual releases or specific projects such as asbestos removal or soldering operations. The procedures and implementation of the procedures for special projects were evaluated and found to comply with appropriate regulations or good practices. During this appraisal, no asbestos removal or cleanup was in process to afford confirmation of program adequacy or evaluation of performance in these areas. However, there were two projects, drilling into transite (an asbestos-containing material) and removal of paint-containing lead, that were evaluated. The employees were questioned and in both cases the proper procedures were known and being used.

At the request of this appraisal team, Industrial Hygiene Department personnel collected a bulk sample of material thought to be asbestos and paint material thought to contain lead. These samples were analyzed by LBL and positive findings were obtained for asbestos and lead.

In the Worker Safety portion of the LBL self-assessment, deficiencies were identified with respect to Hazard Communication, 29 CFR 1910.1200, and

Construction, 29 CFR 1926. A major problem noted in construction activities is the failure to install and use fall protection. According to LBL contracts, outside contractors are required to comply with safety and health regulations and are to be trained in the hazards for the work being performed. Contracts are terminated for noncompliance. No information was provided with respect to whether or not contractors are barred from competition for future contracts. However, there is evidence they do discontinue operations by contractors when they perform their tasks without regard to safety. It is not clear what happens when these unsafe acts are repeated by the contractor. This appraisal confirmed deficiencies in hazard communication related to training, the availability of Material Safety Data Sheets, labeling, written program for each work location, appropriateness of hazard warnings, and the use of the Hazardous Material Information System.

The noncompliance with OSHA regulations and standards reflects, in part, that the industrial safety and hygiene staff has a limited number of representatives to cover the breadth and diversity of the work at the Laboratory. LBL is not performing sufficient audits and surveillance of all the work sites. Although appraisals by outside consultants have been initiated in order to achieve a viable program, onsite safety professionals are not effectively completing evaluations of these efforts.

Many of the hazards identified in previous DOE appraisals and in the self-assessment could have been corrected prior to this appraisal.

**TABLE WS-1
BUILDINGS INSPECTED
AND
NONCOMPLIANCE INFORMATION**

Building	Serious	Number Of Noncompliances Other-Than-Serious
2	34	6
5	1	0
6	11	0
7	5	0
10	1	0
16	10	0
25	12	1
26	4	0
46	19	4
50A	11	2
51	2	3
54	9	0
62	11	2
66	7	0
70	21	3
71A	4	0
74	12	3
76	9	0
77	66	4
77A	1	1
78	3	0
90	2	0
<u>Main Campus</u>		
1	23	1
3	12	1
8	13	0
11	8	0
19	5	0
19A	7	0
21	2	0
22	57	2

4.5.13.2 Findings and Concerns

WS.3 COMPLIANCE WITH OCCUPATIONAL HEALTH STANDARDS FOR GENERAL INDUSTRY

PERFORMANCE OBJECTIVE: Site/facility operations should comply with DOE-prescribed standards for the application and control of occupational health hazards.

- FINDINGS:**
- A regulated area was not established where methyl chloromethyl ether, an OSHA-regulated carcinogen, was available for use.
 - Access to where methyl chloromethyl ether was present has not been restricted to authorized individuals only.
 - Exhaust air from laboratory hoods where methyl chloromethyl ether is used was discharged to the external environment without first being decontaminated.
 - Individuals working in areas where methyl chloromethyl ether was present were not required to wear full body protective clothing.
 - Individuals working with methyl chloromethyl ether were not provided with and required to wear full-face, supplied-air respirators.
 - Rooms where methyl chloromethyl ether was used or available for use were not maintained under negative pressure.
 - Signs were not posted warning of cancer-suspect agent and designating required personal protective equipment to be worn before entry to the area.
 - Training and indoctrination for employee using methyl chloromethyl ether were not provided.
 - Emergency procedures were not prescribed or posted in order for individuals to familiarize themselves regarding the proper response to take in the event of an accidental release of methyl chloromethyl ether.
 - Medical surveillance program has not been established for individuals who handled, used, or were exposed to methyl chloromethyl ether.

CONCERN: See Concern IH.2-4.

- FINDINGS:**
- A comprehensive chemical inventory which identified all regulated chemical carcinogens and their locations in the facilities had not been performed.
 - A comprehensive review of the adequacy of regulated chemical carcinogen storage areas was not performed.

- Usage of regulated chemical carcinogens, including quantities in storage and amounts used, was not documented or tracked.
- Controlled access to regulated chemical carcinogens was not limited. There was no "sign-in/sign-out" system implemented to track individual users of these chemicals.
- Regulated areas had not been universally established for areas containing OSHA-designated carcinogens.
- Individuals using carcinogens had not received training and indoctrination concerning the proper handling of these materials.

CONCERN: See Concern IH.2-4.

- FINDINGS:**
- An area in the cafeteria had broken asbestos containing ceiling tiles.
 - Insulated steam pipe elbows located in the cafeteria food storage room contain asbestos material that was in disrepair.
 - Exposure monitoring for all asbestos work was not being conducted. Asbestos products such as asbestos rope, bench tops, and gloves and apparatus are still being used.
 - LBL recognized this as a deficiency in their self-assessment and had initiated corrective action during this appraisal.

CONCERN: See Concern IH.2-4.

- FINDINGS:**
- LBL did not conduct initial monitoring for lead in the soldering and lead-melting operations.
 - LBL did not inform employees of the contents of the lead standard, Appendices A and B of 29 CFR 1910.1025.
 - LBL did partially acknowledge this deficiency in their self-assessment.

CONCERN: See Concern IH.2-3.

- FINDINGS:**
- LBL did not conduct initial monitoring for benzene in laboratories where it is present.
 - LBL did not provide information and training regarding the requirements of 29 CFR 1910.1028 as it relates to working with benzene.
 - LBL did not specifically acknowledge this deficiency, but did in general terms of monitoring.

CONCERN: See Concern IH.2-4.

- FINDINGS:**
- LBL did not conduct initial monitoring for formaldehyde in laboratories where it is present.
 - LBL did not provide information and training regarding the requirements of 29 CFR 1910.1048 as it relates to working with formaldehyde.
 - LBL did not specifically acknowledge this deficiency, but did in general terms for monitoring.

CONCERN: See Concern IH.2-4.

NOTE: Noncompliance with this performance objective will be documented utilizing the OSHA Form 1B format. A compilation of these completed forms will be provided as an Appendix to the Tiger Team Assessment Report and to the TSA.

WS.4 COMPLIANCE WITH OCCUPATIONAL SAFETY STANDARDS FOR GENERAL INDUSTRY

PERFORMANCE OBJECTIVE: Workplaces should be free of uncontrolled physical hazards and be in compliance with DOE-prescribed occupational safety standards.

- FINDINGS:**
- Unalloyed copper tubing was used to plumb acetylene gas.
 - Acetylene and copper react to form explosive cuprous acetylides.
 - LBL did not identify the deficiency.

CONCERN: Lawrence Berkeley Laboratory does not comply with
(WS.4-1) 29 CFR 1900.253, Oxygen-Fuel Gas Welding and Cutting, in that
(H1/C1) incompatible materials could form an explosive substance.
CAT II

- FINDINGS:**
- Emergency lighting and exit signs were less than adequate or improper in several areas inspected.
 - Means of egress were blocked or restricted in several areas inspected.
 - Passage doors which do not afford a means of egress were not posted "Not an Exit."
 - LBL identified this as a deficiency.
 - The substance of this concern was expressed in the LBL self-assessment and the proposed corrective action plan is adequate. Implementation of the plan will correct the identified problems.

CONCERN: Lawrence Berkeley Laboratory does not fully comply with
(WS.4-2) 29 CFR 1910, Subpart E, Means of Egress.
(H2/C1)

- FINDINGS:**
- Safety showers and eyewash stations were not placed where splash hazards exist. Eyewash squeeze bottles do not provide an adequate volume of deluge.
 - The substance of this concern was expressed in the LBL self-assessment and the proposed action plan is adequate. Implementation of the plan will correct the identified problems.

CONCERN: Safety showers and eyewash stations at the Lawrence Berkeley
(WS.4-3) Laboratory do not fully comply with 29 CFR 1910.151(c), Medical
(H2/C1) Services and First Aid.

- FINDINGS:**
- LBL does not have adequate machine guarding for flying chips, rotating parts, in-going nip points and point-of-operation.

- The substance of this concern was expressed in the LBL self-assessment and the proposed correction action plan is adequate. Implementation of the plan will correct the identified problems.

CONCERN: Machine guarding at Lawrence Berkeley Laboratory does not fully
(WS.4-4) comply with 29 CFR 1910, Subpart O, General Requirements of All
(H2/C1) Machines.

- FINDINGS:**
- In many areas inspected, temporary wiring was used where permanent wiring installations are required.
 - There were deficiencies in marking or labeling of panels and wiring.
 - There was a general lack of ground fault circuit interrupters in most areas required by DOE within 6 feet of water supplies.
 - In many areas inspected, poor wiring techniques using in-wall junction boxes for exterior application and as outlet boxes for extension cords were observed.
 - LBL identified this as a deficiency.
 - The proposed corrective action plan is adequate. Implementation of the plan will correct the identified problems.

CONCERN: Lawrence Berkeley Laboratory does not fully comply with
(WS.4-5) 29 CFR 1910, Subpart S, Electrical Standard.
(H2/C1)

- FINDINGS:**
- Flammable liquids were not always stored in approved cabinets.
 - LBL identified this as a deficiency.

CONCERN: Lawrence Berkeley Laboratory does not fully comply with
(WS.4-6) 29 CFR 1910.106, Flammable and Combustible Liquids.
(H2/C1)

- FINDINGS:**
- Fire extinguishers were not properly inspected nor hydrostatically tested.
 - Fire extinguishers were located where they were not clearly visible or identified.
 - Fire extinguishers were mounted at inaccessible locations.
 - LBL did not identify the deficiencies.

CONCERN: The fire extinguisher program at Lawrence Berkeley Laboratory
(WS.4-7) does not fully comply with 29 CFR 1910.157, Portable Fire
(H3/C1) Extinguisher.

- FINDINGS:**
- Aisles were not always kept clear, nor wide enough.
 - Aisles were not always identified where required.
 - Load ratings for industrial floors were not always posted as required.
 - LBL partially identified the deficiency.

CONCERN: Aisle widths and floor loading labels at Lawrence Berkeley
(WS.4-8) Laboratory do not comply with 29 CFR 1910.22, Subject C,
(H3/C1) General Requirement.

- FINDINGS:**
- Hoisting mechanisms which include chain hoist and block and tackles were not used as engineered.
 - In-house-designed lifting devices were neither engineered nor inspected by a competent person (per OSHA standards).
 - Cranes do not receive inspections as required.
 - Rigging is not inspected as required.
 - LBL identified this as a deficiency.
 - The proposed corrective action plan is adequate. Implementation of the plan will correct the identified problems.
 - See Concern TC.8-1.

CONCERN: See Concern OS.2-2.

- FINDINGS:**
- Flash arrestors were not provided for oxygen-fuel gas assemblies.
 - Hosing for oxygen-fuel gas was not properly attached.
 - LBL did not identify the deficiency.

CONCERN: Lawrence Berkeley Laboratory does not fully comply with
(WS.4-9) 29 CFR 1910.253, Welding, Cutting and Brazing.
(H1/C1)

- FINDINGS:**
- Compressed air used for cleaning is not consistently reduced to 30 psi or less.
 - Frayed electrical cords on appliances and equipment were observed.
 - Mushroomed heads on hammers (deformed surface where pieces of the head could fly off and cause injury) were not dressed to eliminate flying chip hazards.

- Chip guards were not used on lathers, drills, and compressed air used for cleaning equipment.
- LBL did identify the deficiencies in their self-assessment.

CONCERN: Hand tools, compressed air and portable electrical equipment at
(WS.4-10) the Lawrence Berkeley Laboratory do not fully comply with
(H2/C1) 29 CFR 1910.242, Hand and Portable Powered Tools and Equipment,
General.

NOTE: Noncompliance with this performance objective will be documented
utilizing the OSHA Form 1B format. A compilation of these
completed forms will be provided as an Appendix to the Tiger Team
Assessment Report and to the TSA.

WS.5 COMPLIANCE WITH OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR CONSTRUCTION INDUSTRY

PERFORMANCE OBJECTIVE: Construction activities should be free of uncontrolled physical and health hazards, and should be in compliance with DOE-prescribed occupational safety and health standards relating to construction.

- FINDINGS:**
- Scaffolding was observed without proper handrail and/or fall protection.
 - A newly constructed facility was designed without attention to inherent fall hazards.
 - Aerial lift equipment was not equipped with lanyards which means the equipment was probably not being used during aerial lifts. The contractor was told about the potential problem. No aerial lifts were observed being performed without proper protection prior to mentioning this to the contractor.
 - LBL identified this as a deficiency.
 - The proposed corrective action plan is adequate. Implementation of the plan will correct the identified problem.

CONCERN: Lawrence Berkeley Laboratory does not provide effective control of fall protection to workers/employees during construction activity as required by 29 CFR 1926, Subpart L and M.
(WS.5-1)
(H1/C1)

- FINDINGS:**
- A metal ladder in use was not secured properly and needed repair.
 - The top section of an extension ladder was being used as a stand-alone ladder.
 - Several electrical extension cords were observed in need of repair.
 - Several power hand tools in need of repair were observed.
 - LBL identified this as a deficiency.
 - The proposed corrective action plan is adequate. Implementation will effectively correct this problem.

CONCERN: Lawrence Berkeley Laboratory does not assure that construction contractors are using equipment in good repair and in compliance with Occupational Safety and Health Administration regulations as required by 29 CFR 1926.20, General Safety and Health Provisions.
(WS.5-2)
(H2/C1)

- FINDINGS:**
- Temporary light stringers were observed passing through closed doors subjecting them to possible damage.

- Temporary light stringers were observed without proper light guards in place, exposing employees to hazard.
- Electrical 110 VAC wall outlets were observed without proper covers or protection.
- LBL did not identify deficiencies in construction electrical safety.
- LBL did identify deficiencies for the general plant.

CONCERN:
(WS.5-3)
(H2/C1)

Lawrence Berkeley Laboratory does not enforce construction electrical standards as required by 29 CFR 1926, Subpart K, Electrical.

WS.6 PERSONNEL COMMUNICATION PROGRAM

PERFORMANCE OBJECTIVE: Site/facility personnel should be adequately informed of chemical, physical and biological stresses that can be encountered in their work environment.

- FINDINGS:**
- Some hazardous chemicals were not labeled or labeled incorrectly in several areas of the facility.
 - LBL hazard communication standard training did not meet the requirements as specified in 29 CFR 1910.1200, Hazard Communication. Not all employees have received the training.
 - LBL did not determine employee exposure levels for many chemicals.
 - LBL did not develop, implement and maintain a written hazard communication program for each workplace.
 - Material Safety Data Sheets were not always available.
 - Improper storage of incompatible chemicals was observed.
 - There is no Chemical Hygiene Plan that has been developed by the laboratory.
 - LBL did acknowledge the hazard communication deficiencies and the deficiencies in the laboratory standards.
 - See Concern TC.4-1.
 - See Concern IH.6-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

CONCERN: **Lawrence Berkeley Laboratory does not fully comply with**
(WS.6-1) **29 CFR 1910.1200, Hazard Communication, or 29 CFR 1910.1450,**
(H2/C1) **Occupational Exposures to Hazardous Chemicals in Laboratories.**

NOTE: Noncompliance with this performance objective will be documented utilizing the OSHA Form 1B format. A compilation of these completed forms will be provided as an Appendix to the Tiger Team Assessment Report and to the TSA.

4.5.14 Industrial Hygiene

4.5.14.1 Overview

The assessment of the Industrial Hygiene functional area addressed each of the six performance objectives. Concerns were identified in the areas of IH.1 Organization and Administration, IH.2 Procedures and Documentation, and IH.3 Management of Health Concerns. No concerns were identified in the areas of IH.4 Surveillance of Safety Concerns, IH.5 Compliance with Occupational Health Standards, or IH.6 Personnel Communication Program. The appraisal was conducted through facility walkthroughs, review of occupational safety program documentation, interviews with technical safety staff, and interviews with research and maintenance personnel. Facilities visited included Bldgs. 2, 3, 26, 27, 42, 50, 50A, 50B, 54, 66, 70, 70A, 75B, 76, 77, 81, 90, Advanced Light Source Project, and the University of California at Berkeley, Hildebrand Building. Findings and concerns from the Worker Safety functional area of this assessment were also considered in developing programmatic concerns.

There were no conditions observed during the appraisal which were immediately dangerous to life or health although a number of unsafe practices and programmatic deficiencies were observed. The Laboratory safety record is good compared to general industry but performance falls near the midpoint when compared to other Department of Energy (DOE) funded laboratories. In general, the Industrial Hygiene Program at the Lawrence Berkeley Laboratory (LBL) site has suffered from organizational and programmatic deficiencies. The level of industrial hygiene staffing at the Laboratory has been dramatically deficient.

Within the past few months, LBL has undertaken a substantial effort to perform a self-assessment of conditions at the Laboratory as they relate to all aspects of the safety program including industrial hygiene. The Laboratory identified approximately 20,000 deficiencies which are being corrected as expediently as possible. Most of the deficiencies noted in this appraisal were noted in the self-assessment to varying degrees of completeness. To a large extent, the concerns and comments in the overview of the Occupational Safety functional area of this assessment are applicable to Industrial Hygiene functional areas. Specifically, the issues relating to a lack of direction from management and inappropriate influence of line organizations on health and safety policy from the committee system are applicable to Industrial Hygiene as well as Occupational Safety.

A number of requisite aspects of the Industrial Hygiene Programs reviewed at the Laboratory are substantially deficient or undocumented. These include the carcinogen program, the confined space program, the periodic monitoring program, the lead program, and the respiratory protection program. Other programs, such as the laser program, were substantially improved from the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

The LBL confined space program is critical to personnel safety, but is substantially deficient with respect to mandatory requirements. The Laboratory has not established a definition of what constitutes a confined space, it does not have an inventory of confined spaces, it has not posted confined spaces and it does not have a viable confined space training program. This situation was identified in the Technical Safety Appraisal of the

Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) and poses a substantial health and safety risk which has not been successfully addressed by the Laboratory.

Otherwise, the Laboratory has been successful in minimizing or controlling acute health and safety risks to Laboratory employees. The issues of compliance, documentation, and monitoring have apparently not been a priority issue with the San Francisco Operations Office (SAN) or Laboratory management.

Concerns IH.2-1, IH.3-1, IH.5-1, IH.5-2, IH.5-3, and IH.6-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) were reviewed in conjunction with the appraisal. Action on Concerns IH.3-1, IH.5-1, and IH.5-2 was considered complete and closure of these concerns is recommended. There has been progress on Concerns IH.2-1, IH.5-3, and IH.5-1, but serious deficiencies remain and progress has not been sufficient to recommend closure.

4.5.14.2 Findings and Concerns

IH.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site and facility organization and administration should ensure effective implementation and control of the industrial hygiene program.

- FINDINGS:**
- Full-time professional industrial hygiene staffing at the Laboratory consists of one Industrial Hygienist and three Safety Engineers for the entire Laboratory site. There are no full-time safety or industrial hygiene consultants onsite.
 - Because of limited professional staff, routine inspections of all facilities have not been performed on a periodic basis. Some facilities perceived to be of high risk are visited annually, but others may not be scheduled at all. In some cases only a sampling of buildings from each division are visited.
 - The Industrial Hygienist reported having been able to attend only one safety course (a laser safety course) within his 18 months of employment due to a high workload and the absence of backup industrial hygiene support.
 - Much of the safety and industrial hygiene program documentation, including the LBL Health and Safety Manual (PUB 3000), is sparse and mandatory requirements are frequently not addressed. Staff resources to accomplish this were reportedly not available.
 - There is not a current sitewide inventory of hazards at LBL. Asbestos inventories have been completed at only about 33 percent of the buildings onsite and funding for the remaining buildings has not been allocated. Completion of hazards inventories was reportedly awaiting availability of additional staff resources.
 - The LBL Health and Safety Manual (PUB-3000) has not been kept current.
 - Also see Concern OA.2-3.
 - The personnel exposure database has not been revised since 1989 and periodic monitoring has not been performed. This was reported to be due to the nonavailability of staff resources.
 - The substance of this concern was fully expressed in the LBL self-assessment. A formal action plan was not available.

CONCERN: Insufficient resources have been allocated to the occupational
(IH.1-1) safety and industrial hygiene programs to meet mandatory
(H2/C1) Department of Energy and Occupational Safety and Health
Administration requirements as mandated by DOE 5480.10.

IH.2 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Procedures and documentation should provide appropriate direction, record generation, and support for the industrial hygiene program.

- FINDINGS:**
- Various aspects of the industrial hygiene program at the Laboratory including hazard communication, carcinogen control and the respiratory protection program are not defined in accordance with DOE-mandated requirements.
 - The substance of this situation was partially addressed in the Laboratory self-assessment.

CONCERN: See Concern IH.2-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

- FINDINGS:**
- LBL has not performed a sitewide inventory of confined spaces.
 - Safety policy in the LBL Health and Safety Manual (PUB-3000) does not define requirements for posting of confined spaces.
 - LBL has not established a definition of a confined space which is consistent with ANSI Z117.1-1989.
 - There was not a formal training program currently documented for permit-required confined spaces.
 - See Section 4.5.3, OP.5.
 - Areas were observed by the team in which work had been recently performed without any evidence of adequate safety permits or other controls.
 - See Section 4.5.5, TC.5.
 - The substance of this concern was identified in the LBL self-assessment.

CONCERN: Lawrence Berkeley Laboratory has not defined or implemented a permit-required confined space program as required by DOE 5480.4 and ANSI Z117.1-1989.
(IH.2-2)
(H1/C1)
CAT II

- FINDINGS:**
- Work with lead has been conducted in Bldg. 77 with only infrequent monitoring having been performed. The one air sample collected was taken in 1985.
 - LBL has not documented a lead program in the LBL Health and Safety Manual (PUB-3000).

- LBL employees working with lead have not been regularly identified to the LBL medical staff or included in an appropriate medical surveillance program.
- Also see Section 4.5.13, WS.3.
- The substance of this concern was addressed in the Laboratory self-assessment.

CONCERN: Lawrence Berkeley Laboratory has not established or implemented a
(IH.2-3) program to ensure compliance with the Occupational Safety and
(H2/C1) Health Administration lead standard (29 CFR 1910.1025).

- FINDINGS:**
- There have not been designated or regulated carcinogen areas established for control of carcinogens in all areas where Occupational Safety and Health Administration (OSHA) or American Conference of Governmental Industrial Hygienists (ACGIH) carcinogens are handled as required by DOE 5480.10.
 - LBL has not maintained logs of personnel working with chemical carcinogens in regulated areas as required by 29 CFR 1910, Subpart Z or DOE 5480.10.
 - LBL employees working with OSHA and ACGIH chemical carcinogens have not been regularly identified to the LBL medical staff or included in an appropriate surveillance program.
 - LBL has not defined or implemented a proactive carcinogen monitoring program.
 - Laboratory policy on beryllium does not address the carcinogenic potential of beryllium or its compounds.
 - See also Section 4.5.13, WS.3.
 - The substance of this concern was partially addressed in the Laboratory self-assessment.

CONCERN: The Lawrence Berkeley Laboratory chemical carcinogen control
(IH.2-4) program was deficient in meeting Department of Energy and
(H1/C1) Occupational Safety and Health Administration requirements
CAT II mandated by DOE 5480.10.

- FINDINGS:**
- Lead fabrications were being conducted in an area outside Bldg. 77 without monitoring as required by 29 CFR 1910.1025.
 - All monitoring conducted was reportedly as a result of employee concerns or requests for support from researchers.
 - Work with inorganic arsenic was being performed in Bldg. 2 without monitoring or a monitoring plan which is required for compliance with 29 CFR 1910.1018.

- The substance of this concern was fully addressed in the Laboratory self-assessment.

CONCERN:
(IH.2-5)
(H2/C1)

Lawrence Berkeley Laboratory has not established a program of periodic chemical monitoring as required by DOE 5480.10 and 29 CFR 1910.

FINDINGS:

- The LBL respiratory protection program involves only qualitative fit tests; quantitative fit tests are not performed.
- Personnel monitoring is not performed routinely or periodically to provide information on concentrations to assist in recognition or evaluation of respiratory hazards as required by ANSI Z88.2-1980.
- Respirators are issued for a period of 1 year without provisions for assuring that the respirator will be properly sanitized, maintained, or stored in accordance with ANSI Z88.2-1980.
- Few full-face respirators are issued although lead, carcinogens, and other materials are handled without regular monitoring to document exposure levels.
- The substance of this concern was partially addressed in the Laboratory self-assessment.

CONCERN:
(IH.2-6)
(H2/C1)

The Lawrence Berkeley Laboratory respiratory protection program has not been defined and implemented in a manner which ensures compliance with DOE 5480.4 and ANSI Z88.2-1980.

IH.3 MANAGEMENT OF HEALTH CONCERNS

PERFORMANCE OBJECTIVE: Chemical, biological, physical, and/or other environmental stresses arising in the workplace should be identified, evaluated, and controlled.

- FINDINGS:**
- Annual examinations of most LBL employees are voluntary, even if the employees work with regulated carcinogens, lead, or other hazards where annual physicals are required by OSHA.
 - Physical examinations of laser workers and carcinogen workers are frequently not performed until after the work with the hazard has begun.
 - Termination physicals mandated by ANSI Z136.1 for laser workers are frequently not performed.
 - During the appraisal, several persons were identified by the team who had not been previously identified in the medical surveillance program for carcinogen workers.
 - See Concern MS.3-2.
 - The substance of this concern was partially addressed in the Laboratory self-assessment.

CONCERN:
(IH.3-2)
(H2/C1)

Lawrence Berkeley Laboratory has not established a system which ensures that employees exposed to physical, biological, or chemical hazards are enrolled in a medical surveillance program as required by Department of Energy or the Occupational Safety and Health Administration.

4.5.15 Occupational Safety

4.5.15.1 Overview

The assessment of the Occupational Safety functional area addressed each of the five performance objectives. Concerns were identified in the areas of OA.1 Organization and Administration, OS.2 Procedures and Documentation, and OS.4 Surveillance of Safety Concerns. No concerns were identified in the performance areas of OS.3 Management of Safety Concerns or OS.5 Personnel Communication Program. The appraisal was conducted through facility walkthroughs, review of Occupational Safety Program documentation, interviews with technical safety staff, and interviews with research and maintenance personnel. Facilities visited included Bldgs. 2, 3, 26, 27, 42, 50, 50A, 50B, 54, 66, 70, 70-A, 75B, 76, 77, 81, 90, the Advanced Light Source project, and the University of California at Berkeley, Hildebrand Building. Findings and concerns from the Worker Safety functional area of this assessment were also considered in developing programmatic concerns.

There were no conditions observed during the appraisal which were immediately dangerous to life or health although a number of unsafe practices and programmatic deficiencies were observed. The Laboratory safety record is good compared to general industry, but performance falls near the midpoint when compared to other Department of Energy (DOE) funded laboratories. In general, the occupational safety program at the Lawrence Berkeley Laboratory (LBL) site has suffered from organizational and programmatic deficiencies. Staffing resources allocated to occupational safety have been minimal which is believed to have contributed to programmatic deficiencies.

Within the past few months, LBL has undertaken a substantial effort to perform a self-assessment of conditions at the Laboratory as they relate to all aspects of the safety program including occupational safety. The Laboratory identified approximately 20,000 deficiencies which are being corrected as expeditiously as possible. Most of the deficiencies noted in this appraisal were noted in the self-assessment to varying degrees of completeness. Two aspects of the deficiencies did not, however, appear to have been fully recognized.

First, although the Laboratory recognized many deficiencies, there has been insufficient guidance by Laboratory management to facilitate correction of identified deficiencies. The Laboratory safety management structure is weak, safety program documentation is deficient, and staff are confused on how to proceed with implementation of corrective actions. Clearly, the desire and intent to correct deficiencies is present, but the management tools required to implement corrective action simply are not available. Consequently implementation is incomplete.

The eye protection program for laser users serves as an example of this issue. There is a mandatory DOE requirement that laser eye examinations be given to users of Class 4 lasers before beginning work with lasers and upon termination. There is no management tool to ensure that it is actually done and experience has shown that the examinations are frequently late or not done at all.

Second, much of the Laboratory safety policy has been drafted by a committee system whose membership consists primarily of senior line organization personnel. Ostensibly, this has been to foster a peer review atmosphere with which research personnel are familiar and comfortable and to bring scientific expertise to bear on issues not addressed by existing standards and regulations. In effect, however, the system facilitates development and enforcement of safety policy by line organizations with little involvement or oversight by professional safety personnel.

In practice, some committee developed programs such as the hoisting and rigging program have substantial deficiencies. This program has not developed along requirements mandated by DOE. The program does not identify requirements for high consequence lifts, there is no provision for testing of under-the-hook equipment, and mandatory inspections and certifications are not being performed or documented.

Concern OS.5-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) was reviewed as a part of the appraisal. Action in response to this concern was judged to be sufficiently complete to recommend closure of the concern. Some aspects of this concern are, however, addressed in this report.

4.5.15.2 Findings and Concerns

OS.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site and facility organization and administration should ensure effective implementation and control of the occupational safety program.

- FINDINGS:**
- Responsibilities of the Environmental Protection, Health and Safety Division (EPHS) primarily include consulting, monitoring, and inspection functions and are not focused toward establishing programs or ensuring complete compliance with DOE requirements.
 - There is no uniform policy relating to revision of the LBL Health and Safety Manual (PUB-3000). Revisions are submitted by individuals, various safety committees, and by the Environmental and Safety Hazards Control Department (ESHC) or scientific staff members.
 - There is no documented program defining authority and responsibilities for preparation and revision of health and safety policy documents; revisions are submitted by individuals, various safety committees, and by ESHC or individual scientific staff members.
 - In areas such as the confined space program, adequate ES&H guidance had not been provided by management and some individual divisions were in the process of developing confined space programs themselves.
 - The substance of this concern was partially addressed in the Laboratory self-assessment.

CONCERN: See Concern OA.1-4.

- FINDINGS:**
- The Safety Review Committee (SRC) reviews and approves requests for variances from the Laboratory safety guidelines and procedures.
 - The Biological Safety Committee establishes and evaluates guidelines for systems relating to containment, sample handling, and disposal of biological hazardous materials.
 - The SRC is staffed primarily by line personnel from the research, engineering, and maintenance organizations.
 - Authority for preparation and revision of health and safety policy documents is not clearly defined; revisions are submitted by individuals, various safety committees, and by ESHC or individual scientific staff members.

- The substance of this concern was not addressed in the LBL self-assessment.

CONCERN:
(OS.1-1)
(H3/C2) The Safety Review Committee charter provides the authority to approve waivers from all safety requirements in the LBL Health and Safety Manual (PUB 3000).

- FINDINGS:**
- The current Memorandum of Understanding between the Laboratory and the University of California relating to safety responsibility for Laboratory employees performing DOE-funded work in University facilities does not require the University to follow DOE-mandated requirements in DOE 5480.4.
 - The University only follows the California Occupational Safety and Health Administration requirements, which are less restrictive in some cases than the DOE-mandated requirements.
 - A number of Occupational Safety and Health Administration (OSHA) type compliance items were identified during the appraisal, including electrical, chemical, hazard communication, and laboratory safety items.
 - Walkthroughs and inspections of University facilities by Laboratory safety and industrial hygiene personnel were infrequent.
 - The substance of this Concern was addressed in the LBL self-assessment.

CONCERN:
(OS.1-2)
(H3/C2) The Laboratory Occupational Safety and Industrial Hygiene Program as presently documented does not address safety requirements for Lawrence Berkeley Laboratory personnel performing work in University of California facilities.

OS.2 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Procedures and documentation should provide appropriate direction, record generation, and support for the occupational safety program.

- FINDINGS:**
- Both the Safety and Health Subteam assessment and the LBL internal assessment identified numerous OSHA type deficiencies.
 - LBL does not have a documented program which ensures that a systematic inspection of all LBL facilities for OSHA-related deficiencies will be performed on a periodic basis.
 - LBL does not have a documented sitewide system for tracking deficiencies to ensure they are corrected in a timely manner; each division has independently established its own system.
 - There are few controls which would ensure that code or OSHA compliance is adequately considered at the start of a job or project.
 - Although there is a system for "hot work" permits, LBL does not use a safe work permit system to facilitate a proactive safety review of other activities. The confined space permit program currently documented is not effective.
 - The LBL Health and Safety Manual frequently does not reference DOE Orders, OSHA, or the National Electrical Code as being mandatory at LBL.
 - Small-tag job reviews and construction project inspections are informal and not well documented.
 - The substance of this concern was addressed in the LBL self-assessment and is being pursued in accordance with established milestones.

CONCERN: (OS.2-1)
(H2/C2) Lawrence Berkeley Laboratory has not fully defined, established, or documented a sitewide system for the systematic identification and correction of occupational safety and health related deficiencies on a continuing basis.

- FINDINGS:**
- Monthly certifications of hoists and cranes were not being documented as required by 29 CFR 1910.179.
 - In some areas, logs of use of hoists and cranes were not being maintained in accordance with LBL internal requirements.
 - Records for required frequent and periodic inspections were completed without signatures or dates.

- LBL had only one mobile crane. Consequently, heavy lifts often involved the use of an outside contractor. There was no requirement for the contractor to provide evidence that the crane or the operator met the requirements of OSHA or the DOE Hoisting and Rigging Manual.
- Hoisting and rigging equipment under 3 tons in capacity were not subject to LBL load testing requirements.
- Under-the-hook lifting equipment is magnafluxed every 4 years but not periodically load tested or inspected as recommended by the DOE Hoisting and Rigging Manual.
- Since magnafluxing and load testing are performed at 4-year intervals, there is no assurance that load testing will be performed within 1 year of a high consequence lift as recommended by the DOE Hoisting and Rigging Manual.
- See Concerns QV.7-1 and TC.8-1.
- See Section 4.5.13, WS.4.
- The substance of this concern was partially addressed in the Laboratory self-assessment.

CONCERN:
(OS.2-2)
(H2/C1)
CAT II

Program documentation, monthly inspections of equipment, a lack of high consequence lift requirements, and rigging practices do not conform to Occupational Safety and Health Administration requirements or DOE 5480.4.

FINDINGS:

- A number of portable and permanent ladders were observed at the LBL site which were in poor repair or had not been designed in compliance with 29 CFR 1910, Subpart D.
- The LBL Ladder Safety Program documented in the LBL Health and Safety Manual does not address permanent ladders.
- The substance of this concern was not addressed in the LBL self-assessment.

CONCERN:
(OS.2-3)
(H2/C1)

The Lawrence Berkeley Laboratory program for control of permanent and portable ladders has not been effective in maintaining ladders in accordance with Occupational Safety and Health Administration requirements in 29 CFR 1910, Subpart D.

FINDINGS:

- Side shields for safety eye wear are not a documented requirement in the LBL Health and Safety Manual. They are required in some areas but not in others.
- Some shops and laboratories require safety eye wear for "hazardous operations" as opposed to establishing areas where eye protection is mandatory.

- Individuals were observed working around a Class 4 open laser installation without goggles as required by the Operational Safety Procedure for the operation.
- Individuals were observed in shop areas without safety eye wear and/or side shields as required by postings.
- Laser eye exams are frequently not performed prior to beginning work with lasers or upon termination as required by ANSI Z136.1-1986.
- See Concern OA.1-4.
- The substance of this concern was partially addressed in the LBL self-assessment.

CONCERN:
(OS.2-4)
(H2/C1)

The eye protection program at the Lawrence Berkeley Laboratory is not clearly defined or uniformly implemented in accordance with DOE 5480.4 and ANSI Z136.1-1986.

OS.4 SURVEILLANCE OF SAFETY CONCERNS

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to measure safety performance and ensure the continued effectiveness of controls.

- FINDINGS:**
- OSHA logs were maintained as required but contained errors including arithmetic errors in computing totals and errors in transposition of data between pages.
 - The substance of this concern was not addressed in the LBL self-assessment.

CONCERN: OSHA logs were not accurately maintained in accordance with
(OS.4-1) 29 CFR 1904.
(H3/C1)

4.5.16 Fire Protection

4.5.16.1 Overview

The seven performance objectives contained in the Fire Protection functional area were addressed in this appraisal. A Technical Safety Appraisal (TSA) of fire protection was conducted during onsite visits of June 26-30 and July 10-21, 1989. The results are contained in the appraisal report, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

Action plans, both developed and under development, related to the findings and concerns of the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) were provided to the appraiser and resulted in this appraisal being conducted as a followup on the findings and concerns of the previous appraisal. This followup entailed evaluation of the planned actions to determine if they would adequately correct the identified deficiencies, timeliness of schedules for completion of the actions, and progress to-date on the actions. As a result of this review, 8 of the 22 concerns in DOE/EH-0096 are recommended for closure. In addition, although not recommended for closure, Concern FP.2-1 has been recommended for reduction from Category II to Category III.

The assessment of Fire Protection was conducted through site visits to several Lawrence Berkeley Laboratory (LBL) facilities; interviews with various LBL staff ranging from top management positions to the working level position; and a review of manuals, reports, and records. Also, time was spent on evaluating the aspects of management, administration, and program implementation of the Fire Protection Program.

Evaluation of the Fire Protection Program consisted of reviewing the facility fire protection inspections and the resulting correction action, evaluations of the preventive maintenance of fire protection systems, Fire Marshal activities, design review, fire prevention activities, and management of the LBL Fire Protection Program. The interaction of the San Francisco Operations Office (SAN) management in the oversight of this important LBL program was also investigated. This Fire Protection Program review resulted in findings and concerns in some of the performance objectives of the total program. Lack of timely corrective actions on the concerns of the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) indicates that the Fire Protection Program at LBL still needs improvement. However, LBL has hired some new fire protection staff and has begun to lay the groundwork that can result in a very good program.

LBL already has some of the assets necessary to achieve a good program, but lacks the necessary staffing and the full implementation of subtier programs. Some very good fire protection capabilities that exist or are planned are:

- There are some very dedicated, well-qualified people presently in fire protection positions. Some dedicated fire fighters have even pursued fire fighter training, using their own time and money to remain proficient. This is a negative reflection on LBL management support of the Fire Protection Program, because this policy could result in other fire fighters not maintaining the required

proficiency levels. Also, there is a Fire Marshall and a Fire Protection Engineer that have been recently hired that have excellent qualifications.

- LBL has taken contractual action to hire a third party to do in-depth fire protection facility surveys of all the facilities onsite.
- The need for another Fire Protection Engineer has been identified and plans are in place to hire this engineer for the Fire Department. This engineer will be qualified to do in-depth fire protection facility surveys, maintenance evaluations, design reviews, trend analysis, and root cause problem solving.
- The maintenance activities now accomplished by the Fire Department are being transferred to the Construction and Maintenance Department and the two positions that performed these duties are being reclassified and the positions will remain in the Fire Department. LBL plans to use them to hire the Fire Protection Engineer and may consider a Fire Department Training Officer.
- An inspection program for fire prevention and fire risk reduction has recently began. The delegation of the necessary authority and responsibility to make this program successful has been done.

Other specific areas needing improvement are:

- The operation of the Fire Department is not formalized and is not assessed with measurable performance objectives.
- Each operation required to be performed by the Fire Department does not have a detailed operating procedure.
- The fire fighters do not have a program with formal certifiable training designed to keep them up-to-date.
- The Fire Department is understaffed to perform the functions assigned.
- The fire protection program does not support an aggressive, results-oriented fire protection environment at LBL.

The three fire inspections of LBL facilities by SAN are of high quality. However, in order to enhance LBL fire protection efforts, additional oversight activities should be undertaken by SAN. For example, SAN should periodically assess the overall management of the fire protection program at LBL. SAN should also avoid direct involvement in work that is primarily the responsibility of the Laboratory.

The LBL self-assessment addressed most of the criteria found in the fire protection performance objectives. However, all but one of their findings were previously covered in the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

4.5.16.2 Findings and Concerns

FP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Fire Protection organization and administration should ensure the effective implementation and control of fire protection equipment and activities.

- FINDINGS:**
- The fire protection program is organized into two separate organizations within LBL. The fire protection engineering work associated with new design and modification of facilities is located in Plant Engineering. All of the other functions of the fire protection program are located within the Fire Department.
 - The duties of the fire protection engineering position in Plant Engineering Department is established and documented in a job description.
 - Risk reduction and fire protection design has been assigned to Plant Engineering. Because the Fire Protection Engineer is administratively managed by the Mechanical Section in Plant Engineering, his decisions affecting design specifications and design review can be unduly influenced by cost constraints, short deadlines, and opposing objectives.
 - This concern is not addressed in the LBL self-assessment.

CONCERN: Independent design review of fire protection construction projects can be adversely affected by the fact that the Fire Protection Engineer is administratively under the Mechanical Engineering Section in Plant Engineering.
(FP.1-6)
(H2/C2)

- FINDINGS:**
- There is substantial evidence that the official LBL policy statement and direction for the performance of the fire protection program is properly developed. However, this policy and program direction is relatively new and is continuing to be fine-tuned.
 - Detailed implementing procedures that will further refine the program are still not developed.
 - There are still gaps in the overall program, which are evidenced by incomplete training programs, incomplete fire protection facility inspections, and lack of formalized risk reduction programs.
 - Responsibilities and authorities contained in the Health and Safety Manual (PUB-3000) do not match the way business is conducted. For example, Section 12 of PUB-3000 does not indicate design review is a responsibility of the Plant Engineering Department, and does not adequately describe the overall LBL Fire Protection Program.

- The fire protection program at LBL is fragmented among several manuals, internal procedures, and managers. The flow of implementation requirements for the fire protection program can not be traced from top policy statements to implementing procedures for each function and/or responsibility throughout the Laboratory.
- This concern is not addressed in the LBL self-assessment.

CONCERN:
(FP.1-7)
(H2/C2)

There is no comprehensive documented fire protection program from policy to implementation. (Also see Concern OA.1-4.)

FP.2 LIFE PROTECTION

PERFORMANCE OBJECTIVE: All facilities onsite should provide adequate life safety provisions against the effects of fire.

- FINDINGS:**
- Visits to several facilities indicate some improvement in housekeeping in the facilities from the previous TSA. It is apparent that the effort to comply with the Life Safety Code has only had recent emphasis. Some corrective actions have recently occurred during this appraisal. As an example, items, such as flammable storage cabinets, that were located in exit ways are only now being removed.
 - There is no comprehensive program in place at LBL to ensure compliance with NFPA 101, Life Safety Code.
 - Some exits and egress pathways are not yet marked with signs.
 - Fire and smoke doors are not maintained to meet requirements of NFPA 101, Life Safety Code and NFPA 80, Fire Doors.
 - Where a Life Safety Code discrepancy that takes long-term corrective action and funding to correct, near-term action to reduce the risk to occupants in a fire situation has not been completed.
 - Facility exits and exit ways do not meet NFPA 101, Life Safety Code requirements.
 - The recent corrective action indicates that LBL is interested in taking the corrective action necessary to reduce the risk to occupants and facilities in a fire situation. The corrective actions that are currently underway and the improvement in house-keeping is sufficient to allow the reduction of the Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990) concern in this area from a Category II to a Category III. However, Life Safety is still a concern and cannot be considered corrected.
 - The Building Managers are not trained in recognizing Life Safety Code requirements.
 - There are still a number of Life Safety Code discrepancies observed in facilities that indicate the need for a more intensive emphasis on the self-inspection of the facilities by a Fire Protection Engineer. LBL has plans underway to hire another Fire Protection Engineer.
 - This concern was addressed in the LBL self-assessment. The action plan is acceptable; however, portions of the action plan have not been completed on a timely basis. The action plan can be further developed depending upon the results of the third party fire protection facility surveys.

CONCERN:
(FP.2-2)
(H1/C1)

Lawrence Berkeley Laboratory facilities do not meet requirements of NFPA 101, Life Safety Code.

FP.4 IMPAIRMENT OF OPERATIONS

PERFORMANCE OBJECTIVE: The site should not be vulnerable to being shut down for an unacceptable period as the result of a credible fire.

FINDINGS: • There is no Laboratory requirement for any operational or laboratory management to evaluate a minimal outage or minimal loss that can be tolerated due to a fire condition. There is no operational impact statement provided to the Fire Department in order for a proper evaluation of levels of fire risk protection needed for the facility.

CONCERN: See Concern FP.4-2, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

FP.6 FIRE DEPARTMENT OPERATIONS

PERFORMANCE OBJECTIVE: The Fire Department should have the capacity to promptly terminate and mitigate the effects of a fire in a safe and effective manner.

- FINDINGS:**
- The Fire Department has a plan, "LBL Compliance with NFPA/1500-Tracking for Items Requiring Compliance Action," dated May 3, 1990, for accomplishing NFPA 1500, but it was not submitted to Headquarters, DOE. The scheduled completion date of October 1, 1990, was not met. A new plan with new milestone dates does not exist.
 - Some members of the Fire Department have had to pay for some of their basic training themselves while other fire fighters have had the same basic training paid for by the Laboratory.
 - The Fire Department does have a departmental occupancy safety and health committee, but does not have stated goals and objectives relating to reducing safety risks. The safety program does not address the inherent risks of a fire fighter responding to a fire in facilities at LBL.
 - Fire fighters (auxiliary fire fighters) do not meet all the training and education requirements of Chapter 3, NFPA 1500.
 - The latest fire truck purchased for the LBL Fire Department does not meet the requirements of NFPA 1901, Standard for Automotive Fire Apparatus.
 - Most of the fire hose is 30 years old and is rubber-lined; the integrity is suspect for sustained fire fighting. A hydrostatic hose test is done but is not in itself adequate for total hose assessment.
 - Some of the fire pumps on the existing trucks have not been flow-tested in accordance with NFPA 1911, Standard on Acceptance and Service Tests of Fire Department Pumping Apparatus.
 - Inventory and testing records are not available for the equipment carried on the fire trucks or used in training.
 - Ground ladders are not inspected and service tested as required by NFPA 1932, Standard on Use, Maintenance, and Service Testing of Fire Department Ground Ladders. A ladder is missing from one fire engine.
 - A maintenance and inspection program for protective clothing at the Fire Department does not meet the requirements of NFPA 1500, Fire Department Occupational Safety and Health Program.

- Fire fighters did not wear protective clothing as required when responding to a simulated structural fire during the appraisal, as required by paragraph 5-2.6 of NFPA 1500.
- The life safety ropes, harnesses, and hardware used by the Fire Department do not meet the requirements of paragraph 5-5, NFPA 1500.
- The Fire Department does not meet the physical fitness program requirements of paragraph 8-5, NFPA 1500.
- The firemen are not trained on incidents involving special hazards as required, by paragraph 6-3 of NFPA 1500.

CONCERN: See Concern FP.6-1 of the Technical Safety appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

- FINDINGS:**
- The major incident involving special hazards for the LBL Fire Department is a fire in a facility during an earthquake. A response to a structure fire requires at least five trained fire fighters as required by NFPA 1500.
 - The LBL auxiliary fire fighters are not trained to NFPA 1500 requirements and cannot be considered structural fire fighters. Responding to an incident involving special hazards with less than five trained fire fighters is an unacceptable safety risk.
 - Also see Section 4.5.5, TC.1.
 - This concern was not addressed in the LBL self-assessment.

CONCERN: Fire Department response has not been evaluated for special hazard response and appropriate staffing provided to ensure adequate, trained response.
(FP.6-2)
(H1/C1)

- FINDINGS:**
- There is no formal program where prefire plans are updated on a periodic basis to confirm that they are current and reflect hazardous materials and other hazards in facilities.
 - This concern was not covered in the LBL self-assessment.

CONCERN: There is no formal mechanism to keep the prefire plans current.
(FP.6-3)
(H2/C2)

FP.7 PROGRAM IMPLEMENTATION

PERFORMANCE OBJECTIVE: A fire protection engineering program should be in place to effectively provide and maintain an "improved risk" level of fire protection.

- FINDINGS:**
- The SAN Fire Protection Engineer has conducted three recent facility inspections of LBL operated facilities. Those inspections were facility oriented and not program oriented.
 - The SAN Fire Protection Engineer has also conducted an in-depth review of the fire protection concern corrective actions and has documented the results. However, the only documentation provided by LBL is in their self-assessment which basically states that they are on schedule for the corrective action required.
 - There is evidence that the SAN Fire Protection has not recently conducted program appraisals at LBL.
 - The SAN Fire Protection Engineer is accomplishing inspections that are the direct responsibility of LBL.
 - This concern was not covered in the SAN self-assessment.

CONCERN: The San Francisco Operations Office does not evaluate fire protection program requirements in accordance with DOE 5482.1B. (FP.7-11)
(H2/C1) (Also see Concern OA.1-5.)

- FINDINGS:**
- Complete annual fire protection facility surveys are not accomplished as required in DOE 5480.7. However, there is a plan to do this by a third party.
 - There are no trend nor root cause analyses of fire runs.
 - There is a lack of procedures or Laboratory standards dealing with special fire risks.
 - This concern was not in the LBL self-assessment.

CONCERN: Technical aspects of the fire protection program such as fire protection facility surveys, trend analysis of fire alarms, and development of laboratory standards pertaining to fire risks are not being accomplished. (FP.7-12)
(H2/C2)

4.5.17 Medical Services

4.5.17.1 Overview

Familiarity with the processes, activities, projects, hazards, and organization was obtained by briefings, observations, document review, and interviews. The medical facility and equipment were evaluated. Visits were made to Bldgs. 55 (Research Medicine), 3 (Calvin Laboratory), and 74 (Human Genome Center). Interviews were conducted with the Medical Director; Deputy Department Head; nurses; support staff; physicians; Employee Assistance Program (EAP) Coordinator; Chief, Environmental and Safety Support (ESS), San Francisco Operations Office (SAN); Industrial Hygienist; Manager, Environment, Safety and Hazard Control Department and his replacement; and Associate Director, Scientific and Technical Resources. Randomly selected patients and employees were interviewed. Medical records (charts) were examined. Reports, logs, statistical data, policy, practice, and procedure documents were reviewed. Conduct of procedures in the Medical Services Department was observed. Scope and content of programs were evaluated. Recent audits and action plans were reviewed and discussed. The appraisal was conducted using performance objectives MS.1 Organization and Administration, MS.2 Procedures and Documentation, MS.3 Medical Treatment, MS.4 Review and Audit, and MS.5 Personnel Communication.

The Medical Services Department conducts activities that are broad in scope, high quality, and contain all of the essential elements of a contemporary comprehensive occupational medical program. The professional staff consists of the Medical Director; two part-time physicians and contractor physicians; and two Registered Nurses, supplemented by part-time nurses. A clinical laboratory, the EAP, Eye Safety Program, and the Bioassay Laboratory report to the Medical Director. Administrative support is by the Deputy Department Head and two administrative/clerical persons. The number of physicians and nurses is significantly below the staffing guideline level contained in DOE 5480.8. The Medical Director is certified in Occupational Medicine and Nuclear Medicine. Both nurses are Certified Occupational Health Nurses. The EAP Coordinator is a Certified Employee Assistance Professional. The staff is qualified, experienced, and maintains skills and knowledge by participation in relevant continuing education activities. Equipment is modern, well maintained, and routinely serviced and calibrated. The facility is cramped, congested, and cluttered. There is no library conference area resulting in books and documents scattered throughout the facility. There is little provision for privacy for nurses to interview and counsel patients. Lack of storage space results in equipment, supplies, and files being dispersed throughout the patient treatment-evaluation areas. Tonometry, vision testing, and audiometry are located in the main corridor within the view and hearing of other patients.

Clinical activities provide care for emergencies and personal illness to the extent usually provided by industry. Work injuries are treated onsite or are referred to competent specialists when indicated. Preplacement, termination, return to work, medical surveillance, and voluntary comprehensive examinations are done. Adequate time is permitted for questions, explanations, and report of findings. Reports are sent to personal physicians on request. Many activities in health education/promotion are conducted. Employee assistance is provided by a quality EAP onsite and supplemented by contractor resources

in the community. Medical services and the EAP are active in implementing the alcohol, substance abuse policy.

Medical records are current, legible, and well organized. Clinical content is excellent and complete, but exposure data are lacking. A conscientious effort is made to identify persons exposed to hazardous substances and include them in the annual examination program. The program is informal and not well documented. It is hampered by lack of industrial hygiene capability.

Many policy, practice, procedure, and guideline documents of good quality exist. They are not complete, current, indexed, or organized. Practices and procedures are effectively communicated by informal, daily one-on-one contact or during the noon break when the lunch conversation consists of topics relevant to the Department. Communication and working relationships with top management, other health and safety disciplines, and line managers has been good. Effectiveness of the current Division reorganization is yet to be determined as vacancies exist and other changes are forecast in key positions.

There is a high level of awareness of biohazards. A policy exists. Medical services personnel have provided leadership, consultation, and support in developing and implementing the policy. Good engineering controls, work practices, waste management, and training activities are in place but are poorly documented.

All of the concerns identified in this appraisal had been noted in the self-assessment.

4.5.17.2 Findings and Concerns

MS.2 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Procedures and documentation should provide appropriate direction, record generation, and support of the medical services for the facility and site.

- FINDINGS:**
- Much documentation of policies, practices, and procedures was present in the form of memoranda, copies of reference sources, equipment operating instructions, and loose-leaf binders.
 - Documentation was informal, not indexed, and not organized.
 - There is no written medical emergency plan to be integrated with the site Master Emergency Plan.
 - The quality assurance plan for medical services was incomplete and not fully implemented.
 - Documentation was dispersed in multiple locations and not readily accessible for reference, review, or training.
 - The requirement for documentation was addressed in the LBL self-assessment. Much progress has been made recently and continues. No firm timetable has been established within the department for completion. Resources required have not been identified.

CONCERN: A written Occupational Medical Plan does not exist as required by
(MS.2-1) DOE 5480.8.
(H3/C1)

MS.3 MEDICAL TREATMENT

PERFORMANCE OBJECTIVE: Medical treatment should be available and provided by qualified, competent staff, and adequate facilities should be available.

- FINDINGS:**
- The two full-time nurses are supplemented by part-time contract nurses.
 - The Medical Services Department physician's staff consists of the Medical Director and two part-time physicians supplemented by contract physicians.
 - The population served numbered 3300.
 - Staffing levels precluded regular frequent site visits as required by DOE 5480.8.
 - Additional staffing was addressed in the LBL self-assessment. Salary structure was judged to adversely impact recruitment. Timetable and process for resolution have not been identified.

CONCERN: Staffing levels do not meet minimum guidelines based on population served as required by DOE 5480.8.
(MS.3-1)
(H3/C2)

- FINDINGS:**
- There are no written policies, practices, or procedures for required medical surveillance.
 - The Medical Director is not provided with full and timely information on physical, chemical, and biologic hazards in the workplace as required by DOE 5480.8.
 - The medical records do not contain the employee's history of exposure to physical, chemical, or biologic agents.
 - Medical Services does not have access to on-line Material Safety Data Sheet information.
 - See Concern IH.3-2.
 - The substance of this concern was expressed in the LBL self-assessment. Timetable and corrective actions are not clearly identified.

CONCERN: Medical surveillance of employees exposed to carcinogenic, chemical, physical, and biological hazards cannot be assured as required by Occupational Safety and Health Administration standards and DOE 5480.8.
(MS.3-2)
(H2/C1)

- FINDINGS:**
- Tonometry, vision, and hearing testing are performed in the corridor within view and hearing of other patients.

- Treatment, interviewing, and counseling are performed in areas that do not provide privacy.
- There is no library or conference room.
- Nurses share the same office and desks.
- There is no dedicated storage area.
- This was addressed in the self-assessment. Timing of additional space and modifications of facility not identified.

CONCERN:
(MS.3-3)
(H3/C1)

The medical facility does not meet minimum standards required by DOE 5480.8 or accepted industry standards of medical practice in that the facility is not large enough and does not provide privacy.

4.6 NOTEWORTHY PRACTICES

Noteworthy Practices are exceptional ways of accomplishing a performance objective or some aspect of it. Other DOE facilities are encouraged to adopt these practices when they are applicable to their operation.

OS.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Site and facility organization and administration should ensure effective implementation and control of the occupational safety program.

NOTEWORTHY PRACTICE: The Cell and Molecular Biology Division has developed a high voltage training program and high voltage safety guidelines specifically for gel electrophoresis work. This work typically involves the use of up to 2,000 volts at 500 milliamperes which is potentially lethal. The work environment is often wet because chambers holding fluids may leak or electrolyte may be spilled and at times there are bare high voltage leads. Not all of the available systems have interlocks to prevent accessing the fluid reservoirs while high voltage is applied. The equipment is frequently used by students.

Before developing the course, the Cell and Molecular Biology Division became concerned about the high voltage safety aspects of electrophoresis work and hired an electrical consultant to do an assessment of the Division's equipment and the conditions under which it is used. This assessment identified numerous hazardous conditions associated with electrophoresis cell design, laboratory practices, poorly designed power supplies, and the use of surplus power supplies not designed for the application.

A search to find standards or safety training material revealed that there was no material available specific to this application. The situation was complicated by the fact that even newly manufactured equipment seemed to have built-in hazards in some cases. Recognizing the potential for injury and the lack of standards or training materials, the Division elected to develop an electrophoresis high voltage safety training course and safety guidelines for selection and use of high voltage equipment.

The end result is that the Division is changing from traditional "Banana Plugs" to shielded/recessed jacks, use of floating power supplies and ground fault interrupters, and use of nonconducting catch basins instead of blotting paper. These are not industry standard features or configurations. The Division has identified manufacturers and models of power supplies and electrophoresis cells that meet their guidelines and is disseminating this information to users, purchasing, and other divisions. Many of the existing power supplies are being modified to replace the old style banana plugs with the new shielded/recessed plugs.

4.7 SYSTEM FOR CATEGORIZING CONCERNS

Each concern contained in this report has been characterized using the following three sets of criteria.

- A. **CATEGORY I:** Addresses a situation for which a "clear and present" danger exists to workers or members of the public. A concern in this category is to be immediately conveyed to the managers of the facility for action. If a clear and present danger exists, the Assistant Secretary for Environment, Safety, and Health, or his/her designee, is to be informed immediately so that consideration may be given to exercising the Secretary's facility shutdown authority or directing other immediate mitigation measures.

CATEGORY II: Addresses a significant risk or substantial noncompliance with DOE Orders but does not involve a situation for which a clear and present danger exists to workers or members of the public. A concern in this category is to be conveyed to the manager of the facility no later than the appraisal closeout meeting for immediate attention. Category II concerns have a significance and urgency such that the necessary field response should not be delayed until the preparation of a final report or the routine development of an action plan. Again, consideration should be given to whether compensatory measures, mitigation, or facility shutdown are warranted under the circumstances.

CATEGORY III: Addresses significant noncompliance with DOE Orders, or the need for improvement in the margin of safety, but is not of sufficient urgency to require immediate attention.

- B. **Hazard Level 1:** Has the potential for causing a severe occupational injury, illness, or fatality, or the loss of the facility.

Hazard Level 2: Has the potential for causing minor occupational injury or illness or major property damage, or has the potential for resulting in, or contributing to, unnecessary exposure to radiation or toxic substances.

Hazard Level 3: Has little potential for threatening safety, health, or property.

- C. **Compliance Level 1:** Does not comply with DOE Orders, prescribed policies or standards, or documented accepted practices. The latter is a professional judgment based on the acceptance and applicability of national consensus standards not prescribed by DOE requirements.

Compliance Level 2: Does not comply with DOE references, standards, or guidance, or with good practice (as derived from industry experience, but not based on national consensus standards).

Compliance Level 3: Has little or no compliance considerations. These concerns are based on professional judgment in pursuit of excellence in design or practice, i.e., these are improvements for their own sake and are not deficiency driven.

4.8 CATEGORIZATION AND TABULATION OF CONCERNS

4.8.1 Categorization of Concerns

<u>Concerns Number</u>	<u>Potential Hazard Level</u>	<u>Compliance Level</u>
OA.1-3	2	2
OA.1-4	1	2
OA.1-5	2	1
OA.2-3	2	2
OA.3-2	3	2
OA.5-2	2	2
OA.6-1	2	2
OA.7-3	3	1
OA.8-2	2	2
QV.1-2	2	1
QV.1-3	3	2
QV.1-4	2	1
QV.2-1	3	2
QV.2-2	2	2
QV.3-2	2	2
QV.4-2	2	2
QV.5-1	2	2
OP.2-2	3	2
OP.2-3	3	2
OP.2-4	2	3
OP.2-5	2	2
OP.5-2	2	2
MA.1-2	1	2
MA.2-2	2	2
MA.3-2	2	2
MA.4-2	2	2
MA.7-2	3	2
MA.8-2	3	2
TC.1-3	3	2
TC.1-4	3	2
TC.4-1	2	1
TC.8-1	3	2
TC.9-1	2	2
TC.9-2	2	1
TC.10-1	3	2
AX.3-1	2	2
AX.5-1	2	2

* Designates a Category II Concern

<u>Concerns Number</u>	<u>Potential Hazard Level</u>	<u>Compliance Level</u>
EP.1-1	2	1
EP.1-2	2	1
EP.1-3	3	1
EP.1-4	3	1
EP.2-1	3	1
EP.2-2	3	1
EP.2-3	2	2
EP.2-4	3	1
EP.2-5	2	1
EP.3-2	3	2
EP.4-2	2	1
EP.4-3	3	1
EP.5-2	3	1
EP.6-1	3	1
EP.6-2	3	1
EP.7-1	2	1
TS.2-4	2	1
TS.2-5	2	2
TS.2-6	2	1
TS.3-2	2	2
TS.4-3	2	2
PT.1-3	2	1
PT.2-1	2	1
PT.4-2	2	1
PT.5-2	3	2
PT.6-1	3	2
PT.8-1	3	2
PT.10-1	2	1
PT.11-1	3	1
PT.12-1	2	1
EA.4-1	3	1
FR.1-1	3	1
FR.2-1	3	1
FR.3-1	3	1
FR.5-1	3	1
RP.1-1	2	2
RP.1-2	2	2
RP.2-1	2	1
RP.2-2	2	1
RP.2-3	2	1
RP.3-4	2	2
RP.3-5	2	2

* Designates a Category II Concern

<u>Concerns Number</u>	<u>Potential Hazard Level</u>	<u>Compliance Level</u>
RP.3-6	2	1
RP.3-7	2	1
RP.3-8	2	1
RP.3-9	2	1
RP.3-10	2	1
RP.5-3*	2	1
RP.6-1	2	2
RP.7-2	3	1
RP.7-3	2	2
RP.7-4	2	2
RP.8-3*	2	1
RP.8-4	2	1
RP.9-1	2	1
RP.9-2	2	2
RP.10-2*	2	1
RP.10-3	2	2
RP.10-4	2	2
RP.11-1	2	1
WS.4-1*	1	1
WS.4-2	2	1
WS.4-3	2	1
WS.4-4	2	1
WS.4-5	2	1
WS.4-6	2	1
WS.4-7	3	1
WS.4-8	3	1
WS.4-9	1	1
WS.4-10	2	1
WS.5-1	1	1
WS.5-2	2	1
WS.5-3	2	1
WS.6-1	2	1
IH.1-1	2	1
IH.2-2*	1	1
IH.2-3	2	1
IH.2-4*	1	1
IH.2-5	2	1
IH.2-6	2	1
IH.3-2	2	1
OS.1-1	3	2
OS.1-2	3	2
OS.2-1	2	2
OS.2-2*	2	1
OS.2-3	2	1

* Designates a Category II Concern

<u>Concerns Number</u>	<u>Potential Hazard Level</u>	<u>Compliance Level</u>
OS.2-4	2	1
OS.4-1	3	1
FP.1-6	2	2
FP.1-7	2	2
FP.2-2	1	1
FP.6-2	1	1
FP.6-3	2	2
FP.7-11	2	1
FP.7-12	2	2
MS.2-1	3	1
MS.3-1	3	2
MS.3-2	2	1
MS.3-3	3	1

* Designates a Category II Concern

4.8.2 Tabulation of Concerns

4.8.2.1 Organization and Administration

- CONCERN:** The Environmental Protection, Health and Safety Division is not
(OA.1-3) presently organized to support the necessary integration of
(H2/C2) safety and health programs into the activities of the site.
- CONCERN:** Lawrence Berkeley Laboratory has not implemented a consistent
(OA.1-4) sitewide environment, safety, and health program.
(H1/C2)
- CONCERN:** The San Francisco Operations Office has not consistently
(OA.1-5) performed its oversight role of the Lawrence Berkeley Laboratory
(H2/C1) in many safety- and health-related areas.
- CONCERN:** The resources applied to critical safety and health functions are
(OA.2-3) not sufficient to support the safety needs of the Lawrence
(H2/C2) Berkeley Laboratory site.
- CONCERN:** See Concern OA.3-1, Technical Safety Appraisal of the Lawrence
Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** Management has not established and communicated annual quantified
(OA.3-2) safety and health goals for the Lawrence Berkeley Laboratory
(H3/C2) organization.
- CONCERN:** Lawrence Berkeley Laboratory has not implemented mechanisms to
(OA.5-2) assess site safety and health programs.
(H2/C2)
- CONCERN:** Specific safety responsibilities are not included as a required
(OA.6-1) element in the annual performance appraisals of all employee
(H2/C2) groups.
- CONCERN:** Storage of dosimetry and exposure records, less than 2 years old,
(OA.7-3) does not meet the requirements of DOE 1324.2A, and DOE 5500.7A,
(H3/C1) and ANSI/ASME NQA-1 in that the records are not provided adequate
protection in their present location.
- CONCERN:** See Concern OA.7-1, Technical Safety Appraisal of the Lawrence
Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** Lawrence Berkeley Laboratory has not implemented a supervisory
(OA.8-2) training program directed at the detection and handling of
(H2/C2) employees suspected of substance abuse and has not adopted a
policy requiring this training.

4.8.2.2 Quality Verification

- CONCERN:** See Concern QV.1-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** Many of the quality assurance requirements specified in the
(QV.1-2) Institutional Quality Assurance Program Plan and divisional
(H2/C1) Quality Assurance Program Plans have not been implemented as required by DOE 5700.6B. (Also see Concern RP.7-3.)
- CONCERN:** Quality Assurance oversight of Lawrence Berkeley Laboratory
(QV.1-3) activities by the San Francisco Operations Office is infrequent
(H3/C2) and unscheduled. (Also see Concern OA.1-5.)
- CONCERN:** Direction given to Lawrence Berkeley Laboratory concerning
(QV.1-4) quality assurance requirements by the San Francisco Operations
(H2/C1) Office is incomplete and inconsistent with DOE 5700.6B.
- CONCERN:** With the exception of store-stock items, the basis for the
(QV.2-1) qualification of suppliers is often not documented, and
(H3/C2) defective, low-cost items that are important to safety or mission success may be purchased from unqualified suppliers.
- CONCERN:** There are no policies and procedures established to ensure that
(QV.2-2) suspect/counterfeit items are not purchased, installed, or used.
(H2/C2)
- CONCERN:** Defective items may be accepted because inspection practices are
(QV.3-2) often informal and undocumented.
(H2/C2)
- CONCERN:** See Concern QV.4-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** Inaccurate measuring and testing equipment may invalidate
(QV.4-2) inspection, test, and research data at the Lawrence Berkeley
(H2/C2) Laboratory.
- CONCERN:** See Concern QV.2-2.
- CONCERN:** With few exceptions, practices to identify and control hardware,
(QV.5-1) materials, parts, and other items are not documented or
(H2/C2) consistently applied; therefore, these items may be inadvertently used in applications for which they do not meet the specifications.
- CONCERN:** See Concern QV.3-2.
- CONCERN:** See Concerns TC.8-1 and OS.2-2.

4.8.2.3 Operations

- CONCERN:** See Concern OA.2-3.
- CONCERN:** See Concern OP.2-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** Lawrence Berkeley Laboratory has not implemented DOE 5480.19 on
(OP.2-2) conduct of operations.
(H3/C2)
- CONCERN:** Guidance has not been supplied to Lawrence Berkeley Laboratory or
(OP.2-3) to the San Francisco Operations Office by the Department of
(H3/C2) Energy Program Office (Energy Research) on a timely basis for
implementation of DOE 5480.19.
- CONCERN:** Planned review and approval processes for acceptance of the
(OP.2-4) graded-approach assessment to comply with DOE 5480.19, and for
(H2/C3) the Facility Notebooks, have not been established by Lawrence
Berkeley Laboratory.
- CONCERN:** See Concern OP.5-1, Technical Safety Appraisal of the Lawrence
Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** User groups conducting experiments at major Lawrence Berkeley
(OP.2-5) Laboratory facilities are not required to conduct their
(H2/C2) operations in accordance with facility conduct of operation
guides.
- CONCERN:** See Concern OA.2-2, Technical Safety Appraisal of the Lawrence
Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** See Concern TS.2-5; and see Concern TS.2-3, Technical Safety
Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096,
February 1990).
- CONCERN:** See Concern OP.7-1, Technical Safety Appraisal of the Lawrence
Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** Lawrence Berkeley Laboratory has no system to track identified,
(OP.5-2) needed safety improvements.
(H2/C2)
- CONCERN:** See Concern TC.1-4; and see Concern TC.3-1, Technical Safety
Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096,
February 1990).

4.8.2.4 Maintenance

- CONCERN:**
(MA.1-2)
(H1/C2) Coordination among Laboratory divisions and with local utility companies does not ensure effective maintenance and control of systems important to safety. (Also see Section 4.5.6, AX.6, and Concerns MA.8-2 and TS.3-2 in this document; and Concern OA.1-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).)
- CONCERN:**
(MA.2-2)
(H2/C2) System configuration control, administrative procedures, training, and support facilities do not provide for comprehensive control of maintenance and modification activities at the Lawrence Berkeley Laboratory. (Also see Concern TC.1-4 and Section 4.5.5, TC.5, in this document; and Concerns TC.3-1 and TC.3-2, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).)
- CONCERN:**
(MA.3-2)
(H2/C2) Facilities, equipment, and material needed to support safe maintenance are not provided and maintained in all Lawrence Berkeley Laboratory shops.
- CONCERN:**
(MA.4-2)
(H2/C2) Work control systems and control of modifications of plant support systems do not place priority on safety.
- CONCERN:**
See Concern MA.2-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:**
See Concerns MA.4-1 and OA.1-2, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:**
(MA.7-2)
(H3/C2) A predictive maintenance program has not been fully implemented or systematically addressed and planned at the Lawrence Berkeley Laboratory.
- CONCERN:**
(MA.8-2)
(H3/C2) Records and activities for operations, modifications, and maintenance are not coordinated at the Lawrence Berkeley Laboratory. (Also see Concern MA.1-2 in this document; and Concern OP.2-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).)

4.8.2.5 Training and Certification

- CONCERN:**
See Concern OA.2-3.
- CONCERN:**
See Concern TC.1-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:**
(TC.1-3)
(H3/C2) Neither the effectiveness of training nor the trainees' understanding of material presented is routinely assessed.

- CONCERN:** The Lawrence Berkeley Laboratory has not formally identified or established requirements for initial and continuing training.
(TC.1-4)
(H3/C2)
- CONCERN:** Lawrence Berkeley Laboratory is not in compliance with all of the requirements for hazard communication training as specified in 29 CFR 1910.1200.
(TC.4-1)
(H2/C1)
- CONCERN:** See Concern TC.2-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** See Concerns TC.3-1 and TC.3-2, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** Lawrence Berkeley Laboratory has no formal program for certification of Nondestructive Examination Technicians.
(TC.8-1)
(H3/C2)
- CONCERN:** Training materials which illustrate unsafe work practices, without being identified as such, are in use at Lawrence Berkeley Laboratory.
(TC.9-1)
(H2/C2)
- CONCERN:** Lawrence Berkeley Laboratory radiation protection training does not communicate the contamination control requirements required by DOE 5480.11.
(TC.9-2)
(H2/C1)
- CONCERN:** See Concern TC.1-4.
- CONCERN:** The San Francisco Operations Office has not formally established requirements or implemented a program for initial and continuing training for their onsite personnel.
(TC.10-1)
(H3/C2)

4.8.2.6 Auxiliary Systems

- CONCERN:** Solid hazardous waste control requirements contained in Laboratory safety documents are not implemented. (Also see Concern OA.1-4.)
(AX.3-1)
(H2/C2)
- CONCERN:** Laboratory mechanical safety expertise is not applied to non-experimental equipment such as ventilation systems. (Also see Concerns TS.6-1 and TS.6-2, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).)
(AX.5-1)
(H2/C2)
- CONCERN:** See Concerns MA.1-2, MA.8-2, and TS.3-2; and Concern OA.1-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

4.8.2.7 Emergency Preparedness

- CONCERN:** See Concern EP.3-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** The Lawrence Berkeley Laboratory has not developed an effective management and response organization that can detect, react to, and mitigate protracted emergency situations as required by DOE 5500.1A.
(EP.1-1)
(H2/C1)
- CONCERN:** The Building Manager Program has not been formalized through written appointments for the Deputy and Assistant Building Managers in accordance with DOE 5500.1A.
(EP.1-2)
(H2/C1)
- CONCERN:** Lawrence Berkeley Laboratory has not developed an independent, in-house emergency preparedness appraisal capability and action tracking system to ensure compliance with DOE 5500.1A, DOE 5500.3, and Draft DOE 5500.3A.
(EP.1-3)
(H3/C1)
- CONCERN:** See Concern OA.1-5.
- CONCERN:** The existing Lawrence Berkeley Laboratory Emergency Preparedness Program has not been established in accordance with DOE 5500.1A, DOE 5500.3, and Draft DOE 5500.3A.
(EP.1-4)
(H3/C1)
- CONCERN:** See Concern EP.2-1.
- CONCERN:** The existing Lawrence Berkeley Laboratory Master Emergency Plan is not in compliance with the DOE 5500 series, the DOE 5480 series, and DOE 5000.3A in many areas.
(EP.2-1)
(H3/C1)
- CONCERN:** The Lawrence Berkeley Laboratory emergency plan implementing procedures are not in compliance with the DOE 5500 series and do not address individual emergency position responsibilities in sufficient detail. (Also see Concern OA.1-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).)
(EP.2-2)
(H3/C1)
- CONCERN:** Lawrence Berkeley Laboratory had not developed a job task analysis study of their Emergency Response Organization to identify assigned emergency responsibilities as directed in DOE 5500.3 and Draft DOE 5500.3A.
(EP.2-3)
(H2/C2)
- CONCERN:** The Lawrence Berkeley Laboratory Public Affairs Office did not comply with the provisions of DOE 5500.4A with respect to format, content, annual orientations and reporting.
(EP.2-4)
(H3/C1)
- CONCERN:** The San Francisco Operations Office has not developed emergency response plans and emergency plan implementing procedures in accordance with DOE 5500.1A, and DOE 5500.3 and Draft DOE 5500.3A.
(EP.2-5)
(H2/C1)

- CONCERN:** See Concern EP.3-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** The Lawrence Berkeley Laboratory emergency planning and training (EP.3-2) program is not properly documented, evaluated, upgraded, and (H3/C2) maintained current as required by DOE 5500.3 and Draft DOE 5500.3A.
- CONCERN:** See Concern EP.4-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** The Lawrence Berkeley Laboratory exercise/drill program is not in (EP.4-2) compliance with DOE 5500.1A, DOE 5500.3, and Draft DOE 5500.3A. (H2/C1)
- CONCERN:** The Lawrence Berkeley Laboratory is not in compliance with (EP.4-3) DOE 5500.1A, DOE 5500.2A, DOE 5500.3, Draft DOE 5500.3A, and (H3/C1) industry good practices in its planning development, conduct, and critique of emergency exercises.
- CONCERN:** See Concern EP.5-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** The emergency response facilities at Lawrence Berkeley Laboratory (EP.5-2) do not contain sufficient resources, equipment, and materials, (H3/C1) and are not in compliance with DOE 5500.1A, DOE 5500.2A, and DOE 5500.3.
- CONCERN:** Lawrence Berkeley Laboratory did not develop emergency action (EP.6-1) levels and their emergency classification is not in accordance (H3/C1) with the definitions in DOE 5500.2A.
- CONCERN:** Lawrence Berkeley Laboratory had not revised the Master Emergency (EP.6-2) Plan and did not develop emergency plan implementing procedures (H3/C1) to address notifications and reporting criteria during emergency situations in accordance with DOE 5500.2A and DOE 5000.3A.
- CONCERN:** Lawrence Berkeley Laboratory Personnel Protection Program does (EP.7-1) not provide guidance in making protective action recommendations (H2/C1) as required in DOE 5500.1A, DOE 5500.3, DOE 5480.1A, and DOE 5480.10.

4.8.2.8 Technical Support

- CONCERN:** Safety Analysis Documents at Lawrence Berkeley Laboratory do not (TS.2-4) completely cover the safety information required by (H2/C1) SAN MD 5481.1A.
- CONCERN:** Operational Safety Procedures are not being kept current. (TS.2-5) (H2/C2)

- CONCERN:** See Concern TS.2-3, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** Hazard analyses for laboratory facilities should be reviewed for consistency with the requirements of DOE 5481.1B and SAN MD 5481.1A.
(TS.2-6)
(H2/C1)
- CONCERN:** Some modification work that is important to safety is not controlled.
(TS.3-2)
(H2/C2)
- CONCERN:** Safety-related equipment has been tested without proper procedures by personnel whose qualifications to perform the tests have not been documented and resultant data have not been reviewed for acceptability by supervision.
(TS.4-3)
(H2/C2)

4.8.2.9 Packaging and Transportation

- CONCERN:** Management control over the packaging and transportation activities at Lawrence Berkeley Laboratory as required by DOE 5480.3 is lacking.
(PT.1-3)
(H2/C1)
- CONCERN:** The formal training program for packaging and transportation employees as required by DOE 5480.3 and 49 CFR is not complete.
(PT.2-1)
(H2/C1)
- CONCERN:** See Concern PT.1-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** There is no system to ensure that all Lawrence Berkeley Laboratory hazardous wastes are being packaged and transported in accordance with State and Federal regulations as required by DOE 5480.3.
(PT.4-2)
(H2/C1)
- CONCERN:** Safety-related information for packaging and transportation was not always retained by Lawrence Berkeley Laboratory.
(PT.5-2)
(H3/C2)
- CONCERN:** The operating procedures for packaging and transportation of hazardous materials are not properly implemented and not uniform between organizational units.
(PT.6-1)
(H3/C2)
- CONCERN:** The Lawrence Berkeley Laboratory is not in compliance with the proposed Department of Energy policy for onsite transportation.
(PT.8-1)
(H3/C2)
- CONCERN:** Preparation and maintenance of records for packaging and transportation do not meet the requirements of DOE 5480.3.
(PT.10-1)
(H2/C1)

CONCERN: There are no independent internal safety audits of packaging and transportation as required by DOE 5480.3.
(PT.11-1)
(H3/C1)

CONCERN: Packaging and storage procedures do not comply with DOE 5480.3, 49 CFR, and 40 CFR.
(PT.12-1)
(H2/C1)

4.8.2.10 Experimental Activities

CONCERN: See Concern SR.4-1, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

CONCERN: Documents citing satisfactory completion of safety evaluations of experiment proposals and authorizing conduct of experiments are not issued to the experiment proposers, as required to comply with DOE 5482.1B.
(EA.4-1)
(H3/C1)

4.8.2.11 Site/Facility Safety Review

CONCERN: The charter for the Safety Review Committee does not define the relationship between the Safety Review Committee and the Independent Safety Review System of the Laboratory, as required to comply with DOE 5482.1B.
(FR.1-1)
(H3/C1)

CONCERN: The functions essential to the compliance of the internal appraisal system with the requirements of DOE 5482.1B are not stipulated in the Safety Review Committee charter, the "Guidelines for SRC Appraisal of Division Safety Programs," nor elsewhere in published documents on the Independent Safety Review System.
(FR.2-1)
(H3/C1)

CONCERN: The structure and the functional plan for the Lawrence Berkeley Laboratory Independent Safety Review System are not documented (as required to comply with DOE 5482.1B) and are generally not understood.
(FR.3-1)
(H3/C1)

CONCERN: A system for conducting triennial appraisals of the Lawrence Berkeley Laboratory Independent Safety Review System (required by DOE 5482.1B) has not been established.
(FR.5-1)
(H3/C1)

4.8.2.12 Radiological Protection

CONCERN: See Concern OA.1-3.

CONCERN: The resources allocated to the radiation protection program are not sufficient to bring the program into compliance with mandatory standards and industry practices. (Also see Concern OA.2-3.)
(RP.1-1)
(H2/C2)

CONCERN: Action levels and trend analysis are not utilized to assure control of contamination and to promote as low as reasonably achievable goals.
(RP.1-2)
(H2/C2)

CONCERN: Internal Audits in radiation protection have not been done as required by DOE 5480.1B. (Also see Concern RP.1-1.)
(RP.2-1)
(H2/C1)

CONCERN: Employee external radiation exposures (other than whole body) resulting from unusual occurrences have not been properly evaluated and entered into the dosimetry records as required by DOE 5480.11.
(RP.2-2)
(H2/C1)

CONCERN: The San Francisco Operations Office has not provided effective technical oversight to assure that the radiation exposure of employees involved in incidents is documented as required by DOE 5480.11.
(RP.2-3)
(H2/C1)

CONCERN: There is no system to assure prior review and approval by health physics professionals of work involving radiation or radioactive materials.
(RP.3-4)
(H2/C2)

CONCERN: There is no contamination surveillance program for sealed radiation sources less than 20 times the annual limit of intake.
(RP.3-5)
(H2/C2)

CONCERN: An accurate inventory and periodic leak checks are not performed for all sealed radioactive sources as required by SAN MD No. 5480.11.
(RP.3-6)
(H2/C1)

CONCERN: Radioisotopes are neither inventoried nor controlled as required by SAN MD No. 5480.11.
(RP.3-7)
(H2/C1)

CONCERN: Radiation protection procedures do not conform with SAN MD No. 5480.11 in that some are missing and some are not properly documented.
(RP.3-8)
(H2/C1)

CONCERN: Tests of fail-safe interlocks at the 88-inch Cyclotron do not verify proper operation of all safety devices as required by DOE 5480.4 and ANSI N43.1.
(RP.3-9)
(H2/C1)

CONCERN: The radiation field around radiation generating devices at Lawrence Berkeley Laboratory has not been characterized (type, energy, and dose range) as required by DOE 5480.4 and ANSI N43.1.
(RP.3-10)
(H2/C1)

CONCERN: See Concern RP.3-3, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

CONCERN: The film badge dosimeter and thermoluminescent dosimeter programs do not incorporate the requirements of DOE 5480.4 and ANSI N13.7 and N319-1976. Lawrence Berkeley Laboratory has not been able to obtain Department of Energy Laboratory Accreditation as required by DOE 5480.11. (Also see Concern QV.1-2.)
(RP.5-3)
(H2/C1)
CAT II

CONCERN: High-efficiency particulate air filters on vacuum cleaners have not been inspected or tested on a regular basis.
(RP.6-1)
(H2/C2)

CONCERN: Approved procedures for the in-vivo and in-vitro bioassay programs are not documented and updated periodically in accordance with DOE 5480.11.
(RP.7-2)
(H3/C1)

CONCERN: The quality control program for bioassay is not fully implemented. (Also see Concern QV.1-2.)
(RP.7-3)
(H2/C2)

CONCERN: Lawrence Berkeley Laboratory does not assure that personnel submit bioassay samples when requested.
(RP.7-4)
(H2/C2)

CONCERN: Portable survey instruments in use at Lawrence Berkeley Laboratory may not correctly establish radiological conditions as required by DOE 5480.4 and ANSI N323.
(RP.8-3)
(H2/C1)
CAT II

CONCERN: Portable instrument calibration is inconsistent with the requirements of DOE 5480.4 and ANSI N323 in that beta efficiency is not determined and check sources not properly used.
(RP.8-4)
(H2/C1)

CONCERN: See Concern RP.8-2, Technical Safety Appraisal of the Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).

CONCERN: Air monitor calibration and placement of sample heads at the National Tritium Labeling facility do not conform to the requirements of DOE 5480.11.
(RP.9-1)
(H2/C1)

CONCERN: Workplace air sampling is not quantitative.
(RP.9-2)
(H2/C2)

CONCERN: Lawrence Berkeley Laboratory has not assured that material released for uncontrolled use is free of radioactive materials and radioactive contamination in accordance with the requirements of DOE 5480.11 and DOE 5400.5.
(RP.10-2)
(H2/C1)
CAT II

CONCERN: Contamination surveys of radioisotope areas are not being
(RP.10-3) performed and documented on a regular basis. (Also see
(H2/C2) Concern RP.1-1.)

CONCERN: Lawrence Berkeley Laboratory requirements for hand and foot
(RP.10-4) surveys are neither clearly defined nor consistently applied.
(H2/C2)

CONCERN: The Lawrence Berkeley Laboratory has not ensured that internal
(RP.11-1) exposures at the National Tritium Labeling facility are as low as
(H2/C1) reasonably achievable, as required by DOE 5480.11.

CONCERN: See Concerns OA.7-3 and RP.10-2 in this document. Also see
Concern RP.12-1, Technical Safety Appraisal of the Lawrence
Berkeley Laboratory (DOE/EH-0096, February 1990).

4.8.2.13 Worker Safety and Health (OSHA) Compliance

CONCERN: See Concern IH.2-4.

CONCERN: See Concern IH.2-4.

CONCERN: See Concern IH.2-4.

CONCERN: See Concern IH.2-3.

CONCERN: See Concern IH.2-4.

CONCERN: See Concern IH.2-4.

CONCERN: Lawrence Berkeley Laboratory does not comply with
(WS.4-1) 29 CFR 1900.253, Oxygen-Fuel Gas Welding and Cutting, in that
(H1/C1) incompatible materials could form an explosive substance.
CAT II

CONCERN: Lawrence Berkeley Laboratory does not fully comply with
(WS.4-2) 29 CFR 1910, Subpart E, Means of Egress.
(H2/C1)

CONCERN: Safety showers and eyewash stations at the Lawrence Berkeley
(WS.4-3) Laboratory do not fully comply with 29 CFR 1910.151(c), Medical
(H2/C1) Services and First Aid.

CONCERN: Machine guarding at Lawrence Berkeley Laboratory does not fully
(WS.4-4) comply with 29 CFR 1910, Subpart O, General Requirements of All
(H2/C1) Machines.

CONCERN: Lawrence Berkeley Laboratory does not fully comply with
(WS.4-5) 29 CFR 1910, Subpart S, Electrical Standard.
(H2/C1)

- CONCERN:** Lawrence Berkeley Laboratory does not fully comply with
(WS.4-6) 29 CFR 1910.106, Flammable and Combustible Liquids.
(H2/C1)
- CONCERN:** The fire extinguisher program at Lawrence Berkeley Laboratory
(WS.4-7) does not fully comply with 29 CFR 1910.157, Portable Fire
(H3/C1) Extinguisher.
- CONCERN:** Aisle widths and floor loading labels at Lawrence Berkeley
(WS.4-8) Laboratory do not comply with 29 CFR 1910.22, Subject C,
(H3/C1) General Requirement.
- CONCERN:** See Concern OS.2-2.
- CONCERN:** Lawrence Berkeley Laboratory does not fully comply with
(WS.4-9) 29 CFR 1910.253, Welding, Cutting and Brazing.
(H1/C1)
- CONCERN:** Hand tools, compressed air and portable electrical equipment at
(WS.4-10) the Lawrence Berkeley Laboratory do not fully comply with
(H2/C1) 29 CFR 1910.242, Hand and Portable Powered Tools and Equipment,
General.
- CONCERN:** Lawrence Berkeley Laboratory does not provide effective control
(WS.5-1) of fall protection to workers/employees during construction
(H1/C1) activity as required by 29 CFR 1926, Subpart L and M.
- CONCERN:** Lawrence Berkeley Laboratory does not assure that construction
(WS.5-2) contractors are using equipment in good repair and in compliance
(H2/C1) with Occupational Safety and Health Administration regulations as
required by 29 CFR 1926.20, General Safety and Health Provisions.
- CONCERN:** Lawrence Berkeley Laboratory does not enforce construction
(WS.5-3) electrical standards as required by 29 CFR 1926, Subpart K,
(H2/C1) Electrical.
- CONCERN:** Lawrence Berkeley Laboratory does not fully comply with
(WS.6-1) 29 CFR 1910.1200, Hazard Communication, or 29 CFR 1910.1450,
(H2/C1) Occupational Exposures to Hazardous Chemicals in Laboratories.

4.8.2.14 Industrial Hygiene

- CONCERN:** Insufficient resources have been allocated to the occupational
(IH.1-1) safety and industrial hygiene programs to meet mandatory
(H2/C1) Department of Energy and Occupational Safety and Health
Administration requirements as mandated by DOE 5480.10.
- CONCERN:** See Concern IH.2-1, Technical Safety Appraisal of the Lawrence
Berkeley Laboratory (DOE/EH-0096, February 1990).

CONCERN: Lawrence Berkeley Laboratory has not defined or implemented a
(IH.2-2) permit-required confined space program as required by DOE 5480.4
(H1/C1) and ANSI Z117.1-1989.
CAT II

CONCERN: Lawrence Berkeley Laboratory has not established or implemented a
(IH.2-3) program to ensure compliance with the Occupational Safety and
(H2/C1) Health Administration lead standard (29 CFR 1910.1025).

CONCERN: The Lawrence Berkeley Laboratory chemical carcinogen control
(IH.2-4) program was deficient in meeting Department of Energy and
(H1/C1) Occupational Safety and Health Administration requirements
CAT II mandated by DOE 5480.10.

CONCERN: Lawrence Berkeley Laboratory has not established a program of
(IH.2-5) periodic chemical monitoring as required by DOE 5480.10 and
(H2/C1) 29 CFR 1910.

CONCERN: The Lawrence Berkeley Laboratory respiratory protection program
(IH.2-6) has not been defined and implemented in a manner which ensures
(H2/C1) compliance with DOE 5480.4 and ANSI Z88.2-1980.

CONCERN: Lawrence Berkeley Laboratory has not established a system which
(IH.3-2) ensures that employees exposed to physical, biological, or
(H2/C1) chemical hazards are enrolled in a medical surveillance program
as required by Department of Energy or the Occupational Safety
and Health Administration.

4.8.2.15 Occupational Safety

CONCERN: See Concern OA.1-4.

CONCERN: The Safety Review Committee charter provides the authority to
(OS.1-1) approve waivers from all safety requirements in the LBL Health
(H3/C2) and Safety Manual (PUB 3000).

CONCERN: The Laboratory Occupational Safety and Industrial Hygiene Program
(OS.1-2) as presently documented does not address safety requirements for
(H3/C2) Lawrence Berkeley Laboratory personnel performing work in
University of California facilities.

CONCERN: Lawrence Berkeley Laboratory has not fully defined, established,
(OS.2-1) or documented a sitewide system for the systematic identification
(H2/C2) and correction of occupational safety and health related
deficiencies on a continuing basis.

CONCERN: Program documentation, monthly inspections of equipment, a lack
(OS.2-2) of high consequence lift requirements, and rigging practices do
(H2/C1) not conform to Occupational Safety and Health Administration
CAT II requirements or DOE 5480.4.

- CONCERN:** The Lawrence Berkeley Laboratory program for control of permanent
(OS.2-3) and portable ladders has not been effective in maintaining
(H2/C1) ladders in accordance with Occupational Safety and Health
Administration requirements in 29 CFR 1910, Subpart D.
- CONCERN:** The eye protection program at the Lawrence Berkeley Laboratory is
(OS.2-4) not clearly defined or uniformly implemented in accordance with
(H2/C1) DOE 5480.4 and ANSI Z136.1-1986.
- CONCERN:** OSHA logs were not accurately maintained in accordance with
(OS.4-1) 29 CFR 1904.
(H3/C1)

4.8.2.16 Fire Protection

- CONCERN:** Independent design review of fire protection construction
(FP.1-6) projects can be adversely affected by the fact that the Fire
(H2/C2) Protection Engineer is administratively under the Mechanical
Engineering Section in Plant Engineering.
- CONCERN:** There is no comprehensive documented fire protection program
(FP.1-7) from policy to implementation. (Also see Concern OA.1-4.)
(H2/C2)
- CONCERN:** Lawrence Berkeley Laboratory facilities do not meet requirements
(FP.2-2) of NFPA 101, Life Safety Code.
(H1/C1)
- CONCERN:** See Concern FP.4-2, Technical Safety Appraisal of the Lawrence
Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** See Concern FP.6-1 of the Technical Safety appraisal of the
Lawrence Berkeley Laboratory (DOE/EH-0096, February 1990).
- CONCERN:** Fire Department response has not been evaluated for special
(FP.6-2) hazard response and appropriate staffing provided to ensure
(H1/C1) adequate, trained response.
- CONCERN:** There is no formal mechanism to keep the prefire plans current.
(FP.6-3)
(H2/C2)
- CONCERN:** The San Francisco Operations Office does not evaluate fire
(FP.7-11) protection program requirements in accordance with DOE 5482.1B.
(H2/C1) (Also see Concern OA.1-5.)
- CONCERN:** Technical aspects of the fire protection program such as fire
(FP.7-12) protection facility surveys, trend analysis of fire alarms, and
(H2/C2) development of laboratory standards pertaining to fire risks are
not being accomplished.

4.8.2.17 Medical Services

CONCERN: A written Occupational Medical Plan does not exist as required by
(MS.2-1) DOE 5480.8.
(H3/C1)

CONCERN: Staffing levels do not meet minimum guidelines based on
(MS.3-1) population served as required by DOE 5480.8.
(H3/C2)

CONCERN: Medical surveillance of employees exposed to carcinogenic,
(MS.3-2) chemical, physical, and biological hazards cannot be assured as
(H2/C1) required by Occupational Safety and Health Administration
standards and DOE 5480.8.

CONCERN: The medical facility does not meet minimum standards required by
(MS.3-3) DOE 5480.8 or accepted industry standards of medical practice in
(H3/C1) that the facility is not large enough and does not provide
privacy.

APPENDIX B-2

Tabulation of Concerns

A. Organization and Administration

- CONCERN:** The responsibilities and authorities of each management, supervisory, and professional position are not uniquely defined and made available to the staff at large. Consequently, interfaces are not clearly defined.
(OA.1-1)
(H3/C2)
- CONCERN:** In some cases, staffing and resources are not adequate to ensure prevention or identification and timely correction of safety deficiencies.
(OA.1-2)
(H2/C3)
- CONCERN:** The present LBL UOR system does not ensure reporting of all events specified by DOE 5000.3 and DOE 5484.1, nor does it provide for adequate internal distribution.
(OA.2-1)
(H3/C1)
- CONCERN:** The systems and practices of procedural control and use in the lower tiers of the LBL organization are inconsistent, incomplete, unreliable, and not clearly defined.
(OA.2-2)
(H2/C2)
- CONCERN:** The enforcement of approved work practices and procedures is deficient, indicating inadequate management attention.
(OA.3-1)
(H2/C2)
- CONCERN:** The UC Health and Safety Policy statement does not demonstrate a strong commitment to safety.
(OA.4-1)
(H3/C2)
- CONCERN:** Line management oversight and enforcement does not ensure consistent conformance with safety and health policies, practices, and procedures.
(OA.5-1)
(H2/C2)
- CONCERN:** There is no control system that ensures current, appropriate documents are in the possession of LBL staff members having a need for them.
(OA.7-1)
(H2/C1)
- CONCERN:** There is no system that ensures documents such as procedures, records of analyses, test result records, etc. are maintained and retrievable.
(OA.7-2)
(H2/C2)
- CONCERN:** There is no clear policy that explicitly addresses fitness for duty of visitors, guests, or subcontractors at LBL.
(OA.8-1)
(H2/C2)

B. Operations

- CONCERN:** Established and documented performance requirements for logbooks and other operating records, including the responsibilities of those who must read and initial them, do not exist.
(OP.2-1)
(H3/C2)
- CONCERN:** A policy and implementing procedure covering the posting of operating aids in control rooms and adjacent to equipment does not exist.
(OP.3-1)
(H2/C2)
- CONCERN:** Because of the informal nature of the dissemination of information, essential pieces of information may not get communicated to those who need to know.
(OP.5-1)
(H3/C2)
- CONCERN:** Studies of the possibility of oxygen deficiency have not been kept up-to-date to reflect the increasing use of liquid nitrogen and/or other asphyxiants in confined spaces near the accelerators.
(OP.7-1)
(H2/C2)
- CONCERN:** The OSP for the 2-MeV Van de Graaff generator does not address the problem of possible neutron production in an unshielded area.
(OP.7-2)
(H2/C2)
- CONCERN:** Requirements for shift turnover for operating facilities have not been established and documented.
(OP.10-1)
(H3/C2)

C. Maintenance

- CONCERN:** A maintenance management program complying with DOE 4330.4 has not been implemented at LBL.
(MA.1-1)
(H3/C1)
- CONCERN:** The material condition of some real property, not directly associated with program activities, is significantly deteriorated and continues to deteriorate.
(MA.2-1)
(H2/C2)
- CONCERN:** The housekeeping in many laboratories, offices, and facilities is inadequate, is not in accordance with the requirements of the H&SM, and is inconsistent with 29 CFR 1910.22 and generally accepted industrial practices.
(MA.3-1)
(H2/C2)
- CONCERN:** A preventive maintenance program complying with the requirements of DOE 4330.4 has not been implemented.
(MA.4-1)
(H3/C1)
- CONCERN:** Work control is not in accordance with DOE 4330.3 and generally accepted industrial practices.
(MA.6-1)
(H3/C1)
- CONCERN:** Technical information and procedures for maintenance activities are not controlled by a system in accordance with DOE 1324.2A.
(MA.7-1)
(H3/C1)

CONCERNS: A machinery history program consistent with prudent industrial practices has not been implemented and maintained at LBL.
(MA.8-1)
(H3/C2)

D. Training and Certification

CONCERN: Complete records of each individual's safety training participation and performance are not maintained in an auditable manner.
(TC.1-1)
(H2/C2)

CONCERN: There is no requirement at LBL that training be provided in a timely manner for procedural changes or system modifications.
(TC.1-2)
(H2/C2)

CONCERN: There is no requirement at LBL that safety training not performed by EH&S be reviewed and audited for adequacy and appropriateness.
(TC.2-1)
(H2/C2)

CONCERN: On-the-job training requirements are not well identified, completed, and documented prior to assignment to tasks for independent performance.
(TC.3-1)
(H2/C2)

CONCERN: Qualification standards and evaluation methods to measure training were not established in some of the departments.
(TC.3-2)
(H2/C2)

CONCERN: Personnel performing radiological protection functions who are not assigned to EH&S are not provided formal continuing training necessary to perform their assigned job function.
(TC.5-1)
(H2/C2)

E. Emergency Preparedness

CONCERN: The Building Manager is a key component in the emergency response plan and may assume those responsibilities without adequate training, such as required for fire extinguishers by 29 CFR 1910.157, or, in some cases, management support.
(EP.3-1)
(H1/C1)

CONCERN: The LBL emergency exercise program does not effectively test all major aspects of the emergency preparedness program or fully explore means for making significant improvements as required by DOE N5500.3.
(EP.4-1)
(H1/C1)

CONCERN: The PA system used to provide emergency information to LBL personnel is not tested periodically as required in DOE N5500.3.
(EP.5-1)
(H2/C1)

F. Quality Verification

CONCERN: The IQAPP and QAPPs do not include independent verification of quality attainment and the selective application of the elements of recognized QA standards for safety and other activities as required by DOE 5700.6B.
(QV.1-1)
(H2/C1)

CONCERN: Requirements for material storage, metal certifications,
(QV.3-1) and retention of certifications are not formalized.
(H3/C2)

CONCERN: There is no LBL calibration policy for Measuring and
(QV.4-1) Test Equipment that applies to all divisions.
(H3/C2)

G. Technical Support

CONCERN: A formal policy governing the format, content, and use of
(TS.2-1) procedures has not been implemented.
(H3/C1)

CONCERN: Safety analyses are not being performed and maintained for
(TS.2-2) all facilities/operations in accordance with DOE 5481.1B
(H2/C1) Chg 1, SAN MD No. 5481.1, and H&SM.

CONCERN: A document control system does not exist at LBL to ensure
(TS.2-3) that the current revisions of documents and the correct
(H2/C2) documents are provided to the appropriate LBL staff members.

CONCERN: The control and documentation of design reviews of new
(TS.3-1) facilities, facility modifications, and the retention of
(H1/C1) the associated documents is not being accomplished in
accordance with DOE 6430.1A and generally accepted
engineering practices.

CONCERN: The designation of equipment as significant to safety
(TS.4-1) and program continuity is not adequate to permit the
(H3/C1) technical support activities to focus on individual
pieces of equipment as opposed to classes of equipment.

CONCERN: The level of testing afforded equipment considered important
(TS.4-2) to safety or program continuity is not being adequately
(H1/C1) controlled in accordance with DOE 5480.7 and DOE N5500.3.

CONCERN: On-line exhaust stack monitors have not been designed in
(TS.6-1) accordance with generally accepted engineering standards,
(H1/C2) ANSI N13.10-1974.

CONCERN: High efficiency particulate air filters are not regularly
(TS.6-2) tested in accordance with ANSI N510-1980.
(H3/C1)

H. Packaging and Transportation

CONCERN: The QA program is inadequate to assure that hazardous materials
(PT.1-1) transportation and shipping activities are conducted safely as
(H1/C1) required by DOE 5480.3.

- CONCERN:** There is no documented program for identification of existing and potential hazards in transportation and packaging.
(PT.1-2)
(H2/C2)
- CONCERN:** LBL departmental policies, procedures, and operating instructions for packaging and transportation safety are lacking in detail and are inadequate per DOE 5480.3.
(PT.3-1)
(H2/C1)
- CONCERN:** LBL does not have an effective internal management appraisal program for packaging and transportation activities.
(PT.4-1)
(H2/C2)
- CONCERN:** LBL is not in compliance with DOE 5480.3 and DOE 1540.1, with the result that numerous 49 CFR and California transportation requirements are not being met.
(PT.5-1)
(H1/C1)
CAT. II

I. Site and Experiment Safety Review

- CONCERN:** There is inadequate line management safety performance to assure that safety concerns requiring analysis and review are all properly identified and evaluated.
(SR.2-1)
(H1/C1)
- CONCERN:** There is no site-wide guidance for the performance and documentation of experiment safety reviews and approvals indicating facility or equipment management acceptance of potential operating hazards.
(SR.4-1)
(H2/C2)
- CONCERN:** Internal appraisal (internal review) coverage of health, safety, and emergency preparedness operations is deficient.
(SR.6-1)
(H2/C1)
- CONCERN:** There is no objective and independent review program for the EH&S function that meets the intent of DOE 5482.1B, Section 9d(2)(g).
(SR.6-2)
(H3/C1)

J. Radiological Protection

- CONCERN:** The performance and/or documentation of calibrations, design calculations, surveys, and safety assessments lack conformance to requirements in various national standards.
(RP.3-1)
(H3/C1)
- CONCERN:** Surveys with the minimum data required by ANSI N43.1 are not formally documented.
(RP.3-2)
(H3/C1)
- CONCERN:** LBL is not in conformance with ANSI N43.1 and ANSI N43.2.
(RP.3-3)
(H3/C1)
- CONCERN:** LBL's program of badging and access control is not in compliance with generally accepted standards.
(RP.4-1)
(H3/C2)

- CONCERN:** LBL has not conducted an analysis to determine compliance with required standards for the existing film dosimetry system. LBL lacks an effective implementation plan for achieving DOEELAP accreditation by the required date.
(RP.5-1)
(H3/C1)
- CONCERN:** Radiation workers do not consistently wear their personnel dosimeters in areas posted as requiring dosimeters.
(RP.5-2)
(H3/C2)
- CONCERN:** A system is not in place to accurately determine exposures to casual visitors of areas where unsealed radionuclides are handled.
(RP.7-1)
(H3/C2)
- CONCERN:** The traceability of the calibrations for portable survey instruments is not consistent with good practice and accepted Laboratory protocols.
(RP.8-1)
(H3/C2)
- CONCERN:** The LBL fixed active area monitoring program does not meet the requirements of ANSI N43.1 and ANSI N323.
(RP.8-2)
(H3/C1)
- CONCERN:** Contamination control practices observed at the National Tritium Laboratory Facility are inconsistent with good practice.
(RP.10-1)
(H3/C2)
- CONCERN:** The records management program relating to health and safety records is inconsistent with DOE 1324.2A, ANSI N13.6, and ANSI N43.1, and records are improperly recorded, identified, and maintained by LBL.
(RP.12-1)
(H3/C1)

K. Industrial Hygiene

- CONCERN:** Management has not established clear standards, directives, and guidelines to assure the uniform implementation of health and safety practices.
(IH.2-1)
(H2/C2)
- CONCERN:** The EH&S role does not include an adequate proactive assurance, independent oversight, and hazard evaluation component.
(IH.3-1)
(H2/C2)
- CONCERN:** Oversight, monitoring, documentation, and establishment of performance criteria for asbestos abatement actions are inadequate to assure a safe and proper operation, and are inadequate to demonstrate compliance with 29 CFR 1926.58.
(IH.5-1)
(H1/C1)
- CONCERN:** Laser operations are not in complete compliance with LBL laser safety procedures and ANSI Z136.1-1986.
(IH.5-2)
(H1/C1)

CONCERN:
(IH.5-3)
(H1/C2)

Good practices for the use and storage of hazardous chemicals are not applied consistently throughout the site.

CONCERN:
(IH.6-1)
(H2/C1)

Hazard communication systems are not in full conformance with LBL policies and procedures DOE 5483.1A, and referenced 29 CFR 1910.1200.

L. Occupational Safety

CONCERN:
(OS.5-1)
(H1/C1)
CAT. II

Known safety hazards and code violations are not corrected in a timely manner.

M. Fire Protection

CONCERN:
(FP.1-1)
(H2/C2)

Authority to enforce fire protection codes, standards, and Orders is not established at LBL.

CONCERN:
(FP.1-2)
(H1/C1)

The Advanced Materials Laboratory is not constructed in accordance with the Uniform Building Code for occupancy by hazardous materials laboratories.

CONCERN:
(FP.1-3)
(H3/C2)

There is no stated policy for LBL fire safety and for the direction of the fire protection program.

CONCERN:
(FP.1-4)
(H1/C1)

Early and continuing fire protection engineering review is not required by LBL in the design or modification of facilities to assure the adequacy of fire protection features as required by DOE 5480.7-10.b.(1) and DOE 6430.1A-0110-6.2.

CONCERN:
(FP.1-5)
(H1/C1)

Regular self-inspections, fire loss potential reviews, and appraisals to identify the nature, location, and severity of fire risks, as well as to determine the adequacy of fire loss control devices and activities, are not being conducted as required by DOE 5480.7-10.b.(2).

CONCERN:
(FP.2-1)
(H1/C1)
CAT. II

Conformance with NFPA 101 Life Safety Code as required by DOE 5480.7-9.1.(1) is not maintained at LBL and verified by periodic inspection.

CONCERN:
(FP.3-1)
(H2/C1)

It has not been determined, based upon a quantitative analysis, that an offsite release of hazardous amounts of toxic and radioactive materials will not occur under maximum credible fire conditions as per DOE 5480.7-9.a.(3).

- CONCERN:**
(FP.4-1)
(H3/C1) A credible fire could result in program interruption in critical facilities at LBL or in another DOE-owned facility in excess of the limits established by DOE 5480.7-9.(b).
- CONCERN:**
(FP.4-2)
(H3/C1) Fire Hazards Analysis Reports, Fire Risk Assessment Reports, or similar documents have not been prepared to evaluate the potential for interruption of operations due to a credible fire that may exceed the limits specified in DOE 5480.7-9.(b).
- CONCERN:**
(FP.5-1)
(H1/C1) The maximum credible and maximum possible fire loss values may exceed the property damage limits established in DOE 5480.7-9.(c).
- CONCERN:**
(FP.5-2)
(H3/C1) Fire Hazards Analysis Reports, Fire Risk Assessment Reports, or similar documents have not been prepared to evaluate the potential for property losses due to a credible fire that may exceed the limits specified in DOE 5480.7-9.(c).
- CONCERN:**
(FP.6-1)
(H1/C1) Fire Department operations are only in partial compliance with NFPA 1500, Standard on Fire Department Occupational Safety and Health Program.
- CONCERN:**
(FP.7-1)
(H2/C1) The use of ordinary lumber is not controlled to assure that non-combustible or better construction is maintained as required by DOE 5480.7-10.b.(6).
- CONCERN:**
(FP.7-2)
(H1/C1) Automatic sprinkler protection is not provided to protect areas with combustible construction or contents that present a significant potential for property damage or program impact as required by DOE 5480.7-10.b.(11). Examples of such areas are found in Bldg. 51B and the platform in Bldg. 52.
- CONCERN:**
(FP.7-3)
(H2/C1) Regular self-inspections are not conducted to assure the adequacy of general housekeeping and protection as required by DOE 5480.7-10.b.(2).
- CONCERN:**
(FP.7-4)
(H1/C1) Flammable liquids use and handling at LBL is not in conformance with applicable NFPA standards.
- CONCERN:**
(FP.7-5)
(H1/C1) The storage of magnetic tapes in the data processing rooms in Bldg. 50B is not in conformance with NFPA 75, Electronic Data Processing Equipment, and DOE EP-0108, Standard for Fire Protection of Electronic Computer/Data Processing Systems.
- CONCERN:**
(FP.7-6)
(H2/C2) The use of combustible, insulated electrical cables is not controlled in facilities at LBL.
- CONCERN:**
(FP.7-7)
(H1/C2) Fire protection engineering review and approval is not required or necessarily performed prior to the initiation of new experiments at LBL.

- CONCERN:** Sprinkler system and water supply system control valves,
(FP.7-8) fire and water flow alarm systems, and fire pumps are
(H1/C1) not tested and inspected at the frequencies, and
with appropriate corrective action taken, as required by
NFPA Standards and DOE guidance.
- CONCERN:** Employees expected to use portable fire extinguishers are not
(FP.7-9) trained in their use as required by DOE 5483.1A and 29 CFR
(H1/C1) 1910.157.
- CONCERN:** Water pressure at fire hose connections in LBL facilities
(FP.7-10) exceeds the 100 psi limit established in NFPA 14, Standpipe
(H1/C1) and Hose Systems.

4.9 TEAM COMPOSITION AND AREAS OF RESPONSIBILITY

<u>Area of Responsibility</u>	<u>Name/Organization</u>
EH Senior Manager	O. D. T. Lynch, Acting Director Office of Safety Appraisals Department of Energy
Team Leader	Richard H. Lasky Office of Safety Appraisals Department of Energy
Organization and Administration	Bernard R. Kokenge BRK Associates, Inc.
Quality Verification	Jacques B. J. Read Office of Quality and Safety Programs Department of Energy
	C. Frederick Fiege Office of Quality and Safety Programs Department of Energy
	Howard E. Rew, Jr. Westinghouse Hanford Company
Operations	William J. Zielenbach Battelle
	Joseph J. Shonka Shonka Research Associates, Inc.
Maintenance & Auxiliary Systems	Charles R. Jones SCIENTECH, Inc.
Training and Certification	Robert Tayloe Battelle
Emergency Preparedness	George P. Bailey Advanced Systems Technology, Inc.
Technical Support	Woodson B. Daspit WBD Consulting Corporation
Packaging and Transportation	John W. Arendt John W. Arendt Associates, Inc.
Experimental Activities & Site/Facility Safety Review	Leon H. Meyer The LHM Corporation

Radiation Protection

Linda F. Munson
Evergreen Innovations, Inc.

Joseph J. Shonka
Shonka Research Associates, Inc.

Neil Barss
Office of Health Physics
and Industrial Hygiene
Department of Energy

Thomas Tuccinardi
Office of Health Physics
and Industrial Hygiene
Department of Energy

**Personnel Protection &
Industrial Hygiene**

Ronald E. Alexander
Environmental Management Associates

Worker Safety

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Jack J. Janda
Karen G. Rawlings
National BioSystems, Inc.

Deana L. Colley
Westinghouse Hanford Company

David Drury
Private Consultant

Thomas H. Lovatt
Kaiser Engineers Hanford

William R. Murphy
Murphy & Associates

Fire Protection

Jerry D. Davidson
Richland Operations Office
Department of Energy

Medical Services

Bernard S. Zager, M.D.
Private Consultant

Report Support, Observers and Liaison

Coordinators

Ann Bowden
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Larry D. Warren
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Operations Off. Representative

Joe Juetten
San Francisco Operations Office
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5.0

MANAGEMENT ASSESSMENT

5.0 MANAGEMENT ASSESSMENT

5.1 PURPOSE

The Management Subteam conducted a management and organization assessment of ES&H programs and their implementation at LBL. The objectives of the assessment were to (1) evaluate the effectiveness of existing management functions and processes in terms of ensuring environmental compliance and the health and safety of workers and the general public; and (2) identify probable root causes for ES&H findings and concerns.

5.2 SCOPE

Organizations reviewed were DOE Headquarters (the Office of Energy Research (ER) and the Office of Environmental Restoration and Waste Management (EM)), SAN, LBL and its landlord, the University of California (UC), and various Federal, state, and local regulators.

The scope of the assessment covered ES&H management issues (i.e., organization, planning, controls, communication, culture, and commitment); policies and procedures; authority, responsibility, and delegations; resources (including budgeting), training (including qualifications), quality assurance, emergency preparedness, internal oversight, and appraisal and followup. DOE and LBL management configurations were reviewed to ascertain the existing lines of authority, responsibility, and accountability for ES&H and the degree of effectiveness of oversight between DOE Headquarters, SAN, UC, and LBL.

Interviews were conducted with DOE and LBL senior, middle, and first-line management; working level staff; and UC senior management. Documents reviewed included DOE and SAN Orders; SAN Management Directives; the DOE-UC contract for management and operation of LBL, policies and procedures manuals; mission and function statements; strategic plans; implementation plans; budgeting and financial reports and records; audit, appraisal, and surveillance reports; information from manual and computerized tracking systems; self-assessment reports; job descriptions; individual performance plans and appraisals; and training materials and records.

5.3 APPROACH

The Management Subteam conducted its assessment in accordance with the Tiger Team Guidance Manual, (February 1990). The subteam coordinated with the Environmental and the Safety and Health Subteams to share information and ideas on management issues identified during the Tiger Team Assessment, as well as to identify management issues that might be common to the findings of all subteams. The causal factors identified by all subteams were considered in the evaluation of probable root causes.

The Management Subteam was aided in its evaluation by the draft "Management Performance Objectives and Criteria for Tiger Team Assessments." These performance objectives and criteria were one element used to evaluate findings gathered during the course of the review.

Initially, the subteam developed an understanding of DOE Headquarters (ER and EM), SAN, and LBL senior management and expectations for management of ES&H activities. In addition, the subteam was briefed by the Office of the

Inspector General on the results of its recent management assessment of SAN. This was followed by a review of supporting documentation describing the organization, roles, policies, plans, procedures, performance criteria, and funding for ES&H organizational elements, operations, and programs at LBL. Next, the subteam conducted interviews and developed an understanding of the perceptions of DOE Headquarters, SAN, LBL and UC personnel concerning ES&H activities at LBL, how current practices conform to senior management's ES&H policies and goals, and the adequacy of supporting documentation.

The subteam's own observations were supplemented through coordination with the Environmental and the Safety and Health Subteams. Preliminary data and conclusions were developed, checked, and factually validated through further document reviews and followup discussions with managers and staff at SAN and LBL.

5.4 MANAGEMENT ASSESSMENT SUMMARY

LBL, operated by UC, carries out a multidisciplinary research program for DOE with major funding for research and site infrastructure needs provided by ER. LBL is recognized as one of the premier scientific institutions in the world and is enriched by its close interactions with the adjacent University of California at Berkeley (UCB) campus. Many LBL staff hold joint appointments at LBL and UCB. The management culture at LBL reflects this close association with the University and stresses independence and autonomy, with limited central management guidance, for its research activities.

LBL's culture is generally receptive to the increased emphasis being placed on ES&H. The Tiger Team Assessment found an increasing awareness of ES&H throughout the LBL organization. An "Organizational Cultural Assessment of the Lawrence Berkeley Laboratory" (Draft BNL Technical Report 04174-1/91) was performed by Brookhaven National Laboratory (BNL) at LBL shortly before the start of Tiger Team activities. The resulting organizational profile on the values, attitudes and beliefs of the individuals working at LBL was positive. Even though the Organizational Cultural Assessment (OCA) was not focused on ES&H, the results were consistent with the observations of the Tiger Team.

Over the past few months, LBL management has placed considerable emphasis on ES&H. A large part of its effort was to prepare a self-assessment report, but additional efforts were made. There have recently been several reorganizations at LBL. The current organization was established in December 1990 and, as described by LBL, is designed to enable LBL to respond to new ES&H requirements and emphasis, while minimizing any negative impacts on its scientific mission. The LBL planning process is a well-established mechanism that communicates the Laboratory's strategic views, major initiatives, research programs, infrastructural plans and resources data to DOE. In the development of individual plans for site infrastructural needs and major construction initiatives, there is evidence that ES&H needs are considered. What is not evident is the integration of ES&H planning and budgeting into Laboratory-wide strategic and program planning.

LBL conducted a comprehensive self-assessment of its ES&H activities. Overall, there was adequate coverage of the lines of inquiry and a reflection of insight into the condition of LBL's management and organization.

It is evident that ES&H awareness is increasing at both LBL and SAN. However, the Tiger Team observed that the following root causes need correction if an effective sustainable ES&H program is to be implemented.

- LBL's management style, which has served it well for attaining scientific excellence, does not accommodate the formal requirements of the ES&H program.
- The pervasive nature of the ES&H program, with its requirements for new expertise and the urgency of its implementation on a revolutionary rather than evolutionary timeframe, has overwhelmed all levels of the Laboratory.
- DOE's established practices in program direction and oversight of LBL have not emphasized ES&H requirements.

There has been a significant amount of recent activity at LBL and DOE designed to bring greater formality and oversight to the performance of ES&H at LBL. Most of these initiatives are in the planning stage; many of them are so new that they are not fully developed, well-understood or communicated. This raises some concern as to the ability of these organizations to accomplish full implementation of ES&H requirements. The challenging task that lies before LBL and DOE management is to sustain this momentum, build upon it, and bring the Laboratory to ES&H excellence.

5.5 MANAGEMENT FINDINGS

5.5.1 Planning and Resource Allocation

FINDING MF-1: Integration of ES&H Planning With Strategic and Program Planning

Performance Objective

ES&H plans and programs are an integral part of the sitewide planning and budgeting process.

Finding

Lawrence Berkeley Laboratory does not adequately integrate environment, safety, and health planning and budgeting into strategic planning and program planning and budgeting.

Discussion

Neither sitewide strategic planning nor subordinate implementation planning address all programmatic and ES&H activities on an integrated and prioritized basis.

The LBL Institutional Planning process is a well-established planning medium that communicates the Laboratory's strategic view, major initiatives, research programs, infrastructure plans, and resource data to DOE. Feeder plans and planning processes are in place which address the majority of the Institutional Plan elements. The Long-Range Site Development Plan addresses land, facility, and infrastructure status, needs, and plans. Individual plans exist with tentative priorities set for General Plant Projects (GPP), General Purpose Equipment (GPE), and Multiprogram Energy Laboratory Facilities Support (MEL-FS) projects. Individual plans exist for proposed major initiatives as they do for the various research areas via Field Work Proposals.

In the development of individual plans such as GPP, GPE, MEL-FS, and major program initiatives, there is evidence of ES&H considerations and needs factored into planning. This is especially evident in MEL-FS and GPP planning where priority is currently being given to ES&H-driven and related projects. In major initiatives planning, there is evidence of ES&H requirements being integrated into the conceptual design of new scientific program facilities.

What is not evident is the integration of ES&H planning and budgeting into research programs. The Preliminary Data Package prepared by LBL in advance of ER's On-Site Review, the On-Site Review, and the Institutional Plan, all viewed by ER as extremely important oversight and communication vehicles, treat ES&H as a management issue and infrastructure issue separate from the research programs.

LBL is generally not planning and budgeting for ES&H activities via any analytical methodology that assesses ES&H risks and program/site vulnerabilities. MEL-FS and GPP budgeting do use criteria which emphasize ES&H in setting priorities. The overhead budgeting process does not adequately provide for trade-off decisions to be made between achieving programmatic and ES&H objectives. In the existing internal system, overhead

funding for ES&H is in competition with the other support elements of the overhead pool with the Laboratory extremely concerned by the possible adverse impacts of increasing overhead funding. This results in ES&H support funding decisions being predominantly determined on a fiscal basis rather than any analytical or risk assessment basis.

Self-Assessment

This finding was identified in the LBL Self-Assessment. The LBL Self-Assessment findings were consistent with this finding; although, inadequate discussion was presented.

FINDING MF-2:**LBL Resource Allocation For ES&H Needs****Performance Objective**

ES&H plans and programs are an integral part of planning and budget formulation and execution processes.

Finding

Lawrence Berkeley Laboratory has neither identified nor allocated sufficient resources to maintain the laboratory infrastructure and provide for sufficient environment, safety, and health staff.

Discussion

The internal LBL process for identification of needs, both funding and personnel, is a functioning, well-understood system. The mechanisms for each LBL organizational entity to justify and defend its requests are in place. For ES&H support activities, this is primarily via overhead funding. General Plant Projects (GPP) funding, General Purpose Equipment (GPE) funding, and Multiprogram Energy Laboratory Facilities Support (MEL-FS) funding are also sources, particularly for infrastructure funding needs.

Historically, LBL has not placed a high priority on allocating funds for ES&H activities. LBL's data indicates that for the period FY 1987 through FY 1989, ES&H operations remained almost flat with funding increases just slightly ahead of inflation. GPP, GPE, and MEL-FS funding did increase, particularly because of the Waste Handling Facility. Staffing data indicates that ES&H staff remained level during this time at approximately 38 full-time equivalents (FTEs). In FY 1990, ES&H operations funding increased while capital and plant funding decreased, leaving the overall ES&H program at approximately the same level as FY 1989. This recent history of inadequate resource allocation has contributed to the number and range of the Tiger Team findings and concerns. LBL's shortage of qualified ES&H personnel is addressed in several Environmental Subteam findings and Safety and Health Subteam concerns. Environmental Subteam findings have called out inadequate resources as a causal factor in several of their findings (see Section 3.0, Findings IWS/CF-6, WM/CF-4, A/CF-6, and SW/CF-2). A Safety and Health concern is that LBL does not have sufficient trained and professional resources to implement the three-tier ES&H program initiative (see Section 4.0, Concern OA.1-4). The DOE budgeting process requires identification and justification of needs approximately 2 years in advance for inclusion in budget requests to Congress. However, overhead funding priorities can be revised with little or no lead time.

LBL has allocated increased resources for ES&H activities for FY 1991. Not including Environmental Restoration and Waste Management (ERWM) direct funding, which is included in LBL's data, ES&H operations funding has increased approximately 25 percent over FY 1990. A large increase in plant and capital funding over FY 1990 combined with the operations funding increase results in total ES&H funding almost doubling over FY 1990. While this increased priority for ES&H funding is recognized, the lead time necessary to acquire additional staff and to effectively use plant and capital funding will preclude the current situation being remedied in the near future.

Self-Assessment

This finding was partially addressed in the LBL Self-Assessment. LBL findings were deficient in recognizing the breadth of the problem and discussing its impact.

5.5.2 Organization

FINDING MF-3: Organizational Roles, Responsibilities, and Authorities at LBL

Performance Objective

The organizational structure provides a clear understanding of the functions, responsibilities, authorities, and accountabilities of the site organization.

Finding

Lawrence Berkeley Laboratory has not fully developed organizational roles, responsibilities, and authorities throughout all levels of the Laboratory to ensure that environment, safety, and health requirements are implemented in an effective and sustainable manner.

Discussion

During the past year, there have been several LBL reorganizations. The current LBL organization was established in December 1990. These organizational changes, as described by LBL, have been designed to enable LBL to respond to new ES&H requirements and emphasis while, at the same time, minimize any negative impacts on its scientific mission.

A principal change is the establishment of a Scientific and Technical Resources Directorate (ALDSTR) responsible for the Engineering and the Information and Computing Sciences Divisions, as well as for the Environmental Protection, Health & Safety Division (EPHS) and for the development of sitewide QA plans and programs. Furthermore, the ALDSTR manages the site-related program funded by DOE's Office of Environmental Restoration and Waste Management (EM).

Another key feature of the reorganization is the newly created Office of Planning and Assurance (OPA). This office provides a principal interface with DOE, regulatory agencies, and the outside community on ES&H matters and "carries out environment, health and safety planning for the Laboratory." Within the OPA, an Independent Review and Assurance Department (IRAD) has been established and charged with performing internal independent assessments of ES&H programs and ensuring that quality assurance systems are being effectively implemented.

Examination of these organizational changes suggests that there are elements which are in need of clarification. For example, the ERWM split between ALDSTR and OPA is unclear. The critical interfaces and accountabilities in this area have not been delineated. Similarly, the interrelationship between the IRAD and the Safety Review Committee has not been defined (see Section 4.0, Concern FR.1-1).

Furthermore, within EPHS, the Environment and Safety Hazards Control Department (ESHC) organization charts display both organizational units and functional responsibilities without any apparent rationale for the differentiation (see Section 4.0, Concerns OA.1-3 and OS.1-1). This could raise problems of overlapping and confused responsibilities and authorities (see Section 4.0, Concern RP.1-1).

A draft document entitled "Environment, Health, Safety and QA Responsibilities of Laboratory Support Organizations" (December 21, 1990), sets out, in outline form, the intended responsibilities of the Laboratory's ES&H support functions. The document is sketchy and fails to address in any detail the critical ES&H interfaces that occur between support groups and line organizations. There is no indication whether or when the document will be finalized.

Organization charters do not exist at all levels of the Laboratory. There is not a sitewide policy or procedure to provide charters to delineate the ES&H roles, responsibilities, and authorities of each organizational unit (see Section 3.0, Finding TCM/BMPF-1).

Self-Assessment

The LBL Self-Assessment partially identified this issue, but did not address many of its key elements.

FINDING MF-4:**Relationship Between Line and ES&H Support Organizations****Performance Objective**

Interface and functional relationships between the line organization and the staff groups that provide ES&H support are well defined and understood.

Finding

Lawrence Berkeley Laboratory has not developed a comprehensive, integrated management plan or policy which addresses how line organizations acquire the environment, safety, and health (ES&H) expertise needed to meet their ES&H responsibilities.

Discussion

No LBL policy exists which requires that responsibilities, authorities, or interfaces of organizational units be defined, nor does any single document or group of documents contain them. Organizational charters do not exist at all levels of the Laboratory. Where they do exist, they seldom address authorities or interfaces.

LBL management has not formally determined the manner in which it intends to organize its existing ES&H expertise and the additional ES&H personnel it plans to hire. Management may choose to place all ES&H expertise either in the line, or in a support organization, or divide it among the two. There is an indication that management currently leans toward an approach which provides the predominant ES&H expertise to the line by matrixing ES&H professionals to line managers. In a letter to the Laboratory Director dated February 7, 1991, the ALDSTR briefly describes "the tentative plans" to establish such a matrix arrangement. However, the details are too sketchy to determine whether the "plan" will be effective.

In the absence of a central policy or plan, several of the scientific divisions have sought to meet their ES&H line management responsibility by establishing, within their line organizations, ES&H expertise to advise on needs and requirements (including compliance status and interpretations), and to provide liaison with ES&H support groups (see Section 4.0, Concern AO.1-4). Such actions have taken place, for example, in the Accelerator & Fusion Research Division and in the Research Medicine & Radiation Biophysics Division. In the latter instance, the position of Environmental Protection, Safety and Health Assurance Manager was established with some very substantial duties and responsibilities. Some of these divisional actions may provide models for sitewide application; others may have to be rescinded if and when management sets policy in this area.

Until such time as management establishes a sitewide policy and a definitive plan, ES&H programs will be implemented with differing effectiveness throughout the Laboratory, depending upon the ingenuity, resources and ES&H commitment of the various division directors.

Self-Assessment

The LBL Self-Assessment partially identified this issue.

5.5.3 ES&H Roles, Responsibilities, and Authorities

FINDING MF-5: Individual ES&H Roles, Responsibilities, and Authorities

Performance Objective

The ES&H roles, responsibilities, and authorities of all line and support personnel are clearly defined, formally communicated, and understood.

Finding

Individual environment, safety and health roles, responsibilities, and authorities have not been clearly defined or formally communicated throughout Lawrence Berkeley Laboratory.

Discussion

There is neither Laboratory-wide formal definition communication and nor understanding of individual roles, responsibilities, and authorities (RRAs). The guiding LBL policy for establishing individual performance expectations and job descriptions, Regulations and Procedures Manual (PUB 201) is not being implemented uniformly or in sufficient detail to define ES&H RRAs.

LBL management recognizes line management's responsibility for ES&H performance. Since the majority of LBL's ES&H expertise is centralized in the Scientific and Technical Resources Directorate (STRD), program divisions must rely on expertise within the STRD for day-to-day support. The success of this approach is founded on the clear definition and communication of RRAs throughout program divisions and EPHS. It is particularly important that individual RRAs and interfaces between program divisions and STRD are formalized and clearly understood. The Environmental Subteam identified an example of confused RRAs and interface relationships: "there is no formal description of the PCB Coordinator in the LBL management organization, nor are there any written protocols defining the responsibility of that position" (see Section 3.0, Finding TCM/BMPF-1).

The Health and Safety Manual (PUB 3000), Chapter 1, paragraph 3 contains "Performance Expectations" for each employee. While these expectations provide a broad framework for each employee, they do not establish individual, job-specific RRAs. The lack of individual RRAs has led to confusion throughout LBL. For example, there is general sitewide confusion about who has stop work authority for an activity which has a potential ES&H impact (see Section 5.0 , Finding MF-8).

The Laboratory-wide failure to fully develop and uniformly implement a guiding LBL policy for establishing RRAs is reflected in the differing approaches of program divisions towards incorporating specific ES&H expectations in individual job descriptions and performance appraisals (see Section 4.0, Concern OA.6-1). With the possible exception of the Accelerator and Fusion Research Division (AFRD), program divisions have done little more than to begin incorporating broad ES&H performance expectations in individual performance appraisals. The AFRD has directed that specific, focused ES&H job descriptions and performance expectations be developed throughout the division. LBL has a draft Policy and Procedure Memo, "Modifications to the

Annual Performance Review Forms" to remedy this situation. However, there is not yet a concept for clearly and formally communicating individual RRAs sitewide.

Self-Assessment

LBL recognized many of the deficiencies embodied in this finding (e.g., incomplete job descriptions) but, with the exception of confusion about stop work authority, did not recognize other consequences (e.g., ambiguous interface relationships).

FINDING MF-6:**DOE Line Roles, Responsibilities, and Authorities****Performance Objective**

Line responsibilities, authorities and accountabilities for ES&H oversight of contractor activities are reflected in the line organizations at DOE Headquarters, field offices, and site offices.

Finding

The Department of Energy program office with primary responsibility for Lawrence Berkeley Laboratory has not formally defined or clearly communicated the environment, safety and health roles, responsibilities, and authorities of the San Francisco Operations Office.

Discussion

The line of responsibility and authority for programmatic direction has flowed directly from the DOE Headquarters Office of Energy Research (ER) to LBL, with SAN's role having primarily been institutional oversight. The recent realignment to have SAN report to ER, and the ES&H requirements associated with ER's landlord responsibilities may modify SAN's role in management and oversight of LBL. There is currently an uncertainty in ER's expectations of SAN with respect to the line management of programs including ES&H compliance, emergency management, and laboratory operations at LBL. The draft Memorandum of Understanding (MOU) between ER and SAN, which would define SAN roles, responsibilities and authorities (RRAs), is still being negotiated.

Since the MOU between ER and SAN has not been formalized, SAN has been unable to finalize a comprehensive plan to support the ER mission at LBL. As a result, SAN cannot forecast the number of staff, the skill mix and the experience needed in the LBL Site Office. In addition, the absence of formalized RRAs between SAN and ER severely constrains SAN's ability to conduct effective day-to-day program-related ES&H oversight of LBL. For example, since the authority of the LBL Site Office Manager has not been formalized by an MOU, it is difficult for LBL to understand which DOE organization to interface with on specific ES&H issues (e.g., see Section 3.0, Finding IWS/CF-6 "... a failure of SAN to explicitly define its oversight roles and interactions with LBL...").

Self-Assessment

This issue was addressed in the SAN Self-Assessment.

FINDING MF-7:

Building Manager System

Performance Objective

Staff with ES&H responsibilities fully understand their responsibilities, authorities and accountabilities and are properly trained to carry out their assigned duties.

Finding

The Building Manager system, a key component of the Lawrence Berkeley Laboratory environment, safety, and health program, evidences serious deficiencies in formality of operation, training, and understanding of responsibilities and authorities.

Discussion

LBL Building Managers are key components in the Laboratory's ES&H program implementation. They are especially critical in carrying out emergency response plans (see Section 4.0, Concern EP.1-1). Their considerable responsibilities are delineated in the Health and Safety Manual (PUB 3000) and in an LBL Administrative Memo, but these documents provide little guidance on how they are to carry out these responsibilities.

The Building Manager position is a collateral duty. While Building Managers are considered volunteers, in practice, they are expected to "volunteer" when selected by their supervisors. There are no written criteria for selection, tenure, or removal. There are no apparent incentives to volunteer, nor any rewards for service. There are no formal written appointments for deputy or assistant Building Managers (see Section 4.0, Concern EP.1-2).

There are no written policies or procedures describing how Building Managers interface with ES&H professionals, building safety committee members, safety coordinators, fellow employees, visitors, and regulators and what authorities they have with respect to such personnel.

There are no regularly scheduled meetings among Building Managers to share concerns and experiences.

Interviews and observations by the Tiger Team indicate that most Building Managers are inadequately trained (see Section 4.0, Concern EP.1-2). In light of such training inadequacies, it is unrealistic to expect Building Managers to fulfill their responsibilities. This has serious implications for ES&H activities, particularly emergency preparedness.

In the emergency preparedness exercise conducted by LBL for the Safety and Health Subteam, the Tiger Team observed that Building Managers:

- were poorly trained,
- did not exhibit good command and control over their respective building occupants,
- did not display effective coordinated responses to simulated emergency situations,

- were frequently bypassed by responding emergency response teams,
- were using equipment (e.g., bullhorns and radios) in poor condition,
- did not control access or egress for assigned buildings, and
- did not use emergency plans or emergency plan implementing procedures.

Self-Assessment

The LBL Self-Assessment identified this issue. Proposed actions are appropriate.

FINDING MF-8:

Stop Work Authority

Performance Objective

Decision authorities, including the authority to stop work, are placed at the lowest levels of management or staff with the competence to make them.

Finding

Lawrence Berkeley Laboratory has not clearly defined, documented, and communicated the nature, extent, and delegation of stop work authority throughout the organization.

Discussion

Stop work authority is a fundamental element in ensuring that certain defined activities with potentially adverse ES&H consequences are curtailed at the earliest possible time. Interviews conducted by the Tiger Team indicated that stop work authority is not widely understood at all levels of the Laboratory. Many of those who have full authority do not understand how to exercise it and could not identify the source of their authority.

Various LBL documents address the issue of stop work authority. For example, the Health and Safety Manual (PUB 3000) provides a broad framework for each person performing work at LBL. It states the expectation that each person will "immediately stop work in the event of danger to persons and property and notify the appropriate supervisor and building manager and the Environmental Health and Safety Department (EH&S)." While this addresses an aspect of stop work authority, that is, it deals with the authority of an individual to stop working under certain conditions, it does not afford anyone the authority to stop work other than his/her own.

Other portions of the Health and Safety Manual (PUB 3000) delegate full stop work authority to ESHC specialists and construction inspectors, and to Building Managers. However, in most instances such authority is limited to "life hazard or major property damage," "unsafe operations," and "life-safety or hazard of severe injury." These grants of authority do not address environmental concerns.

Self-Assessment

The LBL Self-Assessment partially identified this issue.

5.5.4 Staff Development and Training

FINDING MF-9: LBL ES&H Training Programs

Performance Objective

Formal sitewide programs for staff development, training and certification ensure that only fully qualified personnel are assigned to and implement ES&H programs.

Finding

Lawrence Berkeley Laboratory has not established a sitewide policy that addresses environment, safety and health training and certification requirements nor has it implemented a systematic approach to training to ensure that these requirements are met in a timely and efficient manner.

Discussion

LBL ES&H training and certification efforts have been characterized by a number of deficiencies including the following:

- Lack of timely compliance with ES&H mandatory training requirements such as DOE Order 5480.11 and 29 CFR 1910.1200 (see Section 4.0, Concern TC. 4-1).
- Inadequate training for line personnel with major ES&H job functions, such as line safety and environmental representatives and Building Managers (see Section 5.0, Finding MF-7).
- Lack of a systematic approach to analyzing and defining ES&H training requirements (identified in the 1989 LBL TSA).
- Inadequate standardization and uniformity of training programs across divisions.
- Insufficient training of managers and supervisors in ES&H requirements.
- Fragmented training records due to lack of integration of training record systems maintained by individual divisions, the personnel department, and EPHS (identified in the 1989 LBL TSA).
- Lack of coordination of funding and resource support for training program development and implementation.

Underlying the majority of the above deficiencies is the lack of a comprehensive, sitewide training policy, plan, or program with defined roles and responsibilities for meeting mandatory ES&H training and certification requirements. There is an LBL policy on education and employee development which sets forth the responsibilities, scope, and general provisions for professional development activities. However, the policy does not address mandatory ES&H training requirements. Without sufficient central guidance, there generally is a lack of coordination among the groups who share responsibilities for ES&H training and certification including individual line

divisions, EPHS, and the Personnel Department. In particular, there is a lack of definition of the interfaces between line divisions and the EPHS training group (staffed by one person) in regard to responsibilities and EPHS support obligations. Also, there is little central guidance for defining budgetary responsibility for training efforts.

Self-Assessment

The LBL Self-Assessment addressed this issue.

FINDING MF-10:**Supervisor and Manager Training****Performance Objective**

Formal sitewide programs for staff development, training, and certification ensure that only fully qualified personnel are assigned to and implement ES&H programs.

Finding

The Lawrence Berkeley Laboratory program for professional development of supervisors and managers does not include adequate environment, safety, and health training.

Discussion:

LBL offers a generous employee education and development program which encourages employees to enhance their job-related skills and to improve career opportunities. However, the existing employee education and development program has four significant deficiencies in terms of professional development, training, and education in management and supervisory skills.

There is insufficient training and development of supervisors and managers. There is an LBL policy on education and employee development which sets forth the responsibilities, scope, and general provisions for professional development activities. The policy, however, does not require that personnel in supervisory and management positions receive any training to improve their management position-related skills, and nor does it provide any guidelines for providing training to supervisory and management personnel.

Of the supervisory and management training courses that are offered by the Personnel Department, none provide instruction in ES&H requirements or systematically cover the ES&H responsibilities of supervisory and management personnel. EPHS offers a "Hazards Communication Training for Supervisors" course for which EPHS was awarded a DOE Training Resource and Data Exchange (TRADE) award. However, this training has not been implemented consistently sitewide.

There is no formal training or information program to periodically update LBL managers on DOE ES&H requirements, successful practices and achievements at other DOE facilities, and lessons learned.

There is no formal succession plan. There is no formal program for identifying candidates for promotion and management development and for defining training, education, and experience, including ES&H requirements, for succession candidates.

Self-Assessment

The LBL Self-Assessment partially addressed this finding.

5.5.5 Management Systems

FINDING MF-11: LBL Policies and Procedures

Performance Objective

An integrated system translates laws, regulations, DOE Orders, and other DOE requirements into site-specific operating procedures and ensures that all site activities are conducted in a fully compliant manner.

Finding

Lawrence Berkeley Laboratory does not have a policies and procedures system which ensures that environment, safety and health requirements are developed, documented, and communicated to all levels of the organization.

Discussion

Policies, procedures, and subordinate implementation documents are the foundation of an organization's formality of operations. Collectively, these documents represent a management system designed to ensure that ES&H requirements are communicated, understood and implemented at all levels of an organization. LBL does not have such a system in place. As a result, LBL's ES&H operating policies and procedures are not complete, current, accurate, or controlled. Examples are emergency plan and implementing procedures not in accordance with DOE requirements (see Section 4.0, Concern EP.6-2), OSPs not being kept current (see Section 4.0, Concern TS.2-5), hoisting and rigging documentation not in accordance with OSHA requirements (see Section 4.0, Concern OS.2-2), no procedures to ensure that suspect/counterfeit items are not procured (see Section 4.0, Concern QV.2-2), radiation protection procedures missing or not properly documented (see Section 4.0, Concern RP.3-8), inadequate waste management procedures (see Section 3.0, Finding WM/CF-8), hazardous material packaging and storing procedures not in compliance with DOE or Department of Transportation (DOT) requirements (see Section 4.0, Concern PT.12-1), and lack of autoclave documentation (see Section 3.0, Finding WM/CF-14).

The following are examples of other deficiencies in LBL's ES&H policies and procedures:

- There is no document or set of documents which describe how DOE Orders or other ES&H requirements are translated into Laboratory-specific policies and procedures.
- There is no environmental policy manual, as there is for safety and health (Health and Safety Manual, (PUB-3000)).
- With the exception of OSPs, there are no laboratory-wide policies or procedures which communicate when written procedures are required or how procedures are to be written. However, LBL has developed a draft Conduct of Operations Plan which, when approved by DOE, will provide guidance to managers on when written procedures are needed.

- There is no document control system to ensure that policies and procedures used in the workplace are controlled as to receipt and dissemination; that they are complete, accurate and current; that changes are received; and that superseded or voided documents are removed from use and do not become working copies.
- ES&H requirements are often communicated through Administrative Memos, which are not consistently maintained in any documented form for future reference or update.

LBL has recognized that there are deficiencies in Laboratory policies and procedures, and has recently established, under the direction of the Deputy Director, a Management Integration Group (MIG). The MIG is addressing a number of issues concerning sitewide guidance and direction. However, their efforts have not yet resulted in any substantial changes in sitewide policies or procedures.

Self-Assessment

The LBL Self-Assessment identified this finding.

FINDING MF-12:**Management Directive System****Performance Objective**

DOE managers and staff provide necessary and timely interpretation and guidance to ensure full implementation of ES&H requirements.

Finding

The San Francisco Operations Office does not provide adequate direction to Lawrence Berkeley Laboratory regarding the applicability and implementation of environment, safety, and health requirements.

Discussion

SAN's primary mechanism for implementing DOE Orders is its Management Directive (MD) System. Safety and health MDs are legally binding on LBL by virtue of the prime contract between DOE and UC (Contract No. DE-AC03-76SF00098). In addition, LBL stated in an Administrative Memo, dated January 14, 1991, that DOE Orders pertaining to the environment are implemented as well as orders pertaining to health and safety.

SAN modified its Management Directive system in early 1990. SAN MD 1321.1B provides that DOE Orders are to be transmitted to appropriate SAN divisions for determination of the applicability of the Order to SAN contractors. If SAN determines that an DOE Order is applicable to LBL, the Order is sent to LBL along with a letter requesting that LBL respond within a specified number of days regarding implementation of the Order, or stating that no response is necessary. SAN MD 1321.1B does not include a formal mechanism for ensuring timely and credible responses. In addition, the current system does not ensure timely official transmittal of DOE Orders to LBL (60 to 75 days is typical).

MD 1321.1B does not provide for SAN review of LBL responses regarding LBL's determination of the applicability of a DOE Order or the manner in which LBL intends to implement an Order. As a result, there is no assurance that DOE and LBL have a common understanding regarding the applicability or implementation of DOE Orders.

Self-Assessment

The SAN Self-Assessment addressed only the portion of this finding regarding timely transmittal of safety-related DOE Orders. It did not address the lack of a procedure ensuring SAN review of LBL determinations regarding applicability or implementation of DOE Orders.

FINDING MF-13:**Corrective Action Management System****Performance Objective**

A formal, sitewide corrective action management system is in place which incorporates tracking, trending, prioritization, root cause analysis, and lessons learned to provide management with necessary information and to aid in the closure of ES&H deficiencies.

Finding

Lawrence Berkeley Laboratory (LBL) has not established a sitewide coordinated corrective action management system. As a result, LBL cannot ensure that environment, safety, and health deficiencies will be addressed and reach appropriate closure.

Discussion

An effective corrective action management system provides management with the information it requires to make appropriate decisions on ES&H issues. Such a system includes tracking, trending, root cause analysis, prioritization, lessons learned, and closure of ES&H deficiencies.

The importance of a corrective action management system has been recognized by the Secretary of Energy. He has called for formal systems to track findings and take corrective actions, to perform root cause analysis, and to identify trends and mechanisms to communicate root causes, trends and lessons learned throughout the organization and to incorporate them into daily operations and planning.

LBL has indicated that it intends to establish a corrective action management system, but it is unclear where in the organization management plans to place the full responsibility for a such a system. Such a system does not presently exist at LBL (see Section 3.0, Finding EOR/CF-3 and Section 4.0, Concern OA.5-2). There are several organizations at LBL with formal or informal tracking systems in place (e.g., IRAD and several divisions). These are generally duplicative and are not coordinated to provide an integrated status report to management upon which effective action can be taken.

Trend analysis is infrequently performed by LBL (see Section 4.0, Concerns RP.1-2 and FP.7-12). A fully functioning central database, necessary to accomplish such analysis, is lacking.

Root cause analysis is infrequently performed at LBL (see Section 4.0, Concerns MA.7-1 and FR.7-12). Without such analysis, the fundamental reason for a deficiency cannot be determined and corrected to prevent recurrence.

Only a rudimentary lessons-learned program exists at LBL. Elements of the program are performed at various places in the organization. Operating experience of other DOE facilities and of industry are not actively sought for inclusion in the program.

The Tiger Team is not aware of any LBL plans to provide training in the elements and techniques of corrective action. The number of significant open

findings from past audits, reviews, and appraisals bear witness to the need for further attention by management to effect corrective action and closeout.

Self-Assessment

The LBL Self-Assessment identified this issue.

FINDING MF-14:

Applicability of DOE Orders

Performance Objective

The University accepts contractual terms and conditions that articulate a strong commitment to full implementation of DOE's ES&H initiative.

Finding

The Lawrence Berkeley Laboratory process for determination of the applicability of Department of Energy (DOE) Orders and requirements without consultation with DOE does not ensure that appropriate DOE requirements are being implemented.

Discussion

The Associate Laboratory Director, Administration (ALDA) is the LBL focal point for response to DOE on the applicability, impacts, and actions on DOE Orders. The ALDA distributes each DOE order to the appropriate division/department and to the LBL Counsel for an analysis of the applicability to and impacts on the Laboratory. LBL's previous policies and procedures, dated October 31, 1983, provided that, "After the analysis has been reviewed and the concerned parties consulted, a determination will be made as to whether or not a response to DOE is appropriate." Under this procedure, DOE had no assurance that applicable DOE requirements are being recognized and implemented by LBL. In a January 14, 1991 Administrative Memo, this procedure was changed to require that "After the analysis has been reviewed a response to DOE will be sent." It should be noted that this revised Administrative Memo also provides that "...Orders pertaining to health, safety, and the environment, and orders founded on statute or executive order are implemented." The concern is the possible latitude still afforded LBL to determine which DOE Orders are defined as ES&H Orders. DOE reserves to itself this final determination, after appropriate consultation with LBL, to determine the extent of applicability and implementation. LBL's recent clarifications in policy and procedures are positive actions which could provide greater assurance to DOE that the Laboratory has recognized DOE requirements and plans to implement them. In addition, clarification of the applicability of DOE Orders pertaining to ES&H demonstrates LBL's recognition of the high priority DOE has established for these activities. The positive steps taken by LBL are recent; thus, the Tiger Team was unable to assess their adequacy.

Self-Assessment

The LBL Self-Assessment partially identified this issue.

5.5.6 Oversight

FINDING MF-15: Internal Independent Assessment

Performance Objective

Internal independent assessments are conducted on a formal and regular basis by personnel within the site or corporate organization who have no vested interest in the results of the assessments.

Finding

Lawrence Berkeley Laboratory does not have a fully staffed and functioning program of internal independent assessment of environment, safety and health activities.

Discussion

An essential element of a credible ES&H program is an institutionalized program of internal independent assessment. Overall, such a program is not fully functioning at LBL (see Section 3.0, Finding WM/CF-18, and Section 4.0, Concerns PT.10-1, PT. 11-1, and EA.4-1).

The recently established Independent Review and Assurance Department (IRAD) is intended to provide the function of internal independent assessment, including compliance with National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) requirements. It is appropriately located in the organization structure and appears to have the requisite independence. However, it is not yet adequately staffed and its role has not been clearly defined (see Section 4.0, Concerns OA.5-2, FR.5-1, and TC.2-1). For example, there is no plan in place which identifies its specific goals and objectives, which mandates the periodicity of audits and appraisals, which formulates performance indicators and establishes mechanisms for an effective lessons-learned program. Additionally, it is not clear how IRAD interacts with the Safety Review Committee and what role, if any, the Committee will have in the Laboratory's internal independent assessment function (see Section 4.0, Concern FR.1-1).

Self-Assessment

The LBL Self-Assessment identified this issue, but does not address all the aspects above.

FINDING MF-16:**University of California Guidance and Oversight
of LBL for Implementation of DOE's ES&H Program****Performance Objective**

Corporate policy establishes a strong commitment to ES&H excellence, a culture which reflects this commitment, provides policy guidance and oversight, and provides a mandate for full implementation of DOE's ES&H initiatives.

Finding

The University of California (UC) has not provided adequate policy guidance and direction to Lawrence Berkeley Laboratory (LBL) concerning full implementation of DOE's environment, safety and health requirements, nor has UC conducted adequate oversight to ensure LBL's compliance with these requirements.

Discussion

The Regents of UC are responsible for corporate policy, contract approval and assurance that corporate policies support full implementation of DOE's ES&H requirements. The Regents have delegated to the President, UC all actions, with limited exception, related to the management of LBL. UC has assigned LBL the responsibility for implementing DOE's ES&H requirements. UC policy does not mandate full implementation of DOE's ES&H requirements. The existing DOE-UC contract for the management and operation of LBL does not explicitly include environmental protection. However, applicable health and safety clauses have been interpreted by UC to essentially cover environmental protection. The lack of explicit contract language concerning the applicability of environmental protection requirements creates uncertainty for LBL and DOE. The LBL Self-Assessment (Item CM.3.1) indicates that "The Laboratory will work with the University to determine the benefits of an explicit inclusion of environmental protection in this clause." The autonomy afforded LBL to conduct its operations with minimal oversight provided by the University affords little assurance to UC that DOE's ES&H requirements are being effectively implemented.

In mid-January 1991, UC announced a number of actions that it intends to take to enhance the management of DOE laboratories, including LBL. UC intends to increase its involvement in Laboratory direction and planning as they affect both programmatic, and environment, safety and health matters. As a minimum, UC will endeavor to ensure that DOE laboratory operations (including LBL), are in compliance with all ES&H requirements and regulations.

UC has indicated that it will take the following specific actions to enhance UC's management of DOE Laboratories:

- clearly and specifically assign responsibility and authority within the Office of the President for all aspects of laboratory operations
- strengthen and broaden the advisory mechanisms for both programmatic and operational oversight of laboratory operations, including those bearing on relevant environment, safety, and health standards.

Under this arrangement, the UC Senior Vice President for Administration will be responsible for operational and administrative activities, including oversight of environment, safety, and health matters. The UC Senior Vice President for Administration indicates that a staff is now being organized under his immediate direction to disseminate policy, conduct oversight, conduct independent assessment, and assist in institutionalizing a self-assessment program for ES&H activities at DOE laboratories.

Oversight committees are also being restructured. A new committee is to be established. It will be responsible for ensuring that DOE laboratory operations are conducted in a manner that complies with all applicable ES&H requirements. At this time, it is not clear what expectations and requirements will be placed on this committee. This committee will replace the existing Health, Safety and Environment Advisory Committee whose role is principally advisory.

The planned actions recently announced by the University represent a commitment to strengthen oversight of ES&H activities at LBL. As this was a recent action by the University and plans are still being finalized, the Tiger Team was unable to assess the adequacy of these proposed initiatives.

Self-Assessment

The LBL Self-Assessment identified this issue.

FINDING MF-17:**ES&H Oversight and Assurance Responsibilities
for LBL Employees on Campus****Performance Objective**

Site managers and supervisors carry out the mission in full compliance with DOE's ES&H initiatives.

Finding

There is no assurance by the San Francisco Operations Office or Lawrence Berkeley Laboratory (LBL) that DOE's environment, safety, and health requirements are being applied to work performed under Contract No. DE-AC03-76SF00098 in certain University of California at Berkeley campus space.

Discussion

A Memorandum of Understanding (MOU) executed in 1989 between the University of California at Berkeley (UCB) and LBL provides that: "in Campus areas other than Donner Laboratory and the Melvin Calvin Laboratory in which LBL personnel and equipment are located, the UCB Office of Environmental Health and Safety will provide all environmental health and safety services to any and all personnel working therein and to any and all equipment situated therein. Applicable UCB safety regulations shall preempt and prevail and be applied to all LBL personnel and equipment in such facilities."

This MOU does not impose DOE's ES&H requirements for work performed under the contract in campus buildings. The Tiger Team takes the position that this MOU does not override the provisions contained in Clause 28, Safety and Health, of the DOE-UC contract binding the University and the Laboratory to comply with all applicable DOE safety and health regulations and requirements as communicated to the university. It should be added that UC interprets Clause 28 to cover DOE's environmental orders and requirements. The Tiger Team found that some LBL employees working on the UCB campus were not certain as to which ES&H requirements pertain to their activities, those of DOE or UCB. The University has initiated a study of the differences between ES&H standards enforced on campus and DOE ES&H requirements, and the significance of these differences. UCB has prepared a list of laws and regulations to which it is subject, and has provided this list to LBL. This list has also been provided to SAN at their request.

Self-Assessment

The LBL Self-Assessment identified this issue.

FINDING MF-18:

Work For Others

Performance Objective

Management ensures that all activities conducted by the organization receive timely and appropriate ES&H review.

Finding

Work For Others proposals do not receive appropriate environment, safety and health consideration by Lawrence Berkeley Laboratory or the San Francisco Operations Office prior to their submission to prospective sponsors.

Discussion

LBL Work For Others (WFO) complements DOE research programs by making LBL's unique resources available to other Federal agencies (e.g., Agency for International Development, Department of Defense, and Environmental Protection Agency) and to various other organizations (e.g., State of California, Electric Power Research Institute, and Monsanto Corporation). WFO represents 15 to 20 percent of the LBL operating budget and involves many varied projects and programs.

The LBL WFO program is under the direction of the Office of Sponsored Research Administration in the Administration Division. Although there are several scattered documents on the subject, there is no up-to-date guide or procedure covering the generation, review, and approval of WFO proposals. Those documents which exist do not fully address ES&H concerns. As a result, there is no requirement that all proposals receive an ESHC review (see Section 3.0, Finding NEPA/CF-2).

The 2-page Request for Approval of Sponsored Work form furnished to LBL by SAN lists 13 "review factors," none of which involve ES&H. However, LBL has added a third page (which is not submitted to SAN as a part of the package) on which the originator is asked to check a box asking whether there are potentially hazardous materials involved in the project. If the NO box is checked, the package goes to SAN without ESHC review. If the YES box is checked, the form, often without the accompanying proposal, is reviewed by ESHC staff. Nothing on the form triggers a National Environmental Policy Act (NEPA) or a California Environmental Quality Act (CEQA) review (see Section 3.0, Finding NEPA/CF-1). However, LBL has recently submitted to SAN for approval an addition to the form which addresses NEPA/CEQA requirements.

This practice places initial, and often sole, reliance for ES&H consideration on the research originator and the concurring division director (with no apparent assistance from the division safety committee), persons who are not likely to have ES&H expertise, and who may have a conflict of interest.

ES&H review, when requested, is often rudimentary. The description of the project contained on the form is very brief and would not generally provide an ES&H reviewer with sufficient information to determine potential ES&H concerns. ESHC staff personnel indicated it was their perception that ES&H reviews of WFO proposals by that department are not common.

WFO proposals require the approval of SAN's LBL Institutional Manager. ES&H review of the WFO proposal package by SAN is limited to "NEPA, RCRA and state permits." The apparent rationale is that WFO proposals are subject to adequate ES&H review once they are approved and the work is funded and begun. However, at that stage, DOE could learn, for the first time, that ES&H concerns (e.g., waste management and fire safety) greatly increase the cost of the work or substantially affect the commencement or duration of the work, necessitating an awkward renegotiation with the sponsor.

DOE Order 4300.2A, covering WFO activities, does not require ES&H review as a condition for DOE approval of WFO requests. Indeed, ES&H is not expressly addressed at all in this Order.

Self-Assessment

Neither the LBL Self-Assessment nor the SAN Self-Assessment identified this issue.

FINDING MF-19:**DOE/UC Contract****Performance Objective**

The corporation accepts contractual terms and conditions that articulate a strong commitment to full implementation of DOE's ES&H initiatives.

Finding

The prime contract between the University of California and the Department of Energy (Contract No. DE-AC03-76SF00098) does not reflect the current emphasis on environment, safety, and health.

Discussion

The prime contract between UC and DOE has remained essentially unchanged for 40 years. As a result, it does not reflect DOE's current emphasis on the importance of ES&H objectives relative to program objectives. The language in Clause 28, Safety and Health, qualifies the University's commitment to ES&H by providing that it is required only to take "reasonable precautions" in the performance of its work to protect the health and safety of employees and the public. While other language in Clause 28 requires UC to comply with all applicable DOE safety and health regulations and requirements communicated to the University, DOE has not provided a provision explicitly requiring UC to comply with DOE's environmental regulations and requirements. However, it should be noted that an LBL Administrative Memorandum dated January 14, 1991 states that DOE Orders pertaining to the environment are implemented. In addition, the contract contains no explicit incentives to encourage compliance by UC with ES&H requirements. The contract contains articles that address public and worker health, as well as clean air and water, but the scope of work places singular importance on the achievement of programmatic objectives.

Self-Assessment

This issue was not addressed in the SAN Self-Assessment, but was addressed in the LBL Self-Assessment.

FINDING MF-20:**SAN Oversight of NEPA Activities****Performance Objective**

Internal independent assessments of DOE's ES&H activities are performed by personnel who have no vested interest in the results of the assessments.

Finding

The San Francisco Operations Office does not perform internal independent oversight of its National Environmental Policy Act (NEPA) compliance office activities.

Discussion

NEPA compliance is an important element of DOE's ES&H initiative (Secretary of Energy Notice (SEN)-15-90 and draft DOE Order 5440.1D). SEN-15-90 directs each operations office to designate a NEPA Compliance Officer (NCO) to coordinate, assist, and generally oversee compliance activities. SAN responded to this mandate by designating the Director of the Office of Independent Internal Oversight (OIIO) as the SAN NCO. In his role as NCO, the Director has established a review process which provides the Manager, SAN with an independent review of individual NEPA activities conducted by SAN divisions. Assessments of ES&H implementation provide periodic appraisals of SAN NEPA activities. However, NCO activities that are not compliance functions, such as coordination of NEPA activities and dissemination of guidance, are not independently reviewed since the Director of OIIO is also the NCO.

Self-Assessment

The SAN Self-Assessment did not identify this issue.

FINDING MF-21:

DOE Oversight of LBL Activities

Performance Objective

DOE managers and staff are actively and personally involved in oversight of their contractors to ensure that they comply fully with ES&H requirements established by law, regulation, and DOE policy.

Finding

Department of Energy oversight of Lawrence Berkeley Laboratory environment safety and health activities is inadequate to ensure compliance.

Discussion

Contractor oversight is a cornerstone of DOE's management responsibilities. Secretary of Energy Notice (SEN)-11-89 addresses DOE's oversight responsibilities as follows: "While current periodic external oversight is useful, it is not sufficient to carry out day-to-day, shift-by-shift internal line management oversight responsibilities at many of our field activities. In this connection, senior DOE field and headquarters officials will be expected to ensure that their contractors comply with operational, environmental, safety, health and security standards established by law, regulation or Departmental policy, while at the same time ensuring that they meet their production or research mission."

ER has maintained strong programmatic oversight at LBL with minimal emphasis on related ES&H activities. ER recognition of its programmatic ES&H responsibilities is in the evolutionary stages and is being implemented unevenly. The ER landlord system which provides funding for infrastructure requirements at LBL has not proven adequate. Little priority has been given to meeting necessary infrastructure development and improvements which are ES&H related. It is understood that ER is evaluating alternative approaches for carrying out its landlord responsibilities.

ER is taking further steps to strengthen its ability to carry out its ES&H responsibilities. The Office of Assessment and Support (OAS) has been established to provide centralized ER ES&H expertise and internal independent oversight. The Office of Basic Energy Sciences (BES) has communicated to LBL that ES&H is to be given high priority in their financial planning and conduct of research. The Office of High Energy Nuclear Physics (HENP) and BES have added and plan to add additional ES&H professionals to provide the program office with program ES&H capability. The impact of these recent initiatives on LBL's ES&H performance cannot yet be evaluated.

SAN has not fully implemented its institutional oversight role. Its programmatic ES&H oversight role is unclear, and it has inadequate oversight resources. Several of the findings/concerns of the Environmental and Safety and Health Subteam indicated that SAN does not conduct oversight with sufficient frequency or in sufficient detail to assess LBL regulatory compliance status (see Section 4.0, Concerns, OA.1-5, QV.1-4, RP.2-3, and FP.7-2 and Section 3.0, Findings WM/CF-17, WM/CF-9, and WM/CF-11).

Oversight of LBL's allocation of resources to ES&H is an integral part of the performance objective related to this finding. SAN oversight of LBL planning

and budgeting activities has been limited. The focus of SAN's oversight with regard to LBL overhead has primarily been along the lines of cost management and effective cost reduction. The SAN Cost Management Overview Committee (CMOC) meets semiannually to review LBL overhead rate proposals, plans for the current year, and previous year achievements. Much of the focus of this group is in overhead rate control and economy and efficiency of operation. This committee does not look at the needs of the Laboratory versus funding allocation, particularly with regard to ES&H. Beginning with FY 1991, the lead to coordinate the oversight of LBL overhead has been reassigned from the SAN Contracts Management Division to the Financial Management Division. Plans are underway to review the components of LBL's overhead pool which will include ES&H activities funded from overhead.

Self-Assessment

The SAN Self-Assessment addressed the SAN portion of this finding.

5.5.7 Quality Management

FINDING MF-22: LBL Quality Management

Performance Objective

A sitewide quality assurance program, including formal document control and a formal records management system, is used throughout the site.

Finding

The Lawrence Berkeley Laboratory has not implemented an effective quality assurance (QA) program.

Discussion

There are significant programmatic deficiencies in the LBL QA program, including inadequate program documentation (e.g., Institutional QA Plan, implementing procedures, document control, and records management); inadequate reporting and trending of nonconforming items; insufficient tracking of corrective actions; and incomplete implementation of QA Plans. In addition, line QA representatives are not conducting adequate internal reviews and audits. Associated with the above programmatic deficiencies are the following management issues:

- Lack of central guidance and management attention to QA problems.
- Inappropriate criteria for determining applicability of QA requirements to projects. The trigger for determining if projects require a full QA program is a budget limit of \$500,000 (per the LBL Project Management Handbook).
- Lack of understanding and knowledge of the QA discipline and its application and practices at all organizational levels.
- Resistance to QA application to research activities by research scientists and experimenters.

LBL is redefining the QA organization and program. Key elements of the effort include establishing the Independent Review and Assurance Department (IRAD) with oversight responsibility, staffing a QA support and requirements definition function under the Associate Laboratory Director for Scientific and Technical Resources, establishing a new QA basis (NQA-1 and a total quality approach), incorporating research QA requirements into Project Notebooks (along with conduct of operations concepts), and establishing a comprehensive, integrated self-assessment program.

The new LBL framework and approach to QA has the potential to become an excellent laboratory QA program, with line management having clear responsibility for the quality of ES&H, as well as for research processes and products. However, several key program elements have not been developed, including a program plan, implementing procedures for the guidelines, a detailed implementation plan, and a change in management strategy.

Self-Assessment

The LBL Self-Assessment identified the majority of the QA performance and programmatic deficiencies described in the above finding. It did not fully discuss the management issues.

FINDING MF-23:**SAN Quality Management****Performance Objective**

A sitewide quality assurance program, including formal document control and a formal records management system, is used throughout the site.

Finding

The San Francisco Operations Office is not providing sufficient quality assurance (QA) guidance and oversight to the Lawrence Berkeley Laboratory and has not adequately defined and implemented internal QA requirements.

Discussion

SAN issued a QA policy statement and an ES&H/QA program plan in February 1990, placing greater emphasis on line responsibility and oversight. However, there are significant performance and programmatic problems with the SAN QA program.

A significant performance deficiency is that SAN has not provided appropriate levels of oversight of LBL QA programs. SAN conducted no QA audits of LBL in 1990. SAN has not developed specific LBL QA oversight requirements such as audit schedules and criteria. In addition, SAN has not established a systematic process to review and approve LBL QA plans (see Section 4.0, Concerns QV.1-3 and QV.1-4).

The SAN internal QA program has significant programmatic deficiencies. Foremost among these are that SAN has not updated its internal QA plan and QA manual, and it does not have implementing procedures to guide SAN organizational units and programs in the development of their QA plans.

The Tiger Team also found inconsistencies in management support for QA. A positive indication of management support was the establishment of the Office of Internal Independent Oversight (OIIO), which provides internal quality oversight. On the other hand, the SAN QA function has been reorganized 3 times since November 1989, and SAN management recently eliminated the QA slot in Environment and Safety Support Division. Further, SAN management is planning to reduce the ceiling on a support services contract. The reduction in contract ceiling could limit SAN's ability to obtain contractor QA support. These actions do not reflect support of the QA effort and are in conflict with proposed corrective actions to SAN Self-Assessment QA findings.

Self-Assessment

The SAN Self-Assessment partially addresses this issue.

5.6 NOTEWORTHY PRACTICES

No noteworthy practices were identified during this assessment.

5.7

TEAM COMPOSITION AND AREAS OF RESPONSIBILITY

<u>Area Of Responsibility</u>	<u>Name/Organization</u>
Management Subteam Leader	Carl Guidice Office of Environmental Restoration and Waste Management Department of Energy
Management Assessment	Lisa Cummings Los Alamos Area Office Department of Energy
Management Assessment	John H. Kersten SERI Area Office Department of Energy
Management Assessment	Marvin J. Laster, Esq. Private Consultant
Management Assessment	Edward E. Patenaude Pinellas Area Office Department of Energy
Management Assessment	Louis A. Rancitelli Battelle
Management Assessment	Paul Thurmond Advanced Systems Technical Associates, Inc.

6.0

**EVALUATION OF LBL AND SAN
SELF-ASSESSMENT REPORTS
AND PROGRAMS**

6.0 EVALUATION OF LBL AND SAN SELF-ASSESSMENT REPORTS AND PROGRAMS

On January 26, 1990, the Secretary of Energy issued a directive that all line management organizations institute a formalized self-assessment program. On July 31, 1990, the Secretary also issued guidance on the conduct of self-assessments. Included in that guidance was direction to Tiger Teams to evaluate and compare findings of facility self-assessments with the findings and concerns identified by each Tiger Team.

In addition to comparing findings, the Tiger Team evaluated the methods used by LBL and SAN to develop their self-assessment reports. The methods were evaluated in terms of management involvement and attention, participation of personnel at all levels, extent of use of contractor support, and quality assurance checks employed.

The Secretary's guidance identified the following elements as being necessary to a successful self-assessment program:

1. Formal program charter
2. Comprehensive scope
3. Defined schedules
4. Assessment criteria and procedures
5. Formal tracking systems
6. Root cause analysis
7. Formal system for carrying out corrective actions
8. Formal process to identify trends and mechanisms to communicate root causes and lessons learned
9. Formal training for personnel with assessment responsibilities
10. Cooperation with external oversight and assessment organizations
11. Line management-fostered atmosphere of continual self-evaluation and quality improvement

An institutionalized self-assessment program can be characterized as having systematically addressed these elements as well as having continuing resources and management commitment to support their implementation.

The Tiger Team used these elements, along with the performance objectives and criteria provided in the July 31, 1990, memorandum as the basis for evaluating the degree of institutionalization of the LBL and SAN Self-Assessment Programs.

6.1 SUMMARY OF EVALUATION RESULTS

This section contains summaries of the Tiger Team's evaluation of the LBL and SAN self-assessment reports and programs. Subsequent sections contain more detailed descriptions of the evaluation results.

6.1.1 LBL Self-Assessment

FINDINGS SA-1: LBL Self-Assessment Program

Performance Objective

DOE and contractor organizations are to institute formal self-assessment programs (January 26, 1990, Secretary of Energy Directive and July 31, 1990, implementing guidance).

Finding

The LBL self-assessment process is not yet institutionalized and lacks many of the elements of an effective self-assessment program. LBL conducted an acceptable self-assessment in preparation for the Tiger Team.

Discussion

LBL conducted a comprehensive self-assessment in preparation for the Tiger Team Assessment. A summary of the comparison of Tiger Team findings and concern versus the findings of LBL is presented in Table 6-1.

TABLE 6-1
SUMMARY OF LAWRENCE BERKELEY LABORATORY FINDING COMPARISON

<u>Subteam</u>	<u>Number of Findings</u>	<u>Addressed</u>	<u>Partially Addressed</u>	<u>Not Addressed</u>	<u>Known But Not Addressed</u>
ENV	78*	24 (31%)	31 (40%)	23 (29%)	5**
S&H	128	59 (46%)	24 (19%)	45 (35%)	--
MGMT	<u>16</u>	<u>7 (44%)</u>	<u>8 (50%)</u>	<u>1 (6%)</u>	<u>--</u>
TOTAL	222	90 (41%)	63 (28%)	69 (31%)	5**

* Six findings assigned to both LBL and SAN

** Part of a finding; no % indicated

Of the 222 findings and concerns assigned to LBL, 69 percent were either partially or fully identified by LBL.

The extent and quality of the LBL Self-Assessment was found to vary across the functional areas and disciplines appraised by the Tiger Team. Environmental areas that were adequately covered and generally understood by LBL included NEPA, radiation and environmental monitoring, toxic and chemical materials, and surface water. On the other hand, the LBL Self-Assessment did not demonstrate sufficient understanding of the requirements and problems in the areas of air, inactive waste sites, quality assurance, waste management, groundwater and soils, sediments, and biota.

The Safety and Health Subteam found that the functional areas of organization and administration, maintenance, training, worker safety and health compliance, and medical services were addressed in a thorough manner. However, in other function areas including emergency preparedness, radiological protection, industrial hygiene, and occupational safety many key deficiencies were not identified by the LBL Self-Assessment.

Overall, the Management Subteam found that the LBL Self-Assessment was adequate. Lines of inquiry were adequate. Most Management Subteam findings were identified by LBL. The only exception was the finding related to lack of ES&H review of Work For Others (MF-18). However, LBL discussions of problems were frequently abbreviated and did not reveal a full understanding of the management issues involved.

LBL developed a solid set of key findings in each area. However, the Tiger Team identified a lack of LBL knowledge, experience, and expertise in ES&H requirements and program implementation, and a lack of central policy and policy implementation guidance as key findings, which the LBL Self-Assessment did not address.

The corrective action section was the weakest part of the LBL Self-assessment. Some corrective action plans were missing. Many of the initial responses were not discussed in enough detail to determine if the problem and its root cause were being addressed. Reliance on the LBL action plan developed in response to a 1989 Technical Safety Appraisal (TSA) of LBL as a response to the self-assessment findings was, in some instances, inappropriate. Overall, LBL has not developed an integrated sitewide action plan.

The methodology used in developing the LBL Self-Assessment report was comprehensive. Basically, the approach employed DOE guidance and lines of inquiry enhanced with vertical slice reviews of the organization. LBL senior management was intimately involved; ALDs and Division Directors had major responsibilities. There was broad participation across the laboratory, and, with the exception of the environmental area, LBL did not rely excessively on outside contractors. There were some inconsistencies in implementation across divisions; there was no corrective action integration, and the overall schedule did not allow enough time for all activities to be implemental to the degree planned. Also, there was little quality assurance applied to the process and no trending of information.

Institutionalization of a formal self-assessment program at LBL is at a formative stage. LBL is developing a program charter and has put in place an internal review organization. The Tiger Team found that current LBL self-assessment programs and practices are inadequate in terms of meeting the Secretary's self-assessment program elements.

On the positive side, LBL is developing an understanding of programmatic issues. It has demonstrated the ability to conduct a good periodic assessment, and there is an emerging positive attitude toward ES&H and QA at the Laboratory. On the other hand, LBL has not demonstrated an indepth understanding of ES&H/QA requirements and their implementation or an understanding of how self-assessment systems work (e.g., problem reporting, performance indicator, trending, lessons learned, and root cause analysis).

6.1.2 SAN Self-Assessment

FINDING SA/CF-2: SAN Self-Assessment Program

Performance Objective

DOE and contractor organizations are to institute a formal self-assessment program (January 26, 1990, Secretary of Energy Directive and July 31, 1990, implementing guidance).

Finding

The self-assessment process is not yet institutionalized and lacks many of the elements of an effective self-assessment program. SAN conducted an acceptable self-assessment in preparation for the Tiger Team.

Discussion

Table 6-2 presents a summary of the a comparison of Tiger Team findings and concerns with the results of the SAN self-assessment. Of the 27 findings identified, 19 (70 percent) were either fully or partially addressed. In general, the extent and quality of the SAN Self-Assessment was adequate. The SAN Self-Assessment identified critical issues that were cited by the Tiger Team.

TABLE 6-2
SUMMARY OF SAN FRANCISCO OPERATIONS OFFICE FINDING COMPARISON

<u>Subteam</u>	<u>Number of Findings</u>	<u>Addressed</u>	<u>Partially Addressed</u>	<u>Not Addressed</u>	<u>Known But Not Addressed</u>
ENV	14*	5 (36%)	6 (43%)	2 (14%)	1 (7%)
S&H	7	3 (43%)	0	4 (57%)	--
MGMT	5	1 (20%)	3 (60%)	1 (20%)	--
TOTAL	26	9 (35%)	9 (35%)	7 (27%)	1 (3%)

* Six findings assigned to both LBL and SAN

The SAN Self-Assessment report was difficult to follow and use. SAN management indicated that this was due to a "committee" approach employed in the generation of this document. The manner in which findings were presented varied from section to section. SAN included considerable support and background data. Although the inclusion of this data contributed to the confusing format, it made evaluation of the SAN Self-Assessment effort easier overall.

The SAN Self-Assessment report was basically structured by the organizational unit or in some cases the functional area being assessed. Each section had

its own key findings and root causes. Nowhere in the report were the key findings and root causes consolidated across the organization. Although difficult to track in the report, the SAN key findings and root causes were found to be accurate and consistent with the findings of the Tiger Team. For the most part, SAN presented a thorough discussion of proposed corrective actions. In the area of QA, it was found that the proposed corrective action was not consistent with actual SAN actions.

The implementation of the SAN Self-Assessment methodology was inconsistent among organizational units and functions. Different evaluation criteria were used, methods varied, and the level of discussion of findings (as well as the way findings were presented) was different for different groups. The report was deficient in the integration of findings. This made it difficult to evaluate the SAN effort. SAN demonstrated moderate ability to conduct an adequate periodic self-assessment.

The SAN Self-Assessment addressed the status of institutionalizing the self-assessment process and included a copy of the latest draft of the SAN Management Directive (MD), "Environment, Safety, and Health Self-Assessment Program." The draft is based on the self-assessment guidance of July 31, 1990, from the Secretary and, when issued, will begin to institutionalize the self-assessment process for all SAN programs and contractors. The Tiger Team found that this MD is well organized and presents an insightful discussion of self-assessment requirements. It also sets forth a good set of goals, responsibilities, and broad requirements. The MD, however, does not adequately define a program for SAN internal self-assessment. The target date for issuing the MD is April 1, 1991.

SAN identified the following as key problems that remain to be worked out:

- sufficient staffing to maintain ongoing assessments,
- development of a feedback loop to SAN management based on a tracking system/data base for action items (which does not yet exist),
- integration of contractor, SAN, and Headquarters elements in the process, and
- adequate planning to ensure that there is value added by the process.

LBL, SAN, and the Office of Energy Research (ER) agree that an interlocking tiered self-assessment program throughout line management organizations is needed. However, there appears to be little coordination of self-assessment activities by these organizations.

6.2 COMPARISON OF TIGER TEAM AND SELF-ASSESSMENT FINDINGS

6.2.1 Environmental Subteam Comparison of Findings

The Environmental Subteam reviewed the LBL and SAN Self-Assessments and developed the following information.

The Environmental Subteam identified 86 LBL and SAN findings: 70 compliance findings and 16 best management practice findings (see Table 6-3). Of these, 24 were specifically identified in the self-assessment reports and another 23 were not addressed. Thirty-one findings were only partially addressed. A few findings were identified by the Environmental Subteam in which it was determined that LBL and SAN were aware of the situations; however, they did not include them in their self-assessment reports (e.g., knew the problem existed, but did not recognize that the problem qualified as an environmental compliance or best management practice finding).

The subteam identified 78 findings for LBL of which 24 were fully addressed in the LBL self-assessment. Thirty-one were partially addressed and 23 were not identified by LBL. An additional five findings were not included in the LBL self assessment report, even though LBL was aware of the concerns

The Environmental Subteam also evaluated SAN's Self-Assessment findings and identified 14 findings that relate to SAN's performance as the DOE landlord of LBL operations. These findings pertain primarily to administrative procedures and their implementation and oversight. Except for one finding in the quality assurance/quality control discipline that SAN was aware of but did not report, SAN either partially or fully identified all but 2 findings in its self-assessment report. A table listing each Environmental Subteam finding and the status of each compared to any corresponding LBL finding and SAN finding is included in Appendix H.

**TABLE 6-3
ENVIRONMENTAL SUBTEAM FINDING COMPARISON**

<u>Organization</u>	<u>Number of Findings</u>	<u>Addressed</u>	<u>Partially Addressed</u>	<u>Not Addressed</u>	<u>Known But Not Addressed</u>
LBL	78	24 (31%)	31 (40%)	23 (29%)	5 (%)
SAN	<u>14</u>	<u>5 (36%)</u>	<u>6 (43%)</u>	<u>2 (14%)</u>	<u>1 (7%)</u>
TOTAL	92*	29 (32%)	37 (40%)	25 (27%)	6 (2%)

* Actual number of findings is 86, but six findings were assigned to both LBL and SAN.

The Environmental Subteam found that LBL covered the environmental disciplines with varying degrees of comprehensiveness and completeness. Areas that were adequately covered and in which it appeared that LBL understood the requirements and problem included NEPA, radiation, environmental monitoring, toxic and chemical materials, and surface water. On the otherhand, LBL did not demonstrate in its self-assessment sufficient understanding of the requirements and problems in the areas of air, inactive waste sites, QA, waste management, groundwater and soil, sediment, and biota.

The Environmental Subteam found that their NEPA findings were either partially or fully addressed in the LBL self-assessment and that LBL has a reasonable comprehension of the NEPA deficiencies. The inadequate tracking and recordkeeping system for NEPA documentation was not documented by LBL even though LBL was aware of the problem.

Most of the radiation and environmental monitoring findings were fairly well identified (fully or partially) by the site. It was also determined by the subteam that the existing radiation and monitoring programs at LBL were generally adequate to protect the public and the environment.

LBL identified all but two of the Subteam's seven findings in the category of toxic and chemical materials. The two findings that were not addressed were best management practices concerning an inadequate tracking system for potentially hazardous materials and the inadequate organization of a PCB program.

In the discipline of surface water, LBL identified only half of the findings found by the Tiger Team. Six of the 12 findings were partially addressed or fully addressed in the assessment report. Five were not identified by LBL at all. In addition, one of the findings (lack of an approved Spill Prevention Control and Countermeasures plan) was known by the site but not included in the LBL self-assessment.

The evaluation of the air and inactive waste sites disciplines revealed a very weak awareness of the problems in their respective fields. In both disciplines, LBL did not fully address any of the findings identified by the subteam.

For inactive waste sites LBL did not identify any deficiencies in their self-assessment. This was attributed to the fact that LBL thought there were no inactive waste sites at LBL, thereby precluding any possibility for identifying findings in this category. However, certain programmatic deficiencies applicable to inactive waste sites were discovered in other disciplines (e.g., monitoring, surveillance) and these were assessed accordingly in this category. With this understanding, LBL was credited with partially identifying five of the eight subteam findings. LBL was unaware of one of the findings and two more were not addressed at all. The nature of the subteam's findings and the inadequacy of the findings as reported in LBL's self-assessment indicate a fundamental lack of understanding of the scope of the inactive waste site category.

Two of the five Environmental Subteam air findings were partially addressed in the LBL self-assessment; three were not addressed at all; and three more were findings that the LBL was aware of but did not include. This (and the nature of the findings) demonstrated to the subteam that there is a lack of

comprehensive understanding of the problems identified in this discipline by LBL, and there is a need to thoroughly evaluate and upgrade its air program.

LBL did not fully identify any of the subteam's six findings on quality assurance. Four findings were partially addressed and two were not addressed at all. Although LBL identified a need (finding) for quality assurance plans in their assessment report, it was clear by the types of findings cited by the subteam that there is a lack of understanding by LBL line management and the staff of the principles in the DOE Orders on QA.

Of the 21 waste management findings, only 9 were fully addressed in LBL's report; 4 others were not addressed at all, and 7 were partially addressed. One finding was assigned to SAN. The results of the findings in this discipline indicate there is lack of a comprehensive understanding of waste management regulations and requirements at LBL.

Two of the five groundwater findings were not identified by LBL. Two were partially addressed in the LBL Self-Assessment and one was fully addressed. The report failed to identify deficiencies in the sitewide groundwater protection program, hydrogeologic characterization, monitoring procedures, QA/QC, and well protection and maintenance. Overall, LBL does not appear to have a clear understanding of the magnitude and the nature of the problems associated with groundwater protection.

A single subteam finding for soils, sediments, and biota was partially identified by LBL. It concerned contaminated soils and the lack of LBL's awareness of applicable regulations and DOE Orders.

6.2.2 Safety and Health Subteam Comparison of Findings

The Safety and Health Subteam identified a total of 136 concerns of which 128 were assigned to LBL, 7 to SAN and 1 to OER (See Table 6-4). Of the 128 LBL concerns, 7 were assigned a Category II Seriousness level with no Category I concerns. All 7 of the SAN concerns and the single OER concern were Category III. A total of 59 (46%) concerns had been previously addressed in the LBL self-assessment, 24 (19%) concerns partially addressed, and 45 (35%) concerns had not been previously addressed by LBL. Of the 7 SAN concerns, 3 (43%) had

TABLE 6-4
SAFETY AND HEALTH SUBTEAM CONCERN SUMMARY

<u>Organization</u>	<u>Number of Concerns</u>	<u>Partially Addressed</u>	<u>Not Addressed</u>	<u>Addressed</u>
LBL	128	59 (46%)	24 (19%)	45 (35%)
SAN	7	3 (43%)		4 (57%)
ER		1 (100%)*		
TOTAL	136	63 (46%)	24 (18%)	49 (36%)

* Addressed in SAN self-assessment

been identified in the SAN self-assessment and 4 (57%) had not. The OER concern was identified in the SAN self-assessment.

Seventy-seven (60%) of the LBL concerns were assigned a C1 compliance level indicating noncompliance with mandatory DOE requirements, prescribed policies and standards, and documented accepted practice. A total of 50 (39%) concerns were at the C2 compliance level indicating noncompliance with recommended DOE references, standards, guidance, or good practice. One concern (1%) was given a C3 compliance rating indicating little or no compliance considerations.

Of the seven SAN concerns, five (71%) were assigned a C1 compliance level and two (29%) were identified as C2. The ER concern was assigned a C2 compliance level.

See Tables 6-5, 6-6, and 6-7 for additional summaries of the LBL and SAN concerns. Also see Appendix H which provides a breakdown of hazard and compliance levels for each concern and the degree to which each was addressed in either the LBL or SAN self-assessments.

TABLE 6-5
LAWRENCE BERKLEY LABORATORY CONCERN SUMMARY

<u>Compliance Level</u>	<u>No.</u>	<u>%</u>	<u>Seriousness Category</u>	<u>No.</u>	<u>%</u>
C1	77	60	I		
C2	50	39	II	7	5
C3	<u>1</u>	<u>1</u>	III	<u>121</u>	<u>95</u>
TOTAL	128	100	TOTAL	128	100

The extent to which the LBL self-assessment identified deficiencies varied according to the functional areas of organization and administration, maintenance, training, worker safety and health compliance, and medical services were addressed in a thorough manner. However, in other function areas such as emergency preparedness, radiological protection, industrial hygiene, and occupational safety many key deficiencies were not identified. The LBL self-assessment did not reflect an understanding of the applicable DOE Orders and requirements within emergency preparedness. Within radiological protection, several deficiencies were not identified due, in many instances, to the lack of an implemented audit program. In general, the findings were discussed in an open candid manner and reflected a good understanding of those deficiencies identified.

TABLE 6-6
SAN FRANCISCO OPERATIONS OFFICE CONCERN SUMMARY

<u>Compliance Level</u>	<u>No.</u>	<u>%</u>	<u>Seriousness Category</u>	<u>No.</u>	<u>%</u>
C1	5	71	I	0	0
C2	2	29	II	0	0
C3	<u>0</u>	<u>0</u>	III	<u>121</u>	<u>100</u>
TOTAL	7	100	TOTAL	7	100

6.2.3 Management Subteam Comparison of Findings

The Management Subteam identified 25 findings (including 2 findings assigned to multiple organizations). Of these, 16 were assigned to LBL, 5 to SAN, 2 to OER and 2 to the University of California. Twenty-three of the 25 findings (94%) were addressed or partially addressed in the LBL or SAN self-assessments. Table 6-7 presents a breakdown of the comparison of findings.

TABLE 6-7
MANAGEMENT SUBTEAM FINDINGS COMPARISON

<u>Organization</u>	<u>Number Findings</u>	<u>Addressed</u>	<u>Partially Addressed</u>	<u>Not Addressed</u>
LBL	16	7 (44%)	8 (58%)	1 (6%)
SAN	5	1 (20%)	3 (50%)	1 (20%)
ER	2	1 (50%)	1 (50%)	
UC	<u>2</u>	<u>2</u>	<u>2 (100%)</u>	
TOTAL:	25*	11 (44%)	12 (48%)	2 (8%)

*There were 23 individual findings but one was against both LBL and SAN and one was against both OER and SAN.

The Management Subteam found that the extent and quality of the LBL assessment of management and organization lines of inquiry was very good and the management issues were well developed overall. The Management Subteam also found that the SAN self-assessment addressed the important issues that the Tiger Team identified.

APPENDICES

Appendix A

Tiger Team Personnel and Biographical Sketches

**FIGURE A-1
LAWRENCE BERKELEY LABORATORY TIGER TEAM ORGANIZATION**

Appendix A-1

**Biographical Sketches of the
Tiger Team Leader and
Team Leader Staff**

NAME: Dennis L. Krenz

AREA OF RESP: Tiger Team Leader

ASSOCIATION: U.S. Department of Energy, Albuquerque Operations Office

EXPERIENCE: 33 Years

- U.S. Department of Energy
 - Assistant Manager, Office of Environment, Safety and Health: Overall responsibility for coordinating and managing the functions related to all aspects of safety and health protection, including weapons and weapons systems safety, industrial and radiological safety, industrial hygiene and sanitation, handling of chemical and nuclear wastes, air and water pollution control, environmental production, Environmental Impact Statements and Assessments, and accident investigations.
 - Assistant Manager, Office of Projects and Energy Programs: Overall responsibility for coordinating, managing, and directing the functions of the Waste Isolation Pilot Plant (WIPP), the Uranium Mill Tailings Remedial Action Project (UMTRA), and Energy Programs, (solar, geothermal, nuclear and energy sciences).
 - Director - Energy Technologies Division: Responsible for management and direction of Energy Programs (solar, geothermal, nuclear and energy sciences).
 - Development Engineer - Systems Development Division: Program Manager for the MX Missile Nuclear Warhead.
 - Program Coordinator - Special Programs Division: Project Manager for Solar, Geothermal, Conservation and Nuclear Programs.
- Sandia National Laboratories, Albuquerque, New Mexico
 - Staff Member - Environmental Test Development: Test Engineer for environmental testing of nuclear weapon systems and components.

EDUCATION: B.S., Mechanical Engineering, University of Illinois

OTHER: Member of the American Society of Mechanical Engineers
Registered Professional Engineer in New Mexico

NAME: Bryan D. Walker

AREA OF RESP: Deputy Tiger Team Leader

ASSOCIATION: U.S. Department of Energy, Oak Ridge Operations Office

EXPERIENCE: 26 Years

- U.S. Department of Energy, Oak Ridge Operations Office (ORO), Oak Ridge, TN
 - Deputy Assistant Manager, Environmental Restoration and Waste Management: Responsible for overall management of ORO environmental restoration and waste management activities for ORO sites/facilities at Oak Ridge, Paducah, Portsmouth, and Fernald; the Formerly Utilized Sites Remedial Action Program and the Weldon Spring Remedial Action Program.
 - Deputy Director - Technical Services Division: Responsible for project management of Formerly Utilized Remedial Sites Action Program and related programs. Duties included management of both DOE and contractor remedial action activities for 31 sites nationally in compliance with CERCLA/NEPA and other Federal and state environmental cleanup regulations.
 - Program Manager: Responsible for activities relating to Data Systems Development and Hazardous Materials Remedial Action Programs for both DOE and, through interagency agreements, for DOD.
 - Branch Chief - Project Management and Control, Clinch River Breeder Reactor Project: Responsible for project and contractors' activities relating to cost, schedule, and configuration control; and for total project budget and schedule planning.
- General Electric Company, Philadelphia, PA.
 - Manager - Reentry Systems Division, Survivability Laboratory: Responsible for Management of nuclear effects survivability/lethality programs for USAF Minuteman weapons systems.
- Aerospace Corporation, San Bernadino, CA
 - Section Supervisor: Responsible for systems engineering of weapons effects programs for USAF Ballistic Missile Defense Systems.

EDUCATION: B.S., Physics, Oregon State University
Ph.D., Physics, University of California, Berkeley

NAME: Monet C. Harrison

AREA OF RESP: Assistant to Team Leader

ASSOCIATION: U.S. Department of Energy, Albuquerque Operations Office

EXPERIENCE: 8 Years

- Site Liaison, Waste Management and Operational Safety Division
 - Responsible for assisting the Los Alamos Area Office in implementing an Operational Surety Program at Los Alamos National Laboratory. Program elements include, DOE Order 5480.19 Implementation Plan, Self Assessment, Performance Indicators, DOE Order 5000.3A, and surveillance methodologies.
 - Responsible for assisting the Pinellas Area Office in implementing an Operational Surety Program at the General Electric Neutron Devices Department.
- Program Engineer, B61 bomb, Weapon Programs Division
 - Responsible for program management of the B61 bomb system.

EDUCATION: B.S., Mechanical Engineering, University of New Mexico

NAME: Thomas J. Mazour

AREA OF RESP: Report Technical Manager

ASSOCIATION: Private Consultant

EXPERIENCE: 20 Years

- Private Consultant
 - Participated in 7 Tiger Team Assessments and 21 Technical Safety Appraisals.
 - Developed and presented training programs for DOE site-surveillance personnel and DOE Tiger Team members.
 - Supporting development of nuclear facility training programs to meet DOE Training Accreditation Program.
 - Evaluated operations, organization and administration, and training areas for NRC inspections of commercial nuclear power plants.
- Analysis & Technology, Inc.
 - Supported the NRC in evaluating utility training programs and developing training review criteria and regulations.
 - Supported INPO development of a performance-based training accreditation program.
 - Supervised engineers and scientists in the conduct of applied research and development for U.S. Government and private sector clients.
- Burns & Roe, Inc.
 - Design engineer and licensing engineer for Clinch River Breeder Reactor and NRC licensed PWR.
- U.S. Navy
 - Chief Engineer - nuclear reactors, nuclear weapons officer.

EDUCATION: B.S., Mathematics, U.S. Naval Academy
M.B.A., University of New Haven (UNH)
M.S., Industrial Engineering, UNH
Sc.D. (candidate), Management Systems, UNH

OTHER: Registered Professional Engineer (Nuclear/Mechanical)
Adjunct faculty member, instructs university courses in industrial engineering and operations research.

NAME: Mary Meadows

AREA OF RESP: Tiger Team Administrator

ASSOCIATION: U.S. Department of Energy, Headquarters

EXPERIENCE:

- U.S. Department of Energy
 - Supervisory Appraisal Specialist, Office of Safety Appraisals: Participates in the overall planning and conducting Tiger Team Assessments, Technical Safety Appraisals, Management Appraisals, Nuclear Safety Program Appraisals, Design Reviews, and Comprehensive Appraisals since 1981. Responsible for the overall production of draft reports in the field and final publication of reports at DOE Headquarters. Responsible for providing coordination and editorial support on all DOE appraisals.
 - Staff Assistant, Office of Environmental Compliance and Overview. Recommended specific changes in administrative procedures for the purpose of increasing efficiency, eliminating unnecessary details, or providing needed management control.
 - Staff Assistant, Office of Bio-Medical and Environmental Research, USAEC, ERDA. Obtained and conveyed information with organizations and individuals outside/inside the Agency which required knowledge in wide range of Agency organization, personnel, and procedures.
 - Staff Assistant, Office of the Commissioner, USAEC.
 - Administrative Assistant, Office of the Assistant General Manager for Research and Development, USAEC.
 - Other related experience includes administrative and conference planning responsibilities within the USAEC, ERDA, and DOE.

EDUCATION: Numerous work-related courses and workshops at various colleges, training centers, and American Management Association

OTHER: Member, U.S. Delegation of Disarmament Conference, Geneva, Switzerland; Recipient Federal Government Awards for superior performance.

Appendix A-2

Biographical Sketches of the Environmental Subteam Members

NAME: Lee Stevens

AREA OF RESP: Environmental Subteam Leader

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

EXPERIENCE: 18 Years

- Audit Team Leader (Tiger Team, Office of Environmental Audit)
- Environmental Manager, U.S. Naval Petroleum Reserves
- Environmental Protection Specialist, Federal Prototype Oil Shale Leasing Program
- Policy Analysis, Enforcement, U.S. Environmental Protection Agency
- Enforcement Engineer, Jefferson County Air Pollution Control District

EDUCATION: B.M.E., University of Louisville, J.B. Speed Scientific School, 1970

NAME: Narendra N. Mathur

AREA OF RESP: Assistant Environmental Subteam Leader

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

EXPERIENCE: 18 Years

- U.S. Department of Energy
 - Assistant Environmental Subteam Leader for the Argonne Illinois Site and Lawrence Berkeley Laboratory Tiger Teams
- Department of the Air Force
 - Team Leader, Environmental Compliance Assessment and Management Program (ECAMP). Conducted environmental audits for the Houston and Columbia Air National Guard (ANG) Bases. Responsibilities included validating and prioritizing survey findings and briefing site commanders.
 - Program manager responsible for ANG Hazardous Waste Management Program. Developed ANG policies, regulations, and implementation guidance.
 - Staff Engineer responsible for ANG Air Pollution Control Program.
- Department of the Navy
 - Environmental Engineer responsible for managing Drinking Water program for Chesapeake Division, Naval Facilities Engineering Command.
- District of Columbia Government
 - Worked as Environmental Engineer and later as Chief, Bureau of Air and Water Quality, Department of Environmental Services.

EDUCATION: M.E., Environmental Engineering, Howard University, Washington, DC
B.E., Civil Engineering, Madhav Engineering College, Gwalior, India

NAME: Yvonne M. Garbe

AREA OF RESP: Assistant Environmental Subteam Leader

ASSOCIATION: U.S. Department of Energy-Headquarters, Office of Special Projects

EXPERIENCE: 18 Years

- U.S. Department of Energy, Office of Environment, Safety and Health (EH)
 - EH Coordinator for Tiger Teams conducted at Feed Materials Production Center, Fernald, Ohio; Pantex Plant, Amarillo, Texas; Portsmouth Gaseous Diffusion Plant, Piketon, Ohio; Lawrence Livermore National Laboratory, Pleasanton, California; Hanford Site, Richland, Washington; and Argonne National Laboratory, Argonne, Illinois.
 - Environmental Compliance Coordinator between DOE-HQ and the San Francisco Operations Office and field operations for purposes of environmental compliance and oversight with regard to applicable Federal, state and local environmental regulations.
- U.S. Environmental Protection Agency, Office of Solid Waste
 - Project Manager of programs established to identify and characterize hazardous waste and constituents for potential listings under RCRA. Specialized in industrial manufacturing wastes, mixed wastes, and synfuels.
- Monsanto Research Corporation, Mound Laboratory, Miamisburg, Ohio
 - Waste Management Office, responsible for management onsite of nonradioactive waste.

EDUCATION: M.S., Environmental Engineering, University of Cincinnati
B.S., Biology, Wayne State University

NAME: Susan Barisas
AREA OF RESP: Technical Coordinator
ASSOCIATION: Argonne National Laboratory
EXPERIENCE: 15 Years

- Technical Coordinator for the Tiger Team Assessment of Savannah River Site. Provides technical assistance to 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 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 include 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 different energy scenarios.
- 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, 1975
B.A., Biology, Grinnell College, 1973

NAME: Ralph Basinski
AREA OF RESP: Waste Management
ASSOCIATION: NUS Corporation
EXPERIENCE: 25 Years

- Served as waste management specialist on Tiger Teams at Rocky Flats, Y-12, Lawrence Livermore National Laboratory, Hanford Site, and a RCRA audit at the Pinellas Plant. Prepared Part B and air permit applications for hazardous waste facilities. Developed and conducted training courses in environmental awareness and waste management.
- Served as waste management specialist on DOE Environmental Surveys at Portsmouth, LLNL, Sandia Livermore, Paducah Gaseous Diffusion Plant, K-25, Fermilab, and ETEC. Served as project manager on "due diligence" evaluations of commercial waste management facilities.
- Served as lead hazardous waste specialist for LTV Steel company. Prepared evaluations of hazardous waste regulations efforts at LTV facilities and represented the company in negotiations with various regulatory agencies.
- Developed analytical laboratory for analysis of wastewater effluents and solid wastes generated at integrated steel plants at LTV.
- Conducted research devising methods for analysis of steel and sludge.

EDUCATION: B.S., Chemistry, University of Pittsburgh, 1968

NAME: David A. Dolak

AREA OF RESP: Toxic and Chemical Materials

ASSOCIATION: Argonne National Laboratory, Environmental Assessment and Information Sciences Division

EXPERIENCE: 10 Years

- Environmental Consultant. Technical analyst and author on the New Production Reactor Environmental Impact Statement. Assessed the impacts that NPR generated hazardous and radioactive waste would have on waste management facilities at the Hanford Site, Idaho National Engineering Laboratory, and the Savannah River Site.
- 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 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 Sections 311, 312, and 313, including database 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.
- Analytical Chemist. Diverse background in wet chemical methods and instrument analysis of environmental media.

EDUCATION: M.S., Environmental Science, Water Chemistry, Indiana University, 1985
B.S., Environmental Science, St. Joseph's College, 1980

NAME: Stephen J. Giebel

AREA OF RESP: Radiation

ASSOCIATION: NUS Corporation

EXPERIENCE: 8 Years

- Senior Radiological Analyst. Principal responsibilities include evaluating radiological environmental monitoring programs, performing/reviewing dose assessments, providing input and reviewing environmental impact statements, and assessing the regulatory compliance of various government and commercial facilities. Acted as the radiological field task leader for the proposed high-level waste repository in Texas. Served as an Environmental Subteam specialist in the radiation, environmental monitoring, and soils/sediments/biota disciplines for the Pantex Plant and Sandia National Laboratories, Livermore Tiger Team Assessments. Also, assisted on the Maywood Environmental Audit and served as the NUS Health and Safety Officer on the Sandia National Laboratories, Livermore Tiger Team Assessment.
- Prior environmental experience includes work with state government and nuclear utility programs for determining the radioactive content of various environmental media by alpha, beta, and gamma spectroscopy, as well as liquid scintillation. This includes the maintenance and calibration of gas-flow proportional counters, high purity germanium (GeLi) detectors, and sodium iodide (NaI) detectors. Also developed environmental monitoring program and radiological laboratory program procedures. Additional experience includes whole body counter operations, respiratory fit testing, and annual radiological environmental monitoring report compilation.

EDUCATION: B.S., Biology/Health Physics, Virginia Polytechnic Institute and State University

NAME: Gregory T. Haugan, Jr.

AREA OF RESP: Environmental Subteam Report Administration

ASSOCIATION: META, Inc.

EXPERIENCE: 8 Years

- Information Management Specialist. Assigned to an administrative support contract aiding the Environmental Subteam on Department of Energy Tiger Team assessments. Responsible for onsite report production of the environmental section of the Tiger Team Assessments. Efforts to date include Brookhaven National Laboratories, Sandia National Laboratory, Livermore, Hanford Site, Argonne National Laboratory, and Oak Ridge National Laboratory.
- Project Manager and Administrator for UDI Contractors, Inc. Supervised field operations and managed office administration for a construction management firm.
- Program Analyst for GLH, Inc. Specialized in research, report writing, and project management software for an information resources management consulting firm.

EDUCATION: B.A., General Studies, University of Maryland, 1984

NAME: Ronald Kolpa
AREA OF RESP: Inactive Waste Sites
ASSOCIATION: Argonne National Laboratory
EXPERIENCE: 17 Years

- Mr. Kolpa is a staff scientist with the Environmental Research Division of Argonne National Laboratory. His principal responsibilities include Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) preliminary assessments and site investigations for Department of Energy, Department of Defense, Department of Commerce, and Army National Guard properties. He 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. In addition, Mr. Kolpa chairs the Environmental Research Division's Environment, Safety, and Health Committee and serves as the Environmental Compliance Representative for the Environmental Research Division to Argonne National Laboratory.
- 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 Resource Conservation and Recovery Act (RCRA) authorities.

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

NAME: Kara Levinson

AREA OF RESP: Waste Management

ASSOCIATION: NUS Corporation

EXPERIENCE: 6.5 Years

- Waste Management Specialist for the Environmental Subteam during the Tiger Team Assessment of Lawrence Berkeley Laboratory.
- Other environmental experience includes working as an information specialist on the U.S. Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA)/Superfund Hot line where a comprehensive understanding of the RCRA, underground storage tank (UST) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)/Superfund Amendments and Reauthorization Act (SARA) regulations and statutes was gained.
- Coordinated a team of legal and technical professionals assigned to oversee potential responsible party funded remedial investigations/feasibility studies at hazardous waste sites throughout the State of New Jersey. Responsibilities included reviewing technical documents, (including Health and Safety Plans) sampling and investigatory Scopes of Work, and Quality Assurance Project Management Plans.
- On a consulting level, organized small-scale hazardous waste cleanup projects (drum and soil removals), assisted in preparation of landfill closure/post-closure plans and contractor specifications for cleanup. Also, prepared over 100 material safety data sheets and conducted environmental surveys of solid waste landfills and haulers.

EDUCATION: B.S., Civil Engineering, University of Pittsburgh

NAME: Peter C. Lindahl

AREA OF RESP: Quality Assurance

ASSOCIATION: Argonne National Laboratory

EXPERIENCE: 18 Years

- Group Leader. Principal responsibilities include supervising an environmental analysis group. Served as analytical laboratory project manager for the DOE Environmental Survey Program and currently serving as task manager for gas analysis for the DOE WIPP Pretest Waste Characterization Program. Also participated in the DOE Tiger Team Assessment of Savannah River Site.
- Prior experience includes supervising an inorganic analytical chemistry laboratory in support of coal, oil shale, and hydrothermal research projects, and working in a research analytical chemistry laboratory to develop analysis methods for determining 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: David Misenhimer

AREA OF RESP: Surface Water/Drinking Water

ASSOCIATION: NUS Corporation

EXPERIENCE: 15 Years

- Served as Senior Surface Water Engineer during the DOE Office of Environmental Audit, Environmental Survey and Tiger Team Assessment Programs. Assessed facilities regulated under the Clean Water Act (CWA) and Safe Drinking Water Act (SDWA). Assessed potable water systems, industrial process discharges, wastewater treatment systems, and stormwater and wastewater conveyance systems at the Morgantown Energy Technology Center, Pittsburgh Energy Technology Center, Naval Petroleum Reserves, Oak Ridge National Laboratory, Feed Materials Production Center, and Hanford Site.
- Developed design plans for the upgrade and expansion of wastewater treatment plants, water transmission and distribution pipelines, and wastewater pumping stations. Monitored and analyzed wastewater flows for infiltration/ inflow and sewer system evaluation studies. Planned, directed, and executed investigations of onsite and community wastewater management systems to determine nature and extent of operational problems and develop alternatives for improving existing systems/ constructing new systems. Inspected the construction of sanitary sewers. Provided office engineering support to a wastewater treatment plant construction project. Analyzed daily operations of a water treatment plant.
- Managed several environmental impact assessment projects involving the expansion of manufacturing facilities, wastewater treatment and collection systems, mixed-use development projects, high-voltage underground electric transmission line projects, and hydroelectric pumped storage systems.

EDUCATION: Registered Professional Engineer, District of Columbia M.S., Civil Engineering, University of Maryland, 1982
B.S., Environmental Sciences and Resource Management, Lehigh University, 1976

NAME: Mark D. Notich

AREA OF RESP: Team Coordinator, Environmental Subteam

ASSOCIATION: NUS Corporation

EXPERIENCE: 12 Years

- Team Coordinator for the Tiger Team Assessments of the Y-12 Plant in Oak Ridge, Tennessee, the Pinellas Plant in Largo, Florida, and the Hanford Site in Richland, Washington. Also served as Team Coordinator for the Environmental Audit of the Maywood Interim Storage Site in Maywood, New Jersey. Quality assurance (QA)/Toxic Substances Control Act (TSCA) Technical Specialist for the Rocky Flats Plant Assessment. NUS certified QA Auditor.
- QA/TSCA Technical Specialist for the DOE Environmental Surveys at Oak Ridge National Laboratory (ORNL), Argonne National Laboratory (ANL), Pittsburgh Energy Technology Center (PETC), Morgantown Energy Technology Center (METC), and the Naval Petroleum Reserves in California (NPRC). Served as Lead Site Coordinator for prioritization efforts involving PETC, METC, Pantex Plant, Mound Plant, NPRC, Los Alamos National Laboratory, and ORNL. Also served as Quality Assurance Officer for the NUS Alternate Remedial Contracting Services efforts in Regions I and III for the U.S. Environmental Protection Agency.
- Manager of Special Projects for a variety of environmental chemistry and engineering projects. Managed a fleet of three state-of-the-art mobile chemistry laboratories used for fast turnaround analysis at Superfund sites and designed and constructed a bench-scale thermal decomposition treatment unit for studying the optimal treatment conditions for high hazard chemical wastes.
- Senior Analytical Chemist for the analysis of multimedia environmental samples by gas chromatography, atomic absorption, ICP, ion chromatography, and wet chemical methods.

EDUCATION: B.S., Chemistry, University of Maryland, 1978

NAME: Daniel B. Nugent

AREA OF RESP: Air

ASSOCIATION: NUS Corporation

EXPERIENCE: 6 Years

- NUS Corporation, Air/Radiation Sciences Department
 - Air Specialist on the DOE Audit Team for assessment of the Maywood Interim Storage Site. Investigation at this low-level radiological waste site included inspection of the ambient air monitoring network, review of field and documented procedures, and review of radionuclide air emissions compliance with applicable regulations, standards, and DOE Orders.
 - Project Manager on several environmental permitting activities associated with air emissions compliance at industrial processing facilities. Responsible for coordination of project team in assessing regulatory applicability/compliance, technical review and oversight of protocols and reports, and interface with regulatory agencies.
 - Project Manager/Air Quality Meteorologist for an air toxic compliance assessment. Responsibilities included facility emissions assessment, air quality modeling, compliance reporting, and interface with regulatory agencies.
 - Project Manager/Air Quality Meteorologist for environmental and licensing support to the Perry Nuclear Power Plant. Responsibilities include coordinating the multidisciplined project and evaluating and reporting meteorological data, including radiological dose assessment, as required by Nuclear Regulatory Commission regulatory requirements.
 - Project Manager/Air Quality Meteorologist for environmental audits of ambient air and meteorological monitoring systems. Responsibilities include in-field auditing of monitoring equipment and auditing of associated program files.

EDUCATION: B.S., Meteorology, Pennsylvania State University

NAME: John J. Pulliam, III

AREA OF RESP: National Environmental Protection Act Subteam Leader

ASSOCIATION: U.S. Department of Energy, Office of NEPA Report Assistance

EXPERIENCE: 23 Years

- U.S. Department of Energy
 - Environmental Protection Specialist. Project review group and waste management group. Determine required NEPA documentation for DOE projects. Review environmental impact statements and environmental assessments for accuracy and adequacy. Develop NEPA compliance policies and guidance.
- U.S. Fish and Wildlife Service
 - General Biologist. Recommended species to be added to the list of endangered and threatened species over a four state area.
 - Wildlife Biologist. Reviewed and recommended approval of recovery plan for endangered and threatened species in the Office of Endangered Species, Washington, D.C. Revised recovery planning procedures. Also managed the nationwide endangered species land acquisition program.
 - Fishery Biologist/Fish and Wildlife Biologist. Analyze water resource development projects to determine recommended litigation for related impacts. Utilize habitat evaluation procedures and remote sensing. Participated in river basin planning.
 - Fishery Biologist. Worked as a hatchery biologist and then assistant manager at four national fish hatcheries in three states. Propagated warm fish and trout, included disease diagnosis and control. Prepared reports and performed various administrative functions.

EDUCATION: M.S., Biology, University of Southwestern Louisiana
B.S., General Agriculture, New Mexico State University

NAME: Venkat C. Reddy
AREA OF RESP: Groundwater
ASSOCIATION: Argonne National Laboratory
EXPERIENCE: 11 Years

- Hydrogeologist. Principal responsibilities include providing technical and regulatory support for environmental activities to DOE. Reviewed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Remedial Investigation and Feasibility Study (RI/FS) and Resource Conservation and Recovery Act (RCRA) Facility Investigation and Corrective Measure Study (RFI/CMS) work plans for the Hanford Site and Oak Ridge National Laboratory facilities.
- Prior environmental experience includes emergency response removal, preliminary assessment and site investigation, oversight of potential responsible party's geophysical and hydrogeologic activities, RI/FS work plans, remedial action plans, and hazardous ranking system scoring for DOE sites. Managed field investigations, including installation of piezometers, shallow and deep monitoring wells, aquifer testing, and sampling. Also prepared groundwater flow net maps, groundwater contamination assessment and spill recovery system documents for Litchfield Superfund site, Gulf Petro Chemical facility, Kerr Glass Industry, and Pulverizing Pesticide facility.

EDUCATION: Graduate courses, Environmental Engineering, George Washington University
M.S., Hydrogeology, Osmania University
B.S., Geology and Chemistry, Osmania University

NAME: Lorene L. Sigal
AREA OF RESP: National Environmental Policy Act
ASSOCIATION: Oak Ridge National Laboratory, Martin-Marietta Energy Systems, Inc., Oak Ridge, Tennessee
EXPERIENCE: 11 Years

- Oak Ridge National Laboratory
 - Provide technical assistance to the U.S. Department of Energy Office of NEPA Oversight. Developed the draft DOE NEPA Compliance Guide and the DOE NEPA Compliance Audit Protocol. A NEPA specialist at nine Tiger Team Assessments.
 - Team Leader. Oak Ridge National Laboratory environmental compliance assessments for the U.S. Air Force under their Environmental Compliance and Management Program.
 - Preparation of the DOE Regulatory Compliance Guide for Prevention of Significant Deterioration Under the Clean Air Act.
 - Basic research in the effects of air pollutants on vegetation.
 - Preparation of terrestrial ecology sections of environmental impact statements (EISs) for coal-fired, oil-fired, and nuclear power plants; U.S. Army disposal of chemical agents and munitions; and U.S. Air Force base closures and reuse.

EDUCATION: Ph.D., Botany and Microbiology, Arizona State University

NAME: Millicent L. Stokes

AREA OF RESP: Environmental Subteam Administrative Support

ASSOCIATION: Advanced Sciences, Inc.

EXPERIENCE: 6 Years

- Advanced Sciences, Inc.
 - Technical Editor/Graphics Specialist. Provide onsite technical editing and graphics support to the Environmental Subteam during preparation of Draft DOE Tiger Team Assessment reports, finalize the draft reports, and provide DOE's Office of Special Project with the camera-ready version of the final assessment report. Also, edit and format a variety of documents, including EISs, EAs, and computer manuals and provide overall support to company marketing activities.
 - Writer/Editor and Response Analyst/Media Liaison. Researched, wrote, and edited fact sheets and information briefs on energy conservation and renewable energy topics for a DOE-funded energy information service. Analyzed and researched inquiries from the general public, Congress, trade associations, educators, and students. Also, supervised media outreach for the project.
- *The Rocky Mount Record* (Rocky Mount, North Carolina).
 - News Editor/Reporter. Edited and approved all news copy; wrote news articles on local government, courts, and education; wrote feature articles; and contributed photographs. Also, wrote articles for *The Spring Hope Enterprise* (Spring Hope, North Carolina).
- Givens Performing Arts Center.
 - Theatrical Management Assistant. Wrote articles and press releases about events and performances for the Center's newsletter and local media.

EDUCATION: B.A., Journalism/Communicative Arts (Minor in Public Relations), Pembroke State University, 1986

NAME: Linda Thurston

AREA OF RESP: National Environmental Policy Act

ASSOCIATION: U.S. Department of Energy, Office of NEPA Oversight

EXPERIENCE: 17 Years

- Environmental Protection Specialist. Principal responsibilities include reviewing documents, including categorical exclusions, environmental assessments (EAs) and environmental impact statements (EISs), related to fossil energy and power marketing projects to assure that they comply with the NEPA, other applicable Federal environmental laws, and DOE guidelines and Orders; advising and guiding program staff in the matters of NEPA compliance related to their projects; participating in scoping and public meetings representing the Office of NEPA Oversight as part of the EIS process for these programs; and writing memoranda implementing NEPA policy for Assistant Secretarial and Secretarial signatures.
- Prior environmental experience includes writing and editing statewide and urban planning studies; writing and editing environmental impact assessments and statements for proposed onshore oil and gas exploration and development; writing, developing, and conducting public involvement plans for environmental studies, assessments, and impact statements; and performing program analysis for offshore oil and gas leasing in support of NEPA for Federal offshore oil and gas leasing.

EDUCATION: Graduate courses in Public Administration and Planning, University of Alaska, Anchorage
B.A., Journalism and History, University of Miami

NAME: Paula Zagrecki

AREA OF RESP: National Environmental Policy Act

ASSOCIATION: LABAT-ANDERSON Incorporated

EXPERIENCE: 2.5 Years

- Provide technical assistance to the U.S. Department of Energy Office of NEPA Oversight (EH-25). Reviews NEPA documentation for technical adequacy and compliance with Council on Environmental Quality (CEQ) regulations and DOE NEPA Guidelines. Developed database systems to track compliance with timelines required by SEN-15-90; assisted DOE with the preparation of draft DOE Order 5440.1D; and served as a NEPA specialist on the Tiger Team Assessment of Paducah Gaseous Diffusion Plant.

EDUCATION: B.A., Government and Environmental Studies, Dartmouth College

Appendix A-3

Biographical Sketches of the Safety and Health Subteam Members

NAME: Richard H. Lasky

AREA OF RESP: Safety and Health Subteam Leader

ASSOCIATION: Office of Safety Appraisals, Headquarters, Department of Energy

EXPERIENCE: 17 years

- U.S. Department of Energy, Germantown, MD
 - Safety and Health Subteam Leader for Tiger Team Assessments and TSA Team Leader.
 - TSA Team Member: Responsible for Training and Certification, Facility Safety Review, and Instrumentation and Control Systems on various appraisals.
- U.S. Nuclear Regulatory Commission
 - Electrical Engineer, Instrumentation and Control Systems
 - Equipment Qualification and Test Engineer, Environmental Qualification Inspections.
- U.S. Department of the Navy, Norfolk Naval Shipyard
 - Nuclear/Electrical Engineer, Nuclear Engineering Department.
 - Senior Engineer: Primary Plant Instrumentation, Primary Plant Controls, Nuclear Instrumentations, Steam Generator Water Level Control, Temperature Monitoring, Reactor Protection and Alarms, Radiation Monitoring, SG Chemical Cleaning (Electrical)

EDUCATION: B.S., Electrical Engineering, Norwich University

OTHER: Member, Institute of Electrical and Electronic Engineers

NAME: Ronald E. Alexander

AREAS OF RESP: Personnel Protection and Industrial Hygiene

ASSOCIATION: Environmental Management Associates

EXPERIENCE: 21 Years

- Environmental Management Associates
 - Hazardous Material Management Consultant: Provide OSHA compliance assistance, hazardous waste assistance, environmental liability assessments, Safety Analysis Reports, permitting assistance, and Technical Safety Appraisal assistance.
- Mason & Hanger - Silas Mason Co., Inc.
 - Departmental Scientist: Responsible for managing 34 professionals in the areas of health physics, industrial hygiene, environmental protection, and waste management.
 - Senior Health/Physicist/Industrial Hygienist: Responsible for supervision of health physics, industrial hygiene, and environmental protection personnel.
 - Area Safety Engineer: Responsible for performing industrial safety and explosive safety compliance reviews of weapons assembly areas.

EDUCATION: Graduate Work, Industrial Technology, West Texas State University
B.S., Physics, Texas Tech University

NAME: John W. Arendt
AREA OF RESP: Packaging and Transportation
ASSOCIATION: John W. Arendt Associates, Inc.
EXPERIENCE: 47 years

- John W. Arendt Associates, Inc.
 - Senior Engineer: Provide technical assistance in the fields of UF₆ handling, packaging and transportation of hazardous waste and radioactive materials, quality assurance, standards and regulations, and engineering and management consultation.
- JBF Associates, Inc.
 - Provide technical and management advice to the President in the fields of uranium enrichment, standards and regulations, waste management, packaging and shipping, reactor activities, and quality assurance.
- Nuclear Division, Union Carbide Corporation
 - Staff Engineer: Coordinated preparation of planning document on waste management and environmental problems at Y-12. Served on Y-12 Mercury Task Force and chaired Environmental Impact Committee.
 - Superintendent of Planning and Budgeting in Gas Centrifuge Program.
 - Project Manager for UCC-ND Uranium Resource Evaluation, National Uranium Resource Evaluation (NURE) Project.
 - Superintendent of Physical Measurements, Inspection and Nuclear Technology.
 - Superintendent of Physical Measurements, Inspection and Nuclear Technology.
 - Superintendent of Inspection, Metallurgical and Nuclear Engineering.
 - Production Supervisor for in-plant handling, measuring, storing, packaging and shipping of nuclear materials.
- Manhattan Project, University of Chicago
 - Research Assistant.

NAME: John W. Arendt (Continued)

EDUCATION: B.S., Chemical Engineering, Marquette University

OTHER: Registered Professional Engineer, State of Tennessee, 1974
Certified Nuclear Materials Manager
Member, Nuclear Standards Board, American National
Standards Institute (ANSI)
Chairman, ANSI N14 Standards Committee, Packaging and
Transportation of Radioactive Materials
Member, ANS, ASME, ASQC, ASNT, INMM, NSPE, TSPE, and ADPA

NAME: George P. Bailey

AREA OF RESP: Emergency Preparedness

ASSOCIATION: Advanced Systems Technology, Inc.

EXPERIENCE: 30 years

- Advanced Systems Technology, Inc.
 - Manager, Emergency Preparedness
- Stone & Webster Engineering Corp.
 - Senior Emergency Planning Analyst
- Public Service of Indiana
 - Senior Emergency Preparedness Licensing Engineer, Marble Hill, Nuclear Generating Station
- Louisiana Power & Light
 - Site Emergency Planning Coordinator, Waterford 3, Steam Electric Station
- Nuclear Energy Services, Inc.
 - Manager, Protective Services
- U.S. Air Force (Retired)
 - Onsite Controller, Nuclear Emergency Team

EDUCATION: University of Philippines
Tunxis Community College
Hartford State Vocational College
NET Course, Sandia Base, New Mexico
Disaster Preparedness Instructor Course
CBR Warfare Instructor Course
Nuclear Weapons Basic Course
Nuclear Weapons Advance Recertification

OTHER: AIF - Former Member, Subcommittee on Siting, Licensing and Emergency Preparedness
AIF - Former Member, Subcommittee on Safeguards
Society of Fire Protection Engineers

NAME: Neil M. Barss

AREA OF RESP: Radiation Protection

ASSOCIATION: Office of Health, Headquarters, Department of Energy

EXPERIENCE:

- U.S. Department of Energy, Germantown, MD
 - Health Physicist: Concerned with the technical considerations and program assessments of the various DOE field offices, national facilities, and policy on health physics/radiation protection and radiological emergency preparedness concerns.
- University of Illinois at Urbana-Champaign
 - Health Physicist: Responsibilities included the oversight of a Radiation Protection Program associated with a 1.5 Megawatt TRIGA Reactor and consultation to the nuclear engineering and life sciences faculty, staff, and students on all matters related to health physics. Oversight of the radiation protection program of a 450 MeV LINAC accelerator facility.
- Clinton Power Station, Illinois Power Company
 - Radiological Engineering Specialist: Concerned with the evaluation and implementation of a radiological environmental monitoring program for both routine and emergency plan applications; radiological safety procedures and development; and the technical specifications for an integrated radioanalytical, internal dosimetry, and radiation protection record-keeping computer system.
- State University of New York at Buffalo
 - Health Physicist concerned with the daily implementation and oversight of the University Radiation Protection Program and associated 2-Megawatt PULSTAR research reactor.

EDUCATION: Graduate Program, Radiation Science, Georgetown University.
B.A., Radiation Biology, State University of New York at Buffalo.

OTHER: Member, Health Physics Society.

NAME: B. Ann Bowden

AREA OF RESP: Coordinator

ASSOCIATION: U. S. Department of Energy, Office of Safety Appraisals

EXPERIENCE: 31 years

- U. S. Department of Energy
 - Appraisal Specialist, Office of Safety Appraisals: Participates in the planning, coordination, and finalizing the production of the technical safety appraisals. Maintains appraisal reference center.
 - Participated on the Tiger Team Assessment as Coordinator for the Tech Safety appraisal Subteam at the Oak Ridge National Laboratory, Oak Ridge, Tennessee, October-November 1990
 - Participated on the Tiger Team Assessment as Coordinator for the Tech Safety Appraisal Subteam at the Hanford Site, Richland, Washington, May-June 1990
 - Participated on the Tiger Team Assessment as Coordinator for the Tech Safety Appraisal Subteam at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, June-July 1990
 - Defense Programs, Office of Classification and Technology Policy: Coordinated and participated in DOE/Contractor Classification Officer's meetings
- U.S. Nuclear Regulatory Commission
 - Inspector and Auditor Assistant. Office of Inspector and Auditor. Participated in inspections and audits, served as FOIA Coordinator, office manager and secretarial supervisor
- U.S. Atomic Energy Commission
 - Various secretarial positions in the following offices: Health and Safety, Military Application, Security, Reactor Development and Technology, and Environmental Protection

EDUCATION: Numerous work-related courses/workshops, (FOIA Workshop; computer courses; office management; etc.)

NAME: Melvin E. Cassady

AREA OF RESP: Worker Safety and Health (OSHA) Compliance

ASSOCIATION: National BioSystems, Inc.

EXPERIENCE: 25 years

- National BioSystems, Inc.
 - Testimony in toxic tort litigation and an expert on engineering controls
 - OSHA-type health and safety inspections
 - DOE Tiger Teams: Paducah Gaseous Diffusion Plant, Argonne National Laboratory, Oak Ridge National Laboratory
- Occupational Safety and Health Administration (OSHA) Health Response Team - Director
 - Assessment of complex industrial hygiene problems
 - Engineering control assessment
 - Program evaluation/development
 - Emergency response to health catastrophes
- National Institute for Occupational Safety and Health (NIOSH)
 - Industrial hygiene field investigations
 - Engineering control assessments
- Kennecott Copper Corporation
 - Developed hygiene program
 - Performed industrial hygiene field surveys
 - Reviewed engineering controls
- National Lead Company of Ohio (Fernald)
 - Monitored decontamination activities (reviewed personnel activities and checked levels afterward)
 - Developed water monitoring program
 - Conducted plant surveys

EDUCATION: M.S., Industrial Hygiene, University of Cincinnati
B.S., Biology/Minor Chemistry, Ft. Lewis College, Colorado

OTHER: Certified Industrial Hygienist
Clinical Faculty, University of Utah
Advisory Board, University of Utah

NAME: Deana L. Colley

AREA OF RESP: Worker Safety and Health (OSHA) Compliance

ASSOCIATION: Westinghouse Hanford Company

EXPERIENCE: 18 years

- Westinghouse Hanford Company/Rockwell Hanford Operations
 - Senior Safety Engineer: Responsible for facility safety oversight and surveillance, hazard evaluation, design review, safety audits and appraisals, pre-job safety planning, accident investigation, technical training oversight, employee complaint resolution, and industrial hygiene monitoring.
 - Safety Awareness Coordinator: Responsible for safety incentive program, Governor's Restraint Council, sitewide safety awareness program coordination, ADHOC safety task forces, and technical training.
- J. A. Jones Construction Services
 - Safety Inspector: Responsible for field safety surveillance, construction project inspection, hazard identification and evaluation, accident/incident investigation, pre-job planning and job safety analysis, RCRA/CERCLA Hazards Abatement Council.
 - Radiation Timekeeper: Provided radiation exposure timekeeping to support reactor outage, conducted contamination investigation and recordkeeping, and dosimetry recordkeeping.
 - Whole Body Count Coordinator
- Eastern Washington University
 - Academic Advisor for Undergraduate Studies: Responsible for new student academic orientation, undergraduate registration advising, academic probation counseling, and transfer requirement administration.
- Washington Public Schools
 - Secondary Teacher: Responsible for health instruction, physical education instruction, state representative to Health Curriculum Council, interscholastic girls coaching, and Intermediate District Representative to Federal Title Implementation.

NAME: Deana L. Colley (Continued)

EDUCATION: B.A., Education, Central Washington University

OTHER: Certified Safety and Security Professional, World Safety Organization (WSO)
Industrial First Aid/CPR Instructor, Washington Dept. of Labor & Industries (DL&I)
Standard Teaching Certification, Washington State, Secondary
Certified Asbestos Worker, Washington DL&I
Certified Hazardous Waste Operator, Washington DL&I
Cross Connection Control Specialist I, Washington DL&I, Washington Water Works Association
Member, American Society of Safety Engineers
Member, World Safety Organization
Member, National Management Association

NAME: Woodson B. Daspit

AREA OF RESP: Technical Support

ASSOCIATION: W.B.D. Consulting Corporation

EXPERIENCE: 40 Years

- Consultant

- Reactor operations, training and certification, auxiliary systems, technical support, reactor design, and general reactor technology
- Westinghouse Electric & Bechtel National Corporations: conceptual design of new production reactor
- Team member on ten Technical Safety Appraisals

- DuPont, Savannah River Plant

- Senior Reactor Associate for advanced studies
- Process Associate for advanced studies: procedure enhancement, training, and simulator procurement
- Chief Supervisor for reactor physics: hydraulics, criticality studies, heavy water technology, production reactor charge design, test reactor technical assistance, and manual and automated production calculations
- Site Emergency Response Committee
- Part-time examiner of reactor operators for NRC
- Responsible for mechanical, electrical, and instrument assistance groups
- Shielding and instrumentation group leader
- Experimental Physics: Critical facility startup and operations

- U.S. Naval Ordnance Test Station

EDUCATION: M.S., Physics, Louisiana State University
B.S., Physics, Louisiana State University

OTHER: Member, American Nuclear Society
Member, Sigma Xi
Member, Sigma Pi Sigma

NAME: Jerry D. Davidson

AREA OF RESP: Fire Protection

ASSOCIATION: Richland Operations Office, U.S. Department of Energy

EXPERIENCE: 29 Years

- Richland Operations Office
 - Fire Prevention Engineer, Occupational Safety and Emergency Preparedness Branch: Responsible for overview for fire protection program at the Hanford Site in Richland, Washington
 - Varied engineering experience in aerospace engineering, missile engineering, heating and air conditioning design, program engineering, engineering management, plant and facility engineering, property management, utility management, industry safety, industrial hygiene, and fire protection

EDUCATION: B.S., Mechanical Engineering, University of Arkansas

OTHER: Registered Professional Engineer, Arkansas, Colorado, and Oregon
Certified Hazard Control Manager

NAME: David M. Drury

AREA OF RESP: Worker Safety and Health (OSHA) Compliance

ASSOCIATION: Private Consultant

EXPERIENCE: 7 years

- Private Consultant
 - Participant in Technical Safety Appraisals and Tiger Team Assessments
- Monterey Coal Company
 - Training specialist: Coordinate and document training requirements, individualized assessments for training.
 - Safety Inspector: Loss control system, Computer Loss Control Surveillance System. MSHA inspections and worker safety audits.
- EXXON U.S.A.
 - Field Safety Coordinator: Valdez oil spill-conducted state and federal OSHA inspections of all facilities; worker safety and equipment audits.
- Monterey Coal Company (MCC)
 - Safety specialist: Analyzed MCC accident statistics, maintained MSHA CFR 30 updates; maintained Illinois Right-to-Know law requirements, including MSDSs.
 - Health and safety technician: Maintained all health monitoring equipment, conducted air quality and noise sampling, fire protection audits, self-rescuer audits.

EDUCATION: B.S., Industrial Technology, Southern Illinois University, Carbondale, Illinois
 Associates Degree, Mining Technology, Wabash Valley College

OTHER: U.S. Navy
 Ansul Industrial Fire School
 National Safety Council Congress & Exposition
 Mine Emergency Preparedness
 Loss Control Management Training
 Loss Control Surveillance System (data processing)
 MSHA Instructor Certifications/Electrical Qualifications
 Emergency Medical Technician (EMT-I)

NAME: C. Frederick Fiege

ASSOCIATION: Office of Quality and Safety Programs, Headquarters,
Department of Energy

EXPERIENCE: 19 years

- U.S. Department of Energy, Germantown, MD
 - QA Specialist, Office of Quality & Safety Programs
 - Advisor and Inspector, Office of Inspector General Attorney
- Private Practice of Law
 - Partner in General Practice Firm

EDUCATION: J.D., Law, University of Maryland
B.A., Law, University of Maryland

NAME: Lydia Guerra

AREA OF RESP: Appraisal Coordinator

ASSOCIATION: U.S. Department of Energy, Office of Safety Appraisals

EXPERIENCE: 12 years

- U.S. Department of Energy
 - Appraisal Coordinator, Office of Safety Appraisals: Participates in the planning, coordination, and finalizing the production of the Technical Safety Appraisals.
 - Participated on the Tiger Team Assessment as Coordinator for the Savannah River Plant, South Carolina, March 1990.
 - Participated on the Tiger Team Assessment as Coordinator for the General Electric Pinellas Plant, Pinellas, Florida, January 1990.
 - Participated on the TSA Team as Coordinator for the Oak Ridge National Laboratory, Oak Ridge, Tennessee, August 1989.
 - Participated on the TSA Team as Coordinator for the Strategic Petroleum Reserve Site, Beaumont, Texas, January 1989.
 - Participated on the TSA Team as Coordinator for the Oak Ridge National Laboratory, Oak Ridge, Tennessee, August 1988.
 - Participated on the TSA as WINCO Coordinator at the Idaho National Engineering Laboratory (INEL), Idaho Falls, Idaho, August 1987.
- Westinghouse Idaho Nuclear Co, Inc., (WINCO)
 - Manager, Information Processing Services, responsible for the management direction and operation of two centralized Information Processing Centers.

EDUCATION: B.S., Corporate Training, Idaho State University. Certified Instructional Trainer. Instructor for word processing, Eastern Idaho Vo-Tech School. Training for DOE Appraisal Coordinator at Germantown, Maryland.

NAME: Jack J. Janda

AREA OF RESP: Worker Safety and Health (OSHA) Compliance

ASSOCIATION: National BioSystems, Inc.

EXPERIENCE: 18 Years

- Comprehensive Environmental Health Services, Inc.
 - Safety and health training
 - Asbestos analysis
 - Onsite OSHA-type compliance inspections
 - Safety and industrial hygiene surveys
 - DOE Tiger Team worker safety inspections
- Occupational Safety and Health Administration (OSHA)
 - Established regional enforcement goals, policies, and procedures
 - Directed industrial hygiene and safety compliance
 - Managed agency programs
 - Supervised industrial hygienists and safety specialists
 - Expert witness
 - Team leader on major inspections
- Accident Prevention Laboratory, Institute of Agricultural Medicine
 - Accident investigations involving consumer products, flammable clothing and products, etc.

EDUCATION: M.S., Preventive Medicine and Environmental Health-emphasis in Industrial Hygiene, University of Iowa College of Medicine
B.S., General Science, University of Iowa

OTHER: Member, American Industrial Hygiene Association
Member, American Conference of Governmental Industrial Hygienists
Certified by EPA under Asbestos Hazard Emergency Response Act, Building Inspector and Asbestos Management Planner
Certified by the US Department of Labor as a safety and industrial hygiene instructor for general industry and construction.

NAME: Charles R. Jones

AREAS OF RESP: Maintenance and Auxiliary Systems

ASSOCIATION: SCIENTECH, Inc.

EXPERIENCE: 24 years

- SCIENTECH Inc.
 - Senior Nuclear Engineer: Provide senior level consulting for nuclear plant safety evaluations and reliability studies. Team Coordinator for independent Criticality Safety Assessment at Rocky Flats Plant. Member, Operational Readiness Review (ORR) Teams for Rocky Flats Plant and Savannah River Site. Oversight of Savannah River Site Reactor Safety Improvement Program. Safety advisor for New Production Reactors in maintenance area.
- Tenera Corporation
 - Senior Project Manager: Assisted commercial nuclear plants in safety system functional assessments, technical troubleshooting, and operation reliability and safety.
 - Evaluated safe shutdown and fire protection requirements for nuclear plants.
- U.S. Department of Energy
 - Technical Advisor: On loan from Navy Nuclear Propulsion Program to Naval Advanced Weapons Program for troubleshooting and comprehensive nuclear safety matters.
 - Served as Executive Secretary, Defense Programs Safety, Security, and Control Committee
- Nuclear Powered Cruiser Bainbridge
 - Operations Officer; Nuclear plant qualified
- Nimitz Precommissioning Unit
 - Reactor Mechanical Assistant; Reactor Controls Division Officer
 - Qualified Nuclear Plant Chief Engineer, Systems Acceptance Inspector for Reactor and Propulsion Plant

NAME: Charles R. Jones (Continued)

- USS Enterprise
 - Station Officer in charge of reactor plant overhaul
 - Reactor Mechanical Division Officer

EDUCATION: M.S., Mechanical Engineering, Massachusetts Institute of Technology
Ocean Engineer, Massachusetts Institute of Technology
B.S., Mechanical Engineering, U.S. Naval Academy
USN Nuclear Power School

OTHER: Member, American Nuclear Society
Certified Nuclear Chief Engineer (Naval Reactors)

NAME: Bernard R. Kokenge

AREA OF RESP: Organization and Administration

ASSOCIATION: BRK Associates, Inc.

EXPERIENCE: 26 years

- TSA/Tiger Team Member on 12 Tiger Team Assessments and Technical Safety Appraisals
- Technical and Management Consultant to various nuclear organizations, including EG&G, Rocky Flats, Inc., and Sandia National Laboratory, Livermore
- Price-Anderson Amendment Act Visiting Team, Headquarters, Department of Energy
- Kentucky Christian College, Vice President, Strategic Planning and Program Development
- Monsanto Research Corporation, Mound Plant, Miamisburg, OH
 - Associate Director of Mound Plant: Responsible for all component development and production activities associated with primary detonators, timers, actuators and pyrotechnic devices.
 - Nuclear Operations Director: Responsible for all radiological development and production technology as applied to the isotopes of hydrogen, analytical chemistry support for Mound and production/testing of radioisotopic thermoelectric generators for the Galileo and Ulysses space missions.
 - Nuclear Technology Manager: Covering diverse technical radiological functions including plutonium-238 processing technology, plutonium waste management development, tritium process development in support of weapons programs and processing/engineering technology for Mound's tritium operations.
 - Plutonium Processing Manager: Responsible for plutonium processing building operation, wherein plutonium-238 fuel forms were produced and plutonium-238 scrap recovered and recycled.
 - Plutonium Fuels Group Leader: Investigated the behavior and physical properties of plutonium-238 as a fuel for space applications.

NAME: Bernard R. Kokenge (Continued)

EDUCATION: Ph.D., Inorganic Chemistry, Ohio University
B.S., Chemistry, University of Dayton

OTHER: Patent on Plutonium-238 isotopic fuels
Achievement awards from DOE for significant overall program
contributions
DOE Management Team Chairman for the Galileo and Ulysses
RTG space mission programs

NAME: Thomas H. Lovatt

AREA OF RESP: Worker Safety and Health (OSHA) Compliance

ASSOCIATION: Kaiser Engineers Hanford

EXPERIENCE: 25 Years

- General Information
 - Twenty-five years of safety management experience in all phases of nuclear power plants, construction, mining, and tunnel construction; industrial safety management and oversight. Participant in the Argonne National Laboratory and Oak Ridge National Laboratory Tiger Team Assessments.
- Kaiser Engineers Hanford, Richland, WA
 - Responsible for management of company safety/radiation and hazardous waste management programs at the DOE Hanford Nuclear facility. Supervised up to sixteen safety/radiation staff. Innovative in the micro-computerization of safety/radiation, and hazardous waste tracking systems and functions.
- J. A. Jones Construction Company
 - Safety Manager: Washington Public Power Supply System Units No. 1 and 4 Construction Project, Richland, WA.
- Ebasco Services, Inc.
 - Safety Manager: Washington Public Power Supply System, Units No. 3 and 5 Construction Project, Elma, WA; and Florida Power & Light Company, St. Lucie County, FL.
- Litton Industries, San Carlos, CA
 - Managed Corporate Safety Programs, including company safety meetings, safety inspections, and completed accident reports and worker's compensation claims.
- Fluor Utah, Inc., San Mateo, CA
 - Safety Supervisor, Cordero Coal Mine Construction Project, Gillette, WY; and Mineral Creek Tunnel Construction Project, Kearney, AZ.

NAME: Thomas H. Lovatt (Continued)

EDUCATION: A.A., General Business, Glendale Comm. College, Glendale, AZ
International Loss Control Institute: Certified Safety
Program Auditing, Modern Safety Management, Loss Control
Management, Risk Management

Occupational Safety and Health Training Institute (OSHA):
Construction Safety and Health, General Hazard Recognition

OTHER: Member, American Society of Safety Engineers
Member, National Safety Council
Certified, DOE Accident/Incident Investigation and
Management
Oversight and Risk Analysis (MORT)

NAME: Oliver D. T. Lynch, Jr.

AREA OF RESP: EH Senior Manager

ASSOCIATION: Office of Safety Appraisals, Headquarters, Department of Energy

EXPERIENCE: 27 years

- U.S. Department of Energy, Germantown, Maryland
 - Acting Director, Office of Safety Appraisals
 - Director, Safety Inspections Division, OSA
- U.S. Nuclear Regulatory Commission, Rockville, Maryland
 - Radiation Measurements and Health Effects Section Chief
 - Standardization and Decommissioning Section Chief
 - Safeguards and Non-Power Reactors Section Chief
 - Radiation Protection Section Leader
 - Senior Operating Reactor Project Manager
 - Environmental Assessment Section Chief, TMI Program Office
 - TMI Special Inquiry Group (Rogovin)
 - Senior Environmental Project Manager
- International Atomic Energy Agency
 - Technical Working Group Leader, Vienna, Austria
 - Instructor, Cairo, Egypt
- General Dynamics, Electric Boat Division, Groton Connecticut
 - Chief, Radiological Control Health Engineering
- U.S. Atomic Energy Commission, Las Vegas, Nevada
 - Radiological Specialist
- San Diego State University, San Diego, California
 - Assistant Radiological Safety Officer

NAME: Oliver D. T. Lynch, Jr. (Continued)

EDUCATION: M.S., Nuclear Physics, San Diego State University
B.S., Applied Physics, San Diego State University

OTHER: Member, Health Physics Society
Member, American Forestry Association
Sigma Pi Sigma
Author, Textbooks and Training Manuals, Small Craft,
Operations and Navigation

NAME: Leon H. Meyer

AREAS OF RESP: Site/Facility Safety Review and Experimental Activities

ASSOCIATION: The LHM Corporation

EXPERIENCE: 38 Years

- President, The LHM Corporation
- Technical expert under contract to Oak Ridge Associated Universities and EG&G Idaho. Served on 29 Technical Safety Appraisals for the DOE
- Savannah River Plant, E.I. Du Pont de Nemours & Company, Aiken, SC
 - Program Manager: Responsible for safeguards and security, long-range planning, budget coordination, quality assurance, environmental control, energy conservation, and away-from-reactor spent fuel storage
- Atomic Energy Division, E.I. Du Pont de Nemours & Company
 - Program Manager, Technical Division: Responsible for the Defense Waste Processing Facility and the LWR Fuel Reprocessing Design Project
- Savannah River Laboratory, E.I. Du Pont de Nemours & Company, Aiken, SC
 - Assistant Director
 - Director, Separations Chemistry and Engineering Section
 - Research Manager, Separations Chemistry Division
 - Research Supervisor, Separations Engineering Division: Responsibilities in areas of chemical separations; plutonium, uranium, and thorium processing; and tritium technology

EDUCATION: Ph.D., Physical Chemistry, University of Illinois
M.S., Chemistry, Georgia Institute of Technology
B.S., Chemical Engineering, Georgia Institute of Technology

NAME: Linda F. Munson

AREA OF RESP: Emergency Preparedness

ASSOCIATION: Evergreen Innovations, Inc.

EXPERIENCE: 16 years

- President, Evergreen Innovation, Inc.
 - Project manager to assist EPRI in preparation of a radwaste desk reference
 - Consultant to Battelle on cleanup of Three Mile Island
 - TSA and Tiger Team participant: Industrial Hygiene, Emergency Readiness, and Radiation Protection
- Battelle Pacific Northwest Laboratory
 - Associate Section Manager, Dosimetry Technology Section
 - Project Manager for various technical assistance programs of including cleanup of TMI and upgrade of the RMI Health Physics program
 - Participated in the team appraisal of six uranium mills for and with the NRC
 - Appraised, with DOE-HQ, Emergency Preparedness of the Rocky Flats Plant
 - Observed Emergency Preparedness exercises for NRC
- UNC Nuclear Industries
 - Manager, Industrial Safety responsible for industrial hygiene and industrial safety and fire protection at N Reactor and the associated fuel fabrication facilities
 - Managed the preparation of Environmental Information Reports and license application for various nuclear facilities, primarily uranium mills, and fuel fabrication plants
 - Evaluated decontamination alternatives for the West Valley Reprocessing Plant

EDUCATION: M.S., Analytical Chemistry, Iowa State University
B.A., Chemistry, United States International University
Short courses in Radiation Protection, Industrial Hygiene, Industrial Safety, MORT, Respiratory Protection, Management, and Communication

NAME: William R. Murphy

AREA OF RESP: Worker Safety and Health (OSHA) Compliance

ASSOCIATION: Murphy & Associates

EXPERIENCE: 22 years

- Lurgi Corporation
 - Director of Safety: Responsible for corporate and field operations safety programs.
- Exxon
 - Senior Safety Engineer (Special Assignment): Responsible to the President for all matters pertaining to safety, health, and environment.
 - Safety Engineer: Site safety responsibilities for all research/laboratory/pilot plant and construction projects.
 - Safety Engineer (ESSO, Venezuela): Monitored, inspected and implemented project safety/health fire protection.

EDUCATION: B.S., Safety Engineering/Management, Emory-Riddle University

OTHER: Executive Secretary, National Safety Council Member, Systems Safety Society Member, American Society of Safety Engineers

NAME: Karen G. Rawlings

AREA OF RESP: Worker Safety

ASSOCIATION: National BioSystems, Inc.

EXPERIENCE: 3 Years

- National BioSystems, Inc.
 - Industrial Hygiene Sampling Specialist
 - Safety Inspections Specialist
 - OSHA Standards Specialist and research appropriate OSHA standard violations
 - Developed OSHA-modified 1Bs and report forms/formats
- Campbell Communications, Inc.
 - Responsibilities included research and analysis of market survey data and development of final reports

EDUCATION: Coursework in Management, Montgomery College, Germantown, Maryland

NAME: Jacques B. J. Read

AREA OF RESP: Quality Verification

ASSOCIATION: Office of Quality and Safety Programs, Headquarters,
Department of Energy

EXPERIENCE: 29 Years

- Acting Division Director, Quality Verification and Transportation Safety Division
- Physical Scientist, Office of Nuclear Regulatory Research, Nuclear Regulatory Commission
- Nuclear Reactor Systems Engineer, Office of Nuclear Reactor Regulation, Nuclear Regulatory Commission
- Consultant, Expert Witness, Atomic Energy Commission
- Lecturer, Department of Applied Science, School of Engineering, University of California at Livermore/Davis
- Device Diagnostics, Lawrence Livermore National Laboratory
- Faculty, Fairleigh Dickenson University
- Visiting Scientist, Oak Ridge National Laboratory

EDUCATION: Post-doctoral, Nevis Synchrocyclotron, Columbia University
Ph.D., Nuclear Physics, Yale University
M.S., Theoretical Chemistry, Yale University
A.B., Physical Chemistry, Princeton University

OTHER: Fellow, American Institute of Chemists
Member, Sigma Xi and American Chemical Society

NAME: Howard E. Rew, Jr.

AREA OF RESP: Quality Verification

ASSOCIATION: Westinghouse Hanford Company

EXPERIENCE: 14 years

- Westinghouse Hanford Company
 - Manager, Quality/Safety Data Management: Operation and maintenance of corrective action management tracking system; trend analysis.
 - Staff Manager, Waste Management & Site Support QA: Oversight of N Reactor restart and layup activities.
- UNC Nuclear Industries, Inc.
 - Manager, Code Compliance: Establish and implement ASME Section XI program at N Reactor (Inservice Inspection, Testing, Repair, and Replacement).
 - Senior QA Engineer: Quality engineering support to N Reactor operations.
- Bechtel Power Corporation, WPPSS Unit #2
 - Quality Assurance Supervisor: Nonconformance report processing and close out; QA audits; trend analysis.

EDUCATION: B.S., Numerical Analysis & Applied Mathematics, Brigham Young University

OTHER: ASQC Certified Quality Engineer
Member, ASME/NQA Committee Working Group

NAME: Joseph J. Shonka

AREAS OF RESP: Radiological Protection and Operations

ASSOCIATION: Shonka Research Associates, Inc.

EXPERIENCE: 23 Years

- Shonka Research Associates, Inc.
 - Research Director: Direct private industry and Federal government contracts.
- Atlan-Tech, Inc.
 - Principal Scientist: Established Secondary Standards Laboratory for external radiation, Radiation Monitoring System start-up and support for power reactors.
- Private Consultant
 - Research for private industry and utilities.
- Brookhaven National Laboratory
 - Head of Health Physics Group supporting Accelerator Department.
 - Head of Operational Health Physics Group supporting field offices at BNL.
- Oak Ridge National Laboratory
 - Theoretical and experimental work on neutron transport and dosimetry for use in radiotherapy and with neutron dose calculations.
- Georgia Institute of Technology
 - Radiation instrument calibration, activation analysis, neutron generator facility modifications, and instructor.
- Physical Sciences Laboratory
 - Participated in work involving manufacturing and calibration of ionization chambers.

NAME: Joseph J. Shonka (Continued)

EDUCATION: Ph.D., HP/NE, Georgia Institute of Technology
M.S., Physics, Georgia Institute of Technology
B.S., Math/Physics, St. Procopius College

NAME: Joseph J. Shonka (Continued)

OTHER: Health Physics Society
Sigma Xi
American Association of Physicists in Medicine

NAME: Robert W. Tayloe, Jr.

AREA OF RESP: Training and Certification

ASSOCIATION: Battelle

EXPERIENCE: 12 Years

- Battelle, Principal Research Scientist
 - Criticality Safety and Training
 - Radiation Safety
 - Dosimetry
 - Participated in six security Inspections and Evaluations of DOE Facilities
 - Participated in nine previous Technical Safety Appraisals or Tiger Teams
- Portsmouth Gaseous Diffusion Plant, Nuclear Criticality Safety Staff
 - Member of Nuclear Safety Committees
 - Conducted audits, training, analysis, interface with operations and engineering, instrumentation and resolution of inventory differences
 - Developed emergency drills, participated in Emergency Management Exercises, Member of Emergency Preparedness Committee

EDUCATION: B.S. Nuclear Engineering, North Carolina State University
Completed course work toward M.S. Nuclear Engineering, Ohio State University

OTHER: Lectured on "Safety in Handling UF_6 ," 1983-1985 for DOE Office of Nuclear Safety seminar on Prevention of Significant Nuclear Events
Professional Engineer, State of Ohio

NAME: Thomas Tuccinardi, Jr.

AREA OF RESP: Radiation Protection

ASSOCIATION: Office of Health, Headquarters, Department of Energy

EXPERIENCE: 15 years

- U.S. Department of Energy, Germantown, MD
 - Performed assessments and appraisals in the areas of health physics and emergency preparedness at various DOE facilities. Coauthor of the emergency preparedness order 5500.3A (Draft). Responsible for the development of the Office of Health inspection and assessment program
- U.S. Nuclear Regulatory Commission, Region I
 - Performed inspections at NRC licensed facilities in the northeastern U.S. in the area of health physics and emergency preparedness
- Puget Sound Naval Shipyard, Bremerton, Washington
 - Radiological Engineer during overhauls of nuclear powered surface ships and submarines

EDUCATION: B.S., Conservation, University of Maryland

NAME: Larry D. Warren
AREA OF RESP: Technical Editor
ASSOCIATION: Private Consultant
EXPERIENCE: 26 years

- Private Consultant
 - Technical and management consulting related to nuclear weapons research and development, nuclear weapons manufacturing facilities operations, and nuclear facilities safety programs. Participant in Technical Safety Appraisals (TSAs), Tiger Team Assessments (TTAs), and management appraisals/reviews.
- U.S. Department of Energy, Germantown, MD
 - Safety Programs Manager, Office of Weapons Safety and Operations, Deputy Assistant Secretary for Military Application, Defense Programs: Formulated safety and health policy and long-range plans for three national laboratories and five manufacturing facilities in the nuclear weapons complex. TSA coordinator/contact and Program Representative on 11 TSAs.
- Wilmington District, U.S. Army Corps of Engineers
 - Deputy Commander: Managed/directed annual planning/execution of \$60-70 million in civil works projects and \$9-15 million in military construction projects; Contracting Officer for construction and service contracts.
- Los Alamos National Laboratory
 - Program Manager, Insertible Nuclear Component Technology Program and Corps Support Weapons System Concept Study; Design Engineer, Nuclear weapon components and subsystems.
- U.S. Army (Lieutenant Colonel, Retired)
 - Various command, operations, and training assignments; and nuclear weapons research and development staff assignments.

NAME: Larry D. Warren (Continued)

EDUCATION: M.S., Nuclear Engineering, N. C. State University
B.S., Nuclear Engineering, N. C. State University
U.S. Army Command and General Staff College

OTHER: Member, Society of American Military Engineers
Certified Army Nuclear Plant Engineer
Certified Army Nuclear Power Plant Officer-in-Charge

NAME: Bernard S. Zager, M.D.

AREA OF RESP: Medical Services

ASSOCIATION: Private Consultant

EXPERIENCE: 36 years

- Consultant for occupational medical programs
- Medical Director and Manager Health and Safety Operation, General Electric Company, Nuclear Energy Operation
- Chief Physician Automotive Assembly Division, Ford Motor Company
- Private practice medicine and surgery
- Medical Officer - Mobile Army Surgical Hospital (MASH), Korea

EDUCATION: M.D., Northwestern University
Intern and Resident, Detroit Grace Hospital
B.A., Wayne State University

OTHER: Certified Occupational Medicine, American Board Preventive Medicine
Fellow, American College Occupational Medicine
Fellow, American College Preventive Medicine

NAME: William J. Zielenbach

AREA OF RESP: Operations

ASSOCIATION: Battelle

EXPERIENCE: 35 Years

- Battelle

- Technical Assurance Manager: Decontamination and Decommissioning of Battelle-Columbus Nuclear Material Facilities
- Staff Scientist: Security Evaluations (3) and Technical Safety Appraisals (8) of DOE facilities; nuclear package QA
- Project Manager: Nuclear fuel cycle case studies and facility safety analysis
- Project Leader and Member: Various programs for design and operation of irradiation experiments for Materials Testing Reactor, Engineering Test Reactor, Battelle Research Reactor, Experimental Breeder Reactor-II, University of Michigan Reactor (fueled and nonfueled)
- Researcher: Development of high-temperature air frame bearings and seals, and naval bearings; materials development for Aircraft Nuclear Propulsion program

EDUCATION: M.S., Nuclear Engineering, Ohio State University
B.S., Chemical Engineering, University of Pennsylvania

OTHER: Member, American Nuclear Society

Appendix A-4

**Biographical Sketches of the
Management Subteam Members**

NAME: Carl Guidice

AREA OF RESP: Management Subteam Leader

ASSOCIATION: U.S. Department of Energy, Office of Environmental Restoration and Waste Management

EXPERIENCE: 27 Years

- U.S. Department of Energy
 - Currently Associate Director for Planning and Resource Management for the Office of Environmental Restoration and Waste Management. Member Argonne National Laboratory Tiger Team. Member Budget Formulation Review Team for Richland Operations Office.
 - Seven years experience as DOE assistant Controller for Financial Systems and Accounting, and Director for Financial Policy.
 - Eight years experience as Deputy Assistant Secretary for Management for Fossil Energy R&D Program.
- U.S. Department of the Interior
 - Three years heading Departmental budget office.
- Office of management and Budget
 - Five years; duties included budget examination, and standards for financial systems.
- American Telephone and Telegraph
 - Three years as District Office Supervisor for Plant Operations.

EDUCATION: B.S., Financial, St. Vincent College
Graduate studies in Financial Management, American University
Mid-Career Fellow-Graduate Program at Princeton University
Ph.D., Nuclear Science and Engineering, Cornell University

NAME: Lisa Cummings

AREA OF RESP: Management Assessment Attorney

ASSOCIATION: U.S. Department of Energy, Los Alamos Area Office,
Albuquerque Operations Office

EXPERIENCE: 3 Years

- U.S. Department of Energy
 - Support Area Office staff concerning environmental laws and regulations.
 - Represent DOE at public hearings and in negotiations with Federal and State regulators, and Indian tribes on various environmental matters arising under RCRA, the Clean Water Act, the Clean Air Act, CERCLA, etc. Represent the interests of DOE in litigation in which the United States, DOE, or its operating and onsite contractors have an interest.

EDUCATION: B.S., Secondary Education, University of New Mexico
J.D., University of New Mexico School of Law

NAME: John H. Kersten

AREA OF RESP: Management Assessment

ASSOCIATION: U.S. Department of Engery, Chicago Operations Office, SERI Area Office

EXPERIENCE: 21 Years

- Assistant Area Manager, SERI Area Office
 - Responsible for oversight of the Solar Energy Research Institute planning, operations, and construction activities. Provides management guidance in the areas of environment, safety and health, budget, finance, procurement, property, and salary administration. Coordinates activities with the Chicago Operations Office and the Headquarters program office.
- Budget Officer, Strategic Petroleum Reserve Project Management Office
 - Responsible for budget formulation and execution of a multi-billion dollar national program. Elements of the program included planning, design, construction, operation, and maintenance.
- Budget Analyst, DOE Headquarters
 - Responsible for budget formulation and execution of national research and development programs. Included program analyses of national laboratory and industrial/university contractor programs.

EDUCATION: B.S., Psychology, Central Michigan University

NAME: Marvin J. Laster, Esq.

AREA OF RESP: Management Assessment

ASSOCIATION: Private Consultant

EXPERIENCE: 32 Years

- Private consulting in environmental and safety law, management, and organization
 - Participant in Tiger Team Assessments of the Lawrence Livermore National Laboratory, the Paducah Gaseous Diffusion Plant, and the Oak Ridge National Laboratory as a member of the Management Assessment Subteams.
 - Member of DOE Headquarters Task Force to develop Management Performance Objectives and Criteria for use in Tiger Team management assessments.
- U.S. Government Service
 - U.S. Atomic Energy Commission, U.S. Energy Research and Development Administration, U.S. Department of Energy, 1958-1989 - Office of the General Counsel - Assistant Chief Counsel: Chicago Operations Office, Brookhaven Area Office, and Environmental Measurements Laboratory; Member, Accident Investigation Boards; Participant in annual laboratory institutional appraisal programs; Represented U.S. Government in litigation, claims, and disputes.

EDUCATION: B.A., Political Science, Brooklyn College
LL.B., New York University School of Law
Princeton Fellow, Public and International Affairs, Princeton University

OTHER: Recipient, numerous Federal Government superior performance awards

NAME: Edward E. Patenaude

AREA OF RESP: Management Assessment

ASSOCIATION: U.S. Department of Energy

EXPERIENCE: 22 Years

- Deputy Manager - Pinellas Area Office
 - Responsible for managing environmental restoration activities at the Pinellas Plant
 - Assisting in the management of plant operation and administration of the Cost Plus Award Fee Contract.
- Area Manager - Pinellas Area Office
 - Responsible for all operations at the Pinellas Plant and the administration of the Cost Plus Award Fee contract.
 - The Pinellas Plant is a Government-owned, contractor-operated facility that provides research, development, and production of nuclear weapon components.
- Program Manager, Computer Integrated Manufacturing
 - Responsible for integrating advanced computer technologies throughout nuclear weapon design and production facilities.

EDUCATION: B.S., Industrial Engineering, University of South Florida
B.S., Engineering Technology, University of South Florida

NAME: Louis A, Rancitelli

AREA OF RESP: Management Assessment

ASSOCIATION: Battelle, Energy Systems Group

EXPERIENCE: 23 Years

- Battelle
- Participated in Tiger Team Assessments of the Lawrence Livermore National Laboratory and the Paducah Gaseous Diffusion Plant as a Management Subteam member.
- Participated in Task Force for DOE Headquarters to develop Management Performance Objectives and Criteria for use in Tiger Team management assessments, June 1990.
- Managed the Battelle West Jefferson, Ohio Nuclear Facility. Responsible for compliance with DOE and Nuclear Regulatory Commission (NRC) regulations related to nuclear materials storage, handling and transportation, waste characterization and disposal, criticality safety, and health physics.
- Conducted and managed studies related to the environmental impact of radionuclides resulting from commercial and defense reactor operations and weapons fallout.
- Conducted and managed studies related to the environmental impact of toxic trace metals resulting from fossil fuel combustion and industrial operations.
- Conducted and managed systems studies of fuel cycle wastes and disposal in various geological media.
- Managed, for the NRC, a uranium mine tailing study focused at defining the environmental impact.
- Managed an NRC program to define the emission, transport, and deposition of radionuclides from a low-level radioactive waste site.

EDUCATION: Ph.D., Nuclear Science and Engineering, Cornell University
B.S., Chemical Engineering, Drexel Institute of Technology

NAME: Paul Thurmond

AREA OF RESP: Management Assessment

ASSOCIATION: Advanced Systems Technical Associates, Inc.

EXPERIENCE: 15 Years

- Advanced Systems Technical Associates, Inc.,
Frederick, MD (1987-Present)
 - Management Consultant - Participates in management assessment and organizational development activities for the U.S Department of Energy (DOE), Nuclear Regulatory Commission (NRC), and industrial clients. Has participated as a Management Subteam member on DOE Tiger Team assessments and on NRC diagnostic evaluations of commercial nuclear power plants (NPPs). Served as Principal Investigator for DOE Human Performance Improvement Program. Conducted management appraisals for pulp and paper mills and chemical plants. Serve as management consultant of DOE MANPRINT program.
- NUS Corporation, Gaithersburg, MD (1982-1987)
 - Department Head, Training and Personnel Development Department. Provided management, organizational development, and training consulting to Government and Industrial clients. Responsible for developing NPP operations and maintenance training programs for INPO accreditation. Responsible for all department administrative and personnel concerns, business development and planning, department budgets.
- Systems Exploration, Inc. (1975-1982)
 - Department Head, Training Department. Responsible for Government training and organizational development programs. Provided management consulting services to U.S. Department of Defense agencies.

EDUCATION: Ed.D., Educational Research, Memphis State University
B.S., Chemical Engineering, Drexel Institute of Technology
Ph.D., Nuclear Science and Engineering, Cornell University

Appendix B

**Environmental Subteam
Assessment Plan**

ENVIRONMENTAL ASSESSMENT PLAN
FOR THE
DOE TIGER TEAM ASSESSMENT
AT THE
LAWRENCE BERKELEY LABORATORY
BERKELEY, CALIFORNIA

JANUARY 1991

1.0

INTRODUCTION

On June 27, 1989, Secretary of Energy James D. Watkins announced a 10-point initiative to strengthen environmental protection and waste management activities in the U.S. Department of Energy (DOE). One of the initiatives involves conducting Tiger Team Assessments at DOE's operating facilities.

The purpose of the Environmental Assessment portion of the Tiger Team Assessment of the Lawrence Berkeley Laboratory (LBL) is to provide the Secretary with information on the current environmental regulatory compliance status and associated vulnerabilities of the facility, root causes for noncompliances, adequacy of DOE and site contractor environmental management programs, and response actions to address the identified problem areas.

The scope of the LBL Environmental Assessment is comprehensive, covering all environmental media and applicable Federal, state, and local regulations, requirements, and best management practices (BMPs). The environmental disciplines to be addressed in this assessment include air, soil, surface water, groundwater, waste management, toxic and chemical materials, radiation, quality assurance, and inactive waste sites and releases. The assessment will also address National Environmental Policy Act (NEPA) requirements.

2.0 ENVIRONMENTAL ASSESSMENT INFORMATION

The LBL Environmental Assessment will be conducted by a team of technical specialists, managed by a Team Leader and Assistant Team Leaders from the Office of Environmental Audit (OEV). The technical specialists are from other DOE Offices, NUC Corporation, Argonne National Laboratory (ANL), and Oak Ridge National Laboratory (ORNL). The names and responsibilities are listed below:

Lee Stevens	Team Leader
Yvonne Garbe	Assistant Team Leader
Narendra Mathur	Assistant Team Leader
Mark Notich	Team Coordinator
Dan Nugent	Air
Steve Giebel	Radiation
Ralph Basinski	Waste Management
Dave Misenhimer	Surface Water
Pete Lindahl	Quality Assurance
Ronald Kolpa	Inactive Waste Sites
Venkat Reddy	Groundwater
Dave Dolak	Toxic and Chemical Materials
John Pullium	NEPA
Lorine Segal	NEPA
Linda Thurston	NEPA
Paula Zegrecki	NEPA

2.1 Pre-Assessment Activities

Pre-Assessment activities for the LBL Environmental Assessment included the issuance of an information request memorandum (Krenz, November 1990), a Pre-Assessment Site Visit, and initial review of documentation which was sent to the Environment Team by the LBL as a result of the information request memorandum.

A Pre-Assessment Site Visit was conducted on December 4 and 5, 1990, by the Tiger Team Leader, the three Team Leaders for Environment, Health and Safety, and Management, the Assistant Team Leaders for Environment, the NUS Team Coordinator for the Environment Team, as well as representatives from the Office of Special Projects and other DOE Offices. The purpose of the Pre-Assessment visit was to become familiar with the site, to review information being supplied and request additional information, and to coordinate plans for the upcoming assessment with the San Francisco Operations Office (SAN) and the LBL. Representatives from the U.S. Environmental Protection Agency (EPA) Region IX, the California State Department of Health Services (DHS), the Regional Water Quality Control Board (RWQCB), State Water Quality Control Board (SWQCB) and the East Bay Municipal Utilities District (EBMUD) presented their concerns with respect to Environment, safety, and health (ES&H) concerns at the LBL.

2.2 On-site Activities and Reports

The on-site activities for the Environmental Assessment will (tentatively) take place between January 14, 1991 and February 15, 1991. On-site activities include field inspections, file/record reviews, and interviews with site personnel. The detailed agenda for the environment subteam technical specialists is shown in Table 2-1. An overall environment subteam assessment schedule is shown in Table 2-2. Any and all modifications to the agenda will be coordinated with the Environment Team site contacts from the LBL.

A close-out briefing will be conducted at the conclusion of the on-site activities. Findings from the Environmental Assessment, as well as findings from the Safety and Health and Management Assessments, will be presented. A draft report containing the findings will be provided for review and comment to SAN and LBL.

**TABLE 2-1
LAWRENCE BERKELEY LABORATORY
ENVIRONMENT TEAM
SCHEDULE OF FOR TECHNICAL SPECIALISTS**

PAGE 1 OF

Week 1		Surface Water	Ground Water	Quality Assurance	Waste Management	Inactive Waste Sites	Air	Radiation	TSCA
Monday 1/14/90	AM	Orientation Training	Orientation Training	Orientation Training	Orientation Training	Orientation Training	Orientation Training	Orientation Training	Orientation Training
	PM	Orientation Training	Orientation Training	Orientation Training	Orientation Training	Orientation Training	Orientation Training	Orientation Training	Orientation Training
Tuesday 1/15/90	AM	Interview w/ est Bay MUD	Interview LBL GW personnel, managers, and hydrogeologists	Interview w/ est Bay MUD	Interview LBL Waste Mgmt Pgm Director, S&P Prog Director and DOE-SAN on-site representative	Interview LBL Waste Management Program Personnel	Tour Bldgs 25, 63, 76, 77 for sources	Mtg w/ LBL personnel responsible for Rad Env Monitoring Program	Mtg w/ LBL personnel for overview of PCB, Asbestos, Pesticide, Haz. Materials and SARA Title III programs
	PM	Review Sewer Plant, SPCC Plan, Tox and Organics Mgmt Plan	Review Documents on Mont Well layout and installation	Interview w/ Director of Environmental Protection Program and Manager of E&H Department	Tour of Shops Areas	Shops Area Tour	Continued AIM Activities	Continued AIM Activities	Continued AIM Activities
Wednesday 1/16/90	AM	Tour WTPP in Bldgs 25, 77, 70/70A	Document Review	Interview with Group, SAN on-site E&H representative	Tour of Accelerator facilities	Tour Bldgs 46, 17, 69 and surrounding areas	Tour Bldgs 74, 95, 77 and 62 pollution control equipment	Review off-site Radiation Env Monitoring Program	Visit Emeryville and other warehouse facilities
	PM	Review H&S Manual for wastewater disposal	Tour of monitoring well network	Interview w/ SAN Manager at E&HQA (check w/ M. Kamley)	Magnetic Fusion Facilities	Tour Bldgs 5, 16, 53 and surrounding areas	Continued AIM Activities	Continued AIM Activities	Visit on-site warehouse facilities
Thursday 1/17/90	AM	Tour stormwater drainage system, hazardous material storage	Observe monitoring well sampling procedures	Observe monitoring well sampling	Tour of Biomedical Facilities	Review plans, specs, and aerial photos	Inspect monitoring network w/ Air Specialist	Inspect monitoring network w/ Air Specialist	Visit selected chemical use areas, i.e. labs, shops
	PM	Tour Photo lab, Bldgs. 18, 25, 26 80, 90	Continued AIM Activities	Continued AIM Activities	Training Program Review	Set up interviews w/ former employees	Continued AIM Activities	Continued AIM Activities	Continued AIM Activities
Friday 1/18/90	AM	Surface water sampling, sanitary sewer sampling	Inspect monitoring well maintenance	Surface water sampling sanitary sewer sampling	Tour of Nuclear Science facilities	Former employee interviews	Continue monitoring network review	Inspect monitoring network w/ Air Specialist	Review SARA title III Documentation and Community Right to Know
	PM	Tour of Cooling Towers, USTs	Continued AIM Activities	Review lab contracts, QA documents	Hazardous waste manifesting, off-site facility evaluation program	Interviews and revisit sites	Continued AIM Activities	Continued AIM Activities	Visit aboveground Storage Tank Locations
Saturday* 1/19/90	AM	Document Review	Document Review	Document Review	Document Review	Document Review	Document Review	Document Review	Document Review
	PM								

* Activities are scheduled for Tiger Team members only. Participation by SAN or site personnel is not necessary.

**TABLE 2-1
LAWRENCE BERKELEY LABORATORY
ENVIRONMENT TEAM
SCHEDULE FOR TECHNICAL SPECIALISTS**

PAGE 21

Week 1		Surface Water	Ground Water	Quality Assurance	Waste Management	Inactive Waste Sites	Air	Radiation	TSCA
Monday 1/21/90	AM	Tour and review of hydrographs	Review GW Data Mgmt	Review QA Programs for Env. Protect/Monitoring Programs	Tour Bldgs 981, 934, 935, Donner, Cabin, Review Waste Charac. Program	Tour SA, 25, 26 and Surrounding Areas	Tour Donner, Cabin	Review Rad. Waste Practices w/ Waste Practices w/ Waste Mgmt. Spec.	Review PCB Documentation
	PM	Portable water sampling, back flow prevention records	Continued AM Activities	Portable waste sampling	Tourist Permitted and Interim Status Facilities	Tour 75, 76, 78 and Surrounding Areas	Tour Bldg 75 Sources and Stocks	Continued AM Activities	Tour PCB equipment, storage areas, capcations
Tuesday 1/22/90	AM	Tour Bldgs 71, 74, 76	Interview LBL GW personnel, managers, and hydrogeologists	Interview with East Bay MUD	Interview LBL Waste Mgmt. Pgm. Director, 9830.2A Pgm. Director and DOE-S&H on-site representatives	Interview LBL Waste Management Program Personnel	Tour Bldgs. 25, 62, 76, 77 for sources	Review Data Assessment Methodologies	Continue site visit of PCB equipment, storage areas, capcations
	PM	Review ion exchange columns, Bldgs 37, 51, 62, 66, 64, 71 and 88	Review Documents on Mont. Well layout and installation	Interview with Director of Environmental Protection Program and Manager of E&H Department	Tour of Shops Areas	Shops Area Tour	Continued AM Activities	Continued AM Activities	Pesticide Program Review or Inspection
Wednesday 1/23/90	AM	Tour WTPP in Bldgs 25, 77, 70/70A	On/off-site visits to inactive facilities	Follow-up visits & interviews	Tour of Pining Facilities	Document Review	Site Tour for surrounding terrain influences	Review ALARA and Rad Envir. Plan Procedures	Tour Pesticide mixing and storage areas
	PM	Tour Research Labs in 10, 80, 934	GW well installation review	Findings and overview Prep	Review Waste Min. Programs and Waste Tracking System	Document review	Tour 75	Continued AM Activities	Subsites Document Review, Annual report, disposal practices
Thursday 1/24/90	AM	Review of training records, S&A procedures, SPCC Plan procedures	Document Review	Review off-site Analytical Lab	Review D&D Facilities Program	Tour on-site waste disposal areas	Tour Bldgs. 68, 69 for sources	Follow-up interviews	Document Review
	PM	Document Review	Document Review	Con't AM Activities	Tour Scrap Yards	Rechecks & Revisits	Document Review	Follow-up interviews	Follow-up
Friday 1/25/90	AM	Document Review	Document Review	Follow-up visits & interviews	Revisits	Tour of PCB spill areas	Document Review	Document Review	Document Review
	PM	Document Review	Document Review	Findings and Overview Prep	Revisits	Document Review	Document Review	Document Review	Follow-up
Saturday 1/26/90	AM	Off-Site	Off-Site	Off-Site	Off-Site	Off-Site	Off-Site	Off-Site	
	PM								

TABLE 2-2
LAWRENCE BERKELEY LABORATORY
ENVIRONMENT TEAM
COMPREHENSIVE ASSESSMENT SCHEDULE

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
January 13	14 Orientation Training	15 Interviews and Visits	16	17	18	19 Document Review and Team Mtgs.
20	21 Interviews and Visits	22	23	24	25	26 Off-site
27	28 Off-site this week. Specialists will develop findings and detailed schedule for rechecks & revisits	29	30	31	February 1	2
3	4 Rechecks and Revisits, Develop Findings	5 1st Draft of Finding due to Team Leader (T. L.)	6 2nd Draft of Findings due to Team Leaders, Overview Outlines Due	7 3rd Draft of Findings to T.L., Draft Findings to site at noon	8 Technical Accuracy Review, Overview due to T.L.	9 Incorporate Tech. Accur. Comments
10	11 Final Sections Due to T.L.	12 Section 3.0 Due	13 Exec. Summary Due	14 Close out Preparation	15 Closeout	16

3.0 AIR

3.1 Issue Identification

The radioactive and nonradioactive air-related compliance assessment activities involve an assessment of the facility-wide air emissions, the emission control and emission monitoring procedures and equipment, and the acquisition and processing of ambient air quality data. Areas of particular interest are the process emissions of radionuclides, particulates, organic vapors, and inorganic compounds. 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 (NESHAP) requirements, and DOE Order requirements will also be assessed. In particular, the ambient air and meteorological monitoring networks and sources of radioactive and/or chemical emissions will be investigated.

The general approach to the compliance assessment will involve a review of existing air permits, operating procedures, stack test reports, and other relevant documents to identify significant sources of air emissions. Following the document review will be the physical inspection of significant processes or operations, emissions control and monitoring equipment, and emissions controls equipment.

The ambient air monitoring system assessment will involve inspection of the ambient samplers and meteorological equipment, and review of procedures and documentation applicable to the design of the ambient air monitoring system, data acquisition, calibration, data validation, and data processing. The primary emphasis will be an assessment of these procedures to characterize the environmental impact of facility operation and the defensibility of the collected data.

3.2 Records Required

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

- o Air permits;
- o Source and source emission inventories;
- o Environmental monitoring reports;
- o Ambient air dispersion and dose calculations;
- o Reports on accidental releases of airborne substances;

- o Description documentation on existing and proposed add-on emission controls and ventilation system drawings;
- o Operating and testing/maintenance procedures for control equipment;
- o Air-related correspondence with regulatory agencies;
- o Ambient air monitoring program documentation:
 - Sampling location rationale and documentation
 - Sample collection procedures
 - Calibration procedures and records
 - Ambient air monitoring data
 - Maintenance procedures and records
- o Meteorological monitoring program documentation:
 - Meteorological tower location rationale and documentation
 - Sample collection procedures
 - Calibration procedures and records
 - Maintenance procedures and records
- o Radionuclide and nonradionuclide stack monitoring/sampling program documentation:
 - Sampling location rationale and documentation
 - Calibration procedures and records
 - Maintenance procedures and records

4.0 WASTE MANAGEMENT

4.1 Issue Identification

The solid/hazardous/radioactive waste assessment will be carried out by reviewing and evaluating all activities generating solid/hazardous/radioactive wastes, and the treatment, storage, recycling, and disposal practices involved in the handling of these wastes including handling of wastes by commercial off-site facilities.

Management of all waste streams including mixed wastes, hazardous wastes, radioactive wastes (including high level) and nonhazardous wastes will be reviewed. The review will generally consist of several activities: 1) waste management procedures will be reviewed and evaluated; 2) physical facilities where wastes are generated, accumulated, stored, treated, recycled or disposed of will be inspected and adherence to facility procedures evaluated; 3) personnel involved in these activities will be interviewed; 4) files and records will be reviewed; and 5) the compliance status of waste management facilities and activities with respect to applicable environmental regulations and DOE Orders will be assessed.

At LBL a variety of hazardous, radioactive, and mixed wastes are generated. These wastes generally contain toxic, radioactive, and/or hazardous constituents. Emphasis will be placed on reviewing general waste characterization and management procedures and practices, reviewing training practices, and inspecting facilities which can potentially generate solid/hazardous/radioactive wastes. Particular emphasis will be placed on compliance with state regulations.

Discussions will be held with those individuals knowledgeable of waste management practices in order to develop an understanding of past and existing waste management practices. Discussions will be held with waste generators and personnel from the groups responsible for managing wastes.

Conduct of operations of waste management programs will be examined in detail. This will include procedures evaluation, evaluation of implementation of procedures by operators and management, the adequacy and content of training programs. Waste minimization program plans and their implementation will be evaluated. Compliance with DOE Orders, including orders related to quality assurance/quality control (QA/QC), will be reviewed.

The review of solid/hazardous/radioactive waste management practices will be coordinated with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or Inactive Waste Sites (IWS) assessment to identify if wastes generated from

past LBL activities have been improperly disposed of on-site or off-site; the radiological assessment to define problems with wastes containing radioactive constituents; and the surface water assessment since waste materials may be disposed of thorough the sanitary or storm sewer systems.

4.2 Records Required

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

- o Resource Conservation and Recovery Act (RCRA) Part B Permit Application and Permit;
- o RCRA Section 3016 Inventory;
- o Underground storage tank notification and associated records;
- o Inspection records (state, local and Federal);
- o Groundwater monitoring, sampling, and analytical documentation;
- o Waste Analysis Plan;
- o Contingency plans and emergency procedures;
- o Waste manifests and shipping records;
- o Waste Management Plans;
- o Release notification or occurrence records;
- o Waste inventory documentation;
- o Enforcement action documents;
- o Internal facility inspection documentation;
- o Correspondence with regulatory agencies concerning waste management;
- o Records dealing with the reuse/recycling of wastes;
- o Training records; and
- o Correspondence with off-site commercial waste handling facilities.

5.0 SURFACE WATER

5.1 Issues Identification

The focus of the surface water/drinking water portion of the LBL Environmental Assessment will be on the release of contaminated or polluted wastewaters to the sanitary or storm sewers, or groundwater aquifers underlying the site. Pathways for off-site migration of pollutants include:

- o Spills or leaks into permeable soils areas;
- o Releases (accidental or planned) to sanitary sewers and/or process wastewater drains without retention, chemical and radiological analysis, or treatment;
- o Accidental release of contaminants to storm sewers; and
- o Contaminated surface run-off into drains or sewers or into permeable soils areas.

The assessment will review the potential for contamination of wastewaters by metals, organics, and radionuclides as well as review present conditions of wastewater control, collection and treatment. Liquid waste treatment, collection and handling equipment will be examined and records of operation will be reviewed.

The assessment will include identification of discharges to surface waters, groundwaters, or the sanitary sewer systems, which may not be addressed in operating permits or other documents. Measures taken at the LBL to prevent backflow of process wastewater or sanitary sewer flows into the drinking water piping systems will be reviewed, along with self-monitoring reports (required under primary drinking water regulations). Copies of standard operating procedures (SOPs), operating logbooks, and maintenance records will be reviewed with respect to water and wastewater monitoring and treatment systems. Sampling and analytical practices will be observed to determine how closely SOPs are being followed. Interviews with managers and operators of monitoring equipment and treatment systems will be conducted in order to understand modifications or significant deviations, if any, from written SOPs.

A walk-through of selected buildings will be made to observe normal routines, including maintenance activities which generate wastewaters. Various discharge and monitoring points will be reviewed, and actual sampling and analytical procedures will be observed. Emphasis will be placed on the major contributors to wastewater generation, including discharges from cooling water systems, filter backwashing, and wastewater treatment systems. Spill prevention provisions for fuels and hazardous material storage areas will be reviewed, along with LBL's procedures for

reporting spills.

5.2 Records Required

Files will be reviewed as part of the assessment, including documents not yet reviewed or received. Specific documents and files to be reviewed as part of the assessment include, but will not be limited to, the following:

- o Recent analytical data on wastewater releases;
- o Application for permits to construct water and wastewater facilities;
- o Notices of Violations relating to wastewater releases;
- o Operator logbooks and monitoring reports;
- o SOPs for wastewater collection, holding and transfer;
- o Monitoring equipment maintenance and calibration records;
- o Detailed drawings of the domestic and fire water supply, storage, and distribution system;
- o Detailed drawings of sanitary and storm sewer systems;
- o Records of drinking water quality;
- o Procedures for collecting samples of drinking water and wastewater;
- o Maintenance and inspection records for the drinking water system, including water tanks and backflow prevention procedures;
- o Spill Prevention, Control and Countermeasure (SPCC) plan and records inspection;
- o Internal memos or correspondence relating to surface water/drinking water problems (e.g., backflow prevention measure); and
- o Other records as determined on-site.

6.0 RADIATION

6.1 Issue Identification

The radiological portion of the LBL Environmental Assessment will involve 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 (QA) programs for radiation-related environmental monitoring. The assessment will be performed on a program-by-program basis to determine:

- o Conformance with radiological standards and requirements in applicable Federal, state and local regulations, permits, agreements, orders, and consent decrees;
- o Conformance with radiological standards and requirements in DOE Orders;
- o Adequacy of DOE-SAN and LBL radiological environmental/public protection programs, including planning, organization, resources, procedures, and documentation and training, to effectively and reliably implement/maintain the intent/standards contained in the previously mentioned documents;
- o Relationships with regulatory agencies; and
- o Conformance with and ability to adopt applicable radiological "best" and "accepted" industry practices.

The assessment will be based on observations of programmatic processes, operations, emission control and monitoring, waste disposal including transportation, environmental monitoring, and environmental/public impact analyses. Procedures and/or documentation associated with these activities will be reviewed; 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.

The radiological portion of the LBL Environmental Assessment will be coordinated with the air, surface water, groundwater, waste management, inactive waste sites, and quality assurance assessment disciplines.

6.2 Records Required

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

- o Radiation-related ambient air quality information;
- o Background radiation data for soil, surface water, and groundwater;
- o Inventories of air, soil, surface water, and groundwater radionuclide release points and quantities;
- o Biota radionuclide monitoring data;
- o Radioanalytical QA programs and procedures;
- o Dose assessment methodologies including assumptions, calculations, reporting, etc.;
- o Building and plot plans with process equipment and effluent monitoring locations;
- o Descriptions of radiation monitoring equipment, practices (calibration and maintenance procedures, locations, operating procedures, etc.);
- o On-site and off-site radionuclide sampling point criteria;
- o Radwaste management practices, policies, and procedures; and
- o Field, laboratory, and effluent monitoring equipment records.

7.0 GROUNDWATER

7.1 Issue Identification

The groundwater assessment will involve the evaluation of previous studies of site hydrogeology, determination of the status of ongoing studies and investigations, and the review of plans for future investigations. A representative number of sites of potential groundwater contamination will be inspected. Inspections of selected potential sources, such as the hydraugers, will be conducted jointly with the waste management, inactive waste sites, radiation, and/or surface water disciplines as scheduling permits. Well construction will be reviewed both on "as-built" diagrams and in the field. Well maintenance will also be reviewed.

Several areas of specific interest have been identified through review of the documents received thus far. These include, but are not limited to, the following:

- o Review of well installation;
- o Review of monitoring well sampling;
- o Hydrogeologic characterization of conditions underlying the LBL;
- o Management of groundwater monitoring data; and
- o Potential impacts of spills and releases on groundwater underlying the LBL.

7.2 Records Required

Files to be reviewed as part of this assessment include documents and data not yet received or reviewed. Specific documents include, but will not be limited to, the following:

- o Groundwater Protection Management Program Plan (GPMPP);
- o Detailed groundwater monitoring plan;
- o Sampling procedures and analytical protocols;
- o Well construction (as-built) diagrams and current well/boring locations;
- o Chemical analytical data for soils and groundwater; and
- o Additional geologic and/or hydrogeologic investigations, as available.

8.0 INACTIVE WASTE SITES AND RELEASES

8.1 Issue Identification

The objective of the inactive waste site portion of the Environmental Assessment is to determine whether current activities at the LBL are being performed in accordance with applicable DOE Orders and Federal regulations, such as CERCLA. Additional areas that will be addressed include the adequacy of reporting under SARA Title III, the methods used to quantify spills, and the spill reporting procedures. Also, the LBL will be asked to identify whether Federally-owned property associated with the Laboratory has been transferred and if so, the procedures used to ensure that its acceptability for release/transfer will be reviewed.

8.2 Records Required

In addition to those documents reviewed prior to the on-site assessment, the following records will be examined at the LBL:

- o SARA Title III documentation;
- o Documentation associated with past sampling and analysis (S&A) activities, such as field logbooks, health and safety follow-up reports, and chain-of-custody documentation;
- o Community Relations;
- o Property Transfer records;
- o Notifications and internal records of spills/releases;
- o Records of facility expansion and building destruction; and
- o Other records as determined on-site.

9.0 TOXIC AND CHEMICAL MATERIALS

9.1 Issue Identification

The toxic and chemical materials portion of the LBL Environmental Assessment will address the management and use of raw materials and process-related chemicals used at the LBL with emphasis on their handling, storage, and disposal. Primary emphasis will be given to the substances regulated by the Toxic Substances Control Act (TSCA), which are polychlorinated biphenyls (PCBs), and the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). The aboveground and underground storage tanks used for bulk chemicals and fuels, as well as the drum storage and dispensing facilities, will also be included in this assessment. Management and control of the toxic and hazardous substances will be determined through interviews with appropriate site personnel, inspections of pertinent facilities, and a review of relevant documents. The information obtained will be evaluated to assess whether the LBL's management and control of toxic and hazardous substances are in compliance with Federal, state, and local regulations and pertinent DOE Orders. In addition, for those situations not covered by regulations, the BMP concept will be applied to prevent or minimize releases of toxic substances to the environment.

The management of electrical equipment that contains or has contained PCB or PCB-contaminated coolants will be reviewed during the assessment. The PCB electrical equipment in use, PCB storage areas, and any PCB equipment and materials in storage for use or disposal will be inspected for compliance with TSCA regulations. The LBL records concerned with PCBs will be reviewed, specifically PCB annual reports and PCB electrical equipment inspection logs. Records of off-site shipments and disposal of PCBs or PCB-containing materials, as well as information concerning previous spills of PCBs will be reviewed.

Asbestos or asbestos-containing materials (ACMs) have been used throughout the LBL. A list of buildings known to contain asbestos will be requested. Records pertaining to the handling and disposal of asbestos will be reviewed and any ongoing asbestos removal projects and or/disposal of asbestos will be observed directly.

Toxic and hazardous materials purchase and usage records will be reviewed. Areas where these materials are stored and used will be visited and handling procedures evaluated. For example, the management, inventory, storage and control of petroleum products will be examined.

Discussions will be held with those individuals knowledgeable of toxic/hazardous substances practices in order to develop an understanding of current and past practices.

9.2 Records Required

Files will be reviewed as part of the assessment, including documents not yet reviewed or received. Specific documents and files to be reviewed as part of the assessment include, but will not be limited to, the following:

- o Toxic substances labeling and tracking system;
- o Procedures for handling, control and management of toxic substances;
- o PCB annual inventory documents (1985-1989);
- o Inventory of current PCB-contaminated electrical equipment, or documentation of their removal;
- o Records of inspections of PCB transformers (1985-present);
- o PCB handling, storage, and disposal procedures;
- o Correspondence with fire department on PCB equipment;
- o Locations of buildings containing asbestos, including usage;
- o Asbestos disposal records, including method of disposal and location of disposal sites;
- o Asbestos handling, removal, disposal procedures, and environmental monitoring;
- o Records of asbestos use in process equipment and support facilities;
- o Pesticide training, handling storage, disposal records, and environmental monitoring;
- o SOPs for pesticides;
- o Spill control and emergency preparedness plans for aboveground storage tanks;
- o Audits or inspections pertaining to the toxic substances program; and
- o Other records as determined on-site.

10.0 QUALITY ASSURANCE

10.1 Issue Identification

The quality assurance (QA) part of the Environmental Assessment will consist of an evaluation of current S&A procedures performed at the LBL or at any off-site laboratories conducting analyses on LBL environmental samples to ensure that they result in the generation of scientifically valid and defensible data.

The objective will be to assess the QA procedures for collecting process effluent and environmental samples, and for performing the laboratory analyses to identify and quantify contaminants, as well as for evaluating and reporting the data. Aspects of the QA program relating to environmental management of the LBL Site which will be evaluated include training; instrument calibration and maintenance; sample collection, preservation, handling and chain-of-custody procedures; blank, replicate, and spiked sample results; data reduction and reporting; and data documentation including logbook and calculation reviews and archival data storage.

S&A procedures will be reviewed to ensure that they conform to regulatory requirements and/or accepted practice and are being properly implemented by the LBL contractors. Also, the interlaboratory test programs participated in by the various laboratories as administered by the DOE's Environmental Measurements Laboratory and the EPA will be evaluated for the laboratories' performance and corrective action plans.

In addition to QA/QC for environmental monitoring, the QA programs for all ES&H functions at LBL will be reviewed. Areas of interest include documentation of past audits or surveillances performed by LBL or SAN personnel; procedures for performing audits and surveillances, follow up activities, corrective actions, and lessons learned; a determination of the effectiveness of the QA programs; and a review of the extent of interaction between LBL and SAN ES&H QA programs.

10.2 Records Required

Part of the assessment will consist of a review of pertinent documents and files. This will include documents not previously reviewed or received. Some specific documents and files to be reviewed in this phase of the assessment include, but will not be limited to the following:

- o QA plans for the LBL and any supporting analytical laboratories;
- o The LBL environmental S&A procedures manuals;
- o QA audits of environmental S&A at the LBL;

- o Periodic or annual QA summary reports for the LBL;
- o Summaries of results of QA sample analysis of external performance evaluation samples (e.g., from DOE's Environmental Measurements Laboratory and from EPA);
- o Training records for sample collection personnel and the LBL ES&H staff;
- o Laboratory notebooks, standard data reporting forms and sampling logbooks;
- o Instrument maintenance, repair, and calibration records for laboratory and field equipment;
- o Result of internal precision and accuracy studies of environmental analyses; and
- o Results of interlaboratory analyses of standard samples, if any.
- o Results of any audits or surveillances performed by LBL or SAN QA staff;
- o Procedures for audits and/or surveillances, follow up activities, corrective action implementation and verification, and lessons learned; and
- o Schedules for audits and/or surveillances to be performed by LBL QA staff.

11.0 NATIONAL ENVIRONMENTAL POLICY ACT

11.1 Issue Identification

The objectives of the NEPA assessment are 1) to evaluate the LBL NEPA management structure and review processes; 2) to identify problems that may lead to inappropriate procedures or inadequate NEPA documentation; and 3) to ensure consistency with the NEPA Council on Environmental Quality (CEQ) regulations, and DOE NEPA Guidelines, Orders, and Memoranda. The overall goal of the NEPA assessment is to foster improved and environmentally sound decisionmaking for those DOE actions having the potential for significant impacts on the environment.

A NEPA protocol, developed by the Office of NEPA Project Assistance (EH-5) and ORNL includes worksheets that focus the team's lines of inquiry to ensure a comprehensive, consistent approach to the assessment. The content of the worksheets is divided into seven main areas as follows:

- o Overview of NEPA issues;
- o Management structure (overall organization, training, use of contractors, record-keeping, etc.);
- o NEPA compliance planning;
- o NEPA/CERCLA, NEPA/RCRA integration;
- o Determination of level of NEPA review required;
- o Procedural aspects of NEPA documents; and
- o Technical content of NEPA documents.

The general approach to the assessment will include interviews with LBL staff responsible for the NEPA procedures and review process; LBL project and program managers; the legal and public relations staff and the classification officer; and others, as the need arises. The use of the categorical exclusion (Cat X), memoranda-to-file, and action description memoranda (ADMs) will be evaluated for consistency with DOE guidelines.

11.2 Records Required

As part of the NEPA assessment, files will be reviewed, including documents not previously received or reviewed (e.g., classified documents, individual files, documents not previously identified). Specific documents and files to be reviewed as part of the assessment include, but will not be limited to, the following:

- o Records that locate, identify, and describe both on-site and off-site impacts on the following resources, which may be affected by facility activities: endangered and

threatened species and their critical habitats, bald and golden eagles and migratory birds and their nests, wild horses and burros, waterways (including waters and navigable waters of the U.S., floodplains, wetlands, and wild and scenic rivers); coastal zones; national recreational trails; wilderness and wilderness study areas; sacred Native American sites, prime/unique farmland, archaeological and historical sites; historic and prehistoric ruins and monuments; and other Federal lands (e.g., National Forests).

- o Documentation of consultation with agencies responsible for the administration of the natural resources listed above (e.g., Section 7 consultation with the Department of the Interior on endangered species).
- o Policies and procedures for implementing related regulations (e.g., TSCA, RCRA, Clean Water Act, Clean Air Act, Safe Drinking Water Act, and Noise Control Act).
- o Any facility-specific or Operations Office NEPA guidance or policies.
- o Any correspondence or guidance which refers to delegation of authority to make NEPA determinations.
- o Capital budget files, A-106 plans, and other appropriate records or proposed actions or initiated changes in operation.
- o Lists of ongoing and proposed CERCLA response actions.
- o Lists of ongoing and proposed RCRA closures and corrective actions.
- o All NEPA-integrated documents prepared in support of remedial action.
- o State or local "NEPA-type" statutes and regulations.
- o Description of any litigation related to NEPA.
- o All memoranda-to-file pertaining to NEPA.
- o All documents used to make, support, or record NEPA determinations (e.g., Environmental Evaluations, Environmental Checklists, ADMs) prepared since 1986.
- o All environmental assessments (EAs) and Environmental Impact Statements (EISs) that are still used for assessment of all ongoing or proposed actions.
- o Documents and studies that are cited in support of major aspects of facility EAs (e.g., biological assessments for

endangered species, engineering details of projects).

- o Monitoring or mitigation reports available for EAs and EISs.
- o Printout from a database which tracks NEPA documents (if such a database exists).
- o Current work orders and work orders for the past 5 years.

Appendix C

Environmental Subteam Daily Agendas

LAWRENCE BERKELEY LABORATORY
ENVIRONMENTAL SUBTEAM DAILY AGENDAS

Week 1		Surface Water	Groundwater	Quality Assurance	Waste Management
Monday 1/14/91	AM	Orientation Training	Orientation Training	Orientation Training	Orientation Training
	PM	Orientation Training	Orientation Training	Orientation Training	Orientation Training
Tuesday 1/15/91	AM	Interview with East Bay Municipal Utility District	Interview LBL GW personnel, managers hydrogeologists	Interview with East Bay Municipal Utility District	Tour of Buildings 77 and 79, Mechanical Shops
	PM	Review sewer plans and SPCC Plan	Review documents on Monitoring Well layout and installation	Interview Acting Dir. of Env. Protection, Health & Safety Division & Associate Lab. Director of Scientific and Technical Resources	Tour of Biomedical Facilities; Interview LBL Waste Management Program
Wednesday 1/16/91	AM	Surface water sampling and sanitary sewer sampling	Document Review	Observe air and sanitary sewer sampling	Tour of Bevatron
	PM	Document review	Tour of monitoring well network	Interview with Environmental Protection Group Leader	Tour of HILAC, Magnetic Fusion Facilities, Building 53 Machine Shop
Thursday 1/17/91	AM	Tour stormwater drainage system	Document Review	Interview with Director of SAN Office of Independent Internal Oversight	Sitewide emergency drill
	PM	Tour Photo lab, Bldgs. 10, 25, 26, 80, 90	Continued AM activities	Document review	Interview with SAN
Friday 1/18/91	AM	Tour WTP in Bldgs. 25, 77, 70/70A	Interview LBL personnel on contract procurement	Interview with Head of ESHC Department; interview with SAN Env. Mgt. & Support QA Engr.	Tour 88 inch Cyclotron, Chemistry Labs in Building 70
	PM	Tour of Cooling Towers, Ion exchange columns. Hydraugers review backflow prevention records	Interview LBL personnel sampling and analysis protocol	Interview with Head of IRA; interview EM Section Leader	Int. with LBL Waste Management Program on HW and RAD waste training. Reviewed hazardous waste manifests/LDR notifications.
Saturday 1/19/91	AM	Document review	Document review	Document review	Findings Meeting; document review
	PM			Findings Meeting	Document review

LAWRENCE BERKELEY LABORATORY
ENVIRONMENT SUBTEAM DAILY AGENDAS

Week 1		Inactive Waste Sites	Air	Radiation	Toxic and Chemical Materials
Monday 1/14/91	AM	Orientation Training	Orientation Training	Orientation Training	Orientation Training
	PM	Orientation Training	Orientation Training	Orientation Training	Orientation Training
Tuesday 1/15/91	AM	Interview LBL Waste Management Program Personnel	Meeting with BAAQMD and document review	Meeting with LBL personnel responsible for Radiation Env. Monitoring Program	Meeting with LBL personnel for overview of PCB, Asbestos, Pesticide, Haz. Materials and SARA Title III programs
	PM	Shops Area Tour	Interview with G. Schleimer	Continued AM activities	Continued AM activities
Wednesday 1/16/91	AM	Tour Bldgs. 46, 17, 7 and surrounding areas; interview LBL/ESH personnel	Document review	Review offsite Radiation Env. Monitoring Program	Visit Emeryville and other warehouse facilities
	PM	Tour Bldgs. 5, 16, and 53 and surrounding areas	Inspect monitoring network	Continued AM activities	Visit Donner and Calvin Buildings on UCB Campus
Thursday 1/17/91	AM	Review plans, specs, and aerial photos; tour Bldg. 69; referee emergency drill	Document review	Inspect monitoring network with Air specialist	Sitewide emergency drill
	PM	Tour Bldgs. 4, 5, and 25	Inspect monitoring network with G. Schleimer	Continued AM activities	Interviewed LBL personnel responsible for pesticide management
Friday 1/18/91	AM	Revisit Bldg. 69; tour Corporation yard	Inspection of Bldgs. 25 and 76	Inspect monitoring network with Air specialist	Visit Materials Management personnel at Buildings 7 and 69
	PM	Tour Bldg. 74 and waste tanks; int. LBL/ES&H and Earth Sciences Div. people	Continued AM activities	Continued AM activities	Visit const. and maintenance personnel regarding PCBs and asbestos management
Saturday 1/19/91	AM	Document review	Document review	Document review	Document review
	PM				

LAWRENCE BERKELEY LABORATORY
ENVIRONMENT SUBTEAM DAILY AGENDAS

Week 2		Surface Water	Groundwater	Quality Assurance	Waste Management
Monday 1/21/91	AM	Document review	Review GW Data Management	Review QA Programs for Env. Protect/Monitoring Programs	Document review
	PM	Document review	Continued AM activities	Document Review	Document review
Tuesday 1/22/91	AM	Tour Bldgs. 51 and 71	Interview LBL GW personnel, managers, and hydrogeologists	Interview with LBL GW hydrogeologists	Toured Permitted Facility and Rad Waste Storage Area
	PM	Tour Bldgs. 69, 74, 75A, and 77	Observe monitoring well sampling	Interview with Environmental Monitoring Group personnel	Toured Donner and Calvin Buildings, Interview with SAN on organization structure
Wednesday 1/23/91	AM	Shop Bldgs. 58, 88, and 934	GW well installation review	Review offsite Analytical Lab	Toured Plating Shop; Interview with LBL on Waste Minimization Program
	PM	Tour research labs in Bldgs. 10, 80, 62, 55	Continued AM activities	Document Review	Interview with LBL on Rad Waste certification, Toured Printed Circuit Board Plating Shop
Thursday 1/24/91	AM	Building 76 review of training requirements Dick Shaw, Mona Bernstein	Document review	Interview with LBL Deputy Laboratory Director	Interview UST construction/ maintenance and UST ES&H personnel
	PM	Interviews with Gary Schleimer, Charles Smith	Site Tour Bldgs. 62, 74, 83, and 76	Interview with Training Coordinator of the ESHC Department	Interview UST construction/ maintenance and UST plant engineering personnel
Friday 1/25/91	AM	Review storm sewer videos	Interview LBL personnel geotechnical managers	Document Review	Tour Building 76 (Maintenance, Paint Shop and Motor Pool)
	PM	Document review	Document review	Interview with Associate Lab Director of the Office of Planning & Assurance Interview with Supervisor of Waste Handling Facility	Tour Cafeteria, construction of Advanced Light Source, Fire Department, Building 50
Saturday 1/26/91	AM	Offsite	Offsite	Offsite	Offsite
	PM				

LAWRENCE BERKELEY LABORATORY
ENVIRONMENT SUBTEAM DAILY AGENDAS

Week 2		Inactive Waste Sites	Air	Radiation	Toxic and Chemical Materials
Monday 1/21/91	AM	Document review	Document review	Document Review	Document review
	PM	Document review	Document review	Continued AM activities	Continued AM activities
Tuesday 1/22/91	AM	Interview Plant Engineering and Waste Management personnel	Interview D. Weber	Review dose assessment methodologies	Toured Bldg. 51 Bevatron concerning PCBs
	PM	Interview Plant Engineering personnel	Interview C. Smith, visit Bldgs. 70/70A, Met. tower siting	Continued AM activities	Visited Building 71; interviewed Plant Engineering regarding PCBs
Wednesday 1/23/91	AM	Interview Plant Engineering and ES&H personnel	Tour Building 77	Review ALARA and Radiation Environmental procedures	Interviewed Plant Engineering regarding PCBs; visited Building 55 (Research Medicine) about chemical storage
	PM	Document review	Tour Building 77	Continued AM activities	Interviewed ESH&C personnel about toxic chemicals
Thursday 1/24/91	AM	Interview SAN ER personnel; interview retired LBL staff	Interview G. Schleimer	Emergency Plan	Visited Building 88 concerning PCBs, interviewed ESH&C about PCBs
	PM	Interview retired LBL staff; interview LBL Plant Engineering personnel	Document review	Decommissioning Activities	Visited Building 77 about asbestos and toxic chemicals
Friday 1/25/91	AM	Interview Plant Engineering staff, EPA 9, and LBL Planning & Oversight staff	Tour UC Buildings	UC Campus Tour	Toured 6 buildings on UC Campus which have some LBL laboratories
	PM	Document review	Tour UC Buildings	UC Campus Tour	Continued AM activities
Saturday 1/26/91	AM	Offsite	Offsite	Offsite	Offsite
	PM				

Appendix D

Environmental and Management Subteams Contacts and Interviews

(Appendix D is attached on microfiche.)

Appendix E

Site Documents Reviewed by the Environmental Subteam

(Appendix E is attached on microfiche.)

Appendix F

OSHA Noncompliances

(Appendix F is attached on microfiche.)

Appendix G

Tiger Team Hot Line Calls and Responses

TIGER TEAM HOT LINE CALLS AND RESPONSES

An onsite Tiger Team Assessment hot line for complaints was established for the LBL assessment and operated from January 14 through February 8, 1991. This special hot line, operated by the Tiger Team, was established to allow LBL personnel, as well as the general public, to report specific environment, safety, and health concerns. Notification of the hot line was accomplished through site newsletters and the distribution of notices (developed by the DOE Office of Special Projects) to each LBL organizational entity. In addition, the notices informed LBL employees that information related to fraud, waste, abuse, misconduct, and environmental issues of a criminal nature could be reported directly to the DOE Office of the Inspector General at 1-(800)-541-1625; (202)-586-4073; or FTS: 8-896-4073.

This Appendix summarizes the telephone calls and letters received on the hot line and the subsequent response actions taken.

CONTROL #MGMT-1

DATE: January 15, 1991

NATURE OF CONCERN: The caller delivers documents to Division Directors' Offices. The caller's concern was that there has been several instances when the document has not been given to the intended recipient. The caller stated that Division Directors have complained about not receiving documents delivered to them. The caller feels this is a serious problem because it could involve an important document related to safety procedures or operations. The two divisions where this has been a problem are Research Medicine and Radiation Biophysics Division (RBD) and the Cell and Molecular Biology Division (CMBD).

RESPONSE: A member of the Management Subteam attempted to contact the Division Directors of these divisions. He was unable to talk personally with the Division Director of RBD; however, he talked with his secretary. She stated that the Director would not personally receive all documents directed to his attention - they would be appropriately delegated. She was not aware of any complaints. The team member talked to the Director of CMBD, and she had no complaints regarding receiving documents addressed to her.

CONTROL #HS-2

DATE: January 17, 1991

NATURE OF CONCERN: There was an earthquake building evacuation exercise. The caller had the following concerns regarding the exercise:

1. It was unclear which buildings were to be evacuated.
2. During the exercise, instructions were given to evacuate to the northwest - no one knew which direction that was.
3. The Building Manager ineffectively used the megaphone.
4. One Building Manager was observed wearing high heel shoes.

5. There should be periodic announcements during the exercise so that personnel across the whole site know what is going on.
6. He did not hear an official "all clear" notification.
7. He suggested the site construct a helicopter landing pad in the area for injured personnel.

RESPONSE:

1. When an evacuation exercise is conducted using an earthquake situation, all employees must exit the LBL buildings. An earthquake would affect all buildings at LBL.
2. Every floor of all LBL buildings has a map which indicates "north" by an arrow.
3. Building Managers do not have adequate time to change their shoes and evacuate a building and give directions to evacuees.
4. Agree that the EOC/Management did not provide sufficient updates and the termination message could have been made clearer.
5. There is a designated LBL helicopter landing space, and it was used last year to transport an injured person to the hospital.

CONTROL #ENV-3

DATE: January 18, 1991

NATURE OF CONCERN: The caller was concerned that in Bldg. 46, second floor, between the cages, there was asbestos on the wall, and that there was a problem in getting it removed.

RESPONSE: A member of the Environmental Subteam investigated LBL's program for asbestos removal. It was determined that LBL has an active program in which buildings are addressed on a prioritized basis (i.e., asbestos-containing buildings are treated according to age, beginning with the older ones, which have a higher probability of deteriorated asbestos). Bldg. 46 has not yet been reached in the priority line. The area in question does not appear to present an imminent hazard.

CONTROL #HS-4

DATE: January 22, 1991

NATURE OF CONCERN: The caller asked to have a discussion in person with a member of the Tiger Team. The Tiger Team Leader and Deputy talked to the caller on January 23, 1991, and he presented the following issues:

1. In 1981, the caller worked in Rm. D-79 of the Hildenbrand Bldg. and he became ill after working there. He was off sick for several weeks and was diagnosed by Keiser Hospital in Walnut Creek, CA, as well as the LBL Medical Dept., as having Legionella (Legionnaire's Disease). The medical department wrote a letter to the LBL director of Material and Molecular Research Division advising that, in particular, that laboratory needed checking.
2. It is difficult for staff to get access to the LBL Director and to Division heads.
3. The Laboratory does a good job of diagnosing problems for employees, but does not give its employees adequate advice on the options available to them when medical problems exist. Example: The Laboratory identified a lesion in the caller's lung, probably related to asbestos exposure in the early 1960s at the Laboratory, but did not tell him what followup options he had.

RESPONSE: According to two doctors at LBL, the diagnosis was not confirmed as "Legionnaire's Disease"; reportedly it was an allergic reaction. The Safety and Health Subteam member visited the Laboratory (D-79) in question which had changed very little since 1981. The Laboratory was still run by Dr. Johnston who recalled the incident. There were 6,000 individuals reportedly affected. The building ventilation system was looked at and there were no noticeable areas where moisture was evident. Since the situation hasn't reoccurred, the diagnosis was not confirmed, and there didn't seem to be any obvious points for collection of moisture. There appears to be no need for additional followup. The team member has a general concern relating to how well LBL looks into the well being of employees doing work in the University facilities which will be addressed as a concern in the TSA Report.

CONTROL #OTHER-5

DATE: January 24, 1991

NATURE OF CONCERN: The caller had a concern regarding the Chemistry Department. The caller stated that the Chemistry Department had collected and stored all of the chemicals in Bldg. 46 Hildenbrand in an adjacent classroom until after the inspection. Caller stated there were two classrooms full of chemicals. The caller also stated that it was possible there was a bomb that has also been assembled there.

RESPONSE: This concern was turned over to Julia B. Epley, Director, Office of Environment, Health and Safety, University of California, Berkeley, on January 25, 1991, as it was directed at campus facilities.

CONTROL #HS-6

DATE: February 5, 1991

NATURE OF CONCERN: Caller had the following concerns regarding pedestrian safety:

1. Potholes in the sidewalk in front of Bldg. 46 and around the Bevatron. Caller stated he had been complaining for years about these potholes, and about 2 to 3 years ago an employee sprained her ankle. The pothole was repaired at the time, but it did not hold up.
2. The retaining wall at the south end of the bridge in front of Bldg. 46 appears to have cracked about 6 inches. Caller said that he complained about this about a year ago.
3. Outside of the entrance to Bldg. 46, on the foot path, there is a tripping hazard where some kind of steel stake is protruding about 1 inch from the ground. The caller stated that he has attempted to report this problem for several years to the Bldg. Manager. He stated the repairs have not been done in a timely manner. Caller stated an employee sprained an ankle and had to be on crutches for one week.
4. Also, one of 20 fluorescent lights on the walkway across Bldg. 46 is burned out. Caller stated it typically takes months before anyone replaces the burned out lights. Caller said these lights were installed after he insisted for 2 years that the area presented a safety hazard without them.

RESPONSE:

A Safety and Health Subteam member notified LBL of these complaints and counseled LBL as to the importance of dealing with these four safety issues and notified LBL that the individual with this concern should receive a response. Hazards such as these are addressed in OS-2-1.

Appendix H

Comparison of Tiger Team and Self-Assessment Findings

**TABLE H-1
SAN AND LBL SELF-ASSESSMENT EVALUATION**

DISCIPLINE/ FINDING NUMBER	FINDING TITLE				
		Not Addressed	Partially Addressed	Fully Addressed	SAN & LBL Aware But Not Reported
Air					
A/CF-1	Improper and Inadequate Radiological Sample Exchange and Handling Practices	LBL			
A/CF-2	Noncompliance with Requirements of the National Emissions Standards for Hazardous Air Pollutants, Subpart H		LBL		LBL
A/CF-3	Inadequate Evaluation of Air Permit Requirements and Regulations		LBL		
A/CF-4	Inadequate Supervision of Permitted Air Emission Sources	LBL			
A/CF-5	Incomplete Regulatory Compliance for Asbestos Removal Operations	LBL			
A/CF-6	Deficiencies in the Indoor Air, Ambient Air, and Meteorological Monitoring Networks		LBL		LBL
A/BMPF-1	Inadequate Program for Maintenance of High-Efficiency Particulate Air Filter Systems		LBL		
A/BMPF-2	Inadequate Meteorological Monitoring Program		LBL		LBL
Surface Water/ Drinking Water					
SW/CF-1	East Bay Municipal Utility District Permit Excursions			LBL	
SW/CF-2	Inadequate Environmental Protection and Surveillance for Surface Water Discharges		LBL		LBL
SW/CF-3	Lack of an Approved Spill Prevention Control and Countermeasures Plan			LBL	
SW/CF-4	Noncompliance with East Bay Municipal Utility District Wastewater Discharge Permit Requirements	LBL			
SW/CF-5	Inadequate Standard Operating Procedures for Wastewater Treatment Systems	LBL			
SW/CF-6	Floodplain Management	LBL			
SW/CF-7	Lack of Backflow Prevention Devices			LBL	
SW/BMPF-1	Inadequate Training Program for Wastewater Treatment System Operators	LBL			
SW/BMPF-2	Stormwater National Pollutant Discharge Elimination System Permit Requirements	LBL			
Groundwater					
GW/CF-1	Lack of a Comprehensive Groundwater Protection Management Program and Groundwater Monitoring Plan		LBL		
GW/CF-2	Incomplete Hydrogeologic Characterization of the Site		LBL		
GW/CF-3	LBL Operations Have Contaminated Groundwater			LBL	
GW/CF-4	Inadequate Placement of Monitoring Wells for Closure of Underground Storage Tanks	LBL			
GW/CF-5	Lack of a Comprehensive Program to Inventory, Maintain, Inspect, and/or Abandon Wells and Boreholes	LBL			
Waste Management					
WM/CF-1	Inadequate Training for Generators and Handlers of Hazardous, Radioactive, and Mixed Wastes			LBL	
WM/CF-2	Lack of an Effective Waste Tracking System		LBL		

TABLE H-1 (Continued)
SAN AND LBL SELF-ASSESSMENT EVALUATION

DISCIPLINE/ FINDING NUMBER	FINDING TITLE				
		Not Addressed	Partially Addressed	Fully Addressed	SAN & LBL Aware But Not Reported
WM/CF-3	Deficiencies in Hazardous Waste Inspections		LBL		
WM/CF-4	Deficiencies in Development and Implementation of Waste Minimization Plans		LBL		
WM/CF-5	Lack of Generator Waste Certification Plans for Low-Level and Transuranic Radioactive Wastes		LBL		
WM/CF-6	Lack of Implementation of DOE Order 5820.2A Requirements		LBL		
WM/CF-7	Lack of a Comprehensive Waste Characterization Program			LBL	
WM/CF-8	Deficiencies in Secondary Containment of the Hazardous Waste Handling Facility			LBL	
WM/CF-9	Lack of an Underground Storage Tank Response Plan	LBL			
WM/CF-10	Inadequate Management of Generator Waste Accumulation Areas and Satellite Accumulation Areas		LBL		
WM/CF-11	Inadequate Land Disposal Restriction Notifications	LBL			
WM/CF-12	Solvent/Oil-Contaminated Rags			LBL	
WM/CF-13	Lack of Autoclave Documentation	LBL			
WM/CF-14	Inadequate Treatment, Storage, and Disposal Facility Operating Record			LBL	
WM/CF-15	Storage of Land Disposal Restricted Mixed Wastes	LBL			LBL
WM/CF-16	Lack of Effective DOE Oversight of LBL Waste Management Activities			SAN	
WM/CF-17	Lack of Efficient Oversight of Waste Management Activities by LBL			LBL	
WM/CF-18	Laboratory Closeout Procedures			LBL	
WM/BMPF-1	Radioactive and Mixed Waste Tags			LBL	
WM/BMPF-2	Lack of Documented Oversight of Commercial Treatment, Storage, and Disposal Facilities			LBL	
WM/BMPF-3	Lack of Adequate Waste Management Procedures		LBL		
Toxic & Chemical Materials					
TCM/CF-1	Lack of Secondary Containment at Aboveground Storage Tanks Containing Petroleum Products			LBL	
TCM/CF-2	Inadequate Containment of Bulk Storage Areas for Petroleum Products and Hazardous Chemicals			LBL	
TCM/CF-3	Asbestos Management Program is Not Fully Developed			LBL	
TCM/CF-4	Inadequate Storage and Labeling of Toxic/Hazardous Materials in Laboratories			LBL	
TCM/BMPF-1	Inadequate Organization of PCB Management Program	LBL			
TCM/BMPF-2	Inadequate Procedures for Tracking Potentially Hazardous Materials at LBL Warehouse Facilities	LBL			
TCM/BMPF-3	Improper Containment of Inline Chemical Transport Pipes at the Building 77 Wastewater Treatment Facility			LBL	

TABLE H-1 (Continued)
SAN AND LBL SELF-ASSESSMENT EVALUATION

DISCIPLINE/ FINDING NUMBER	FINDING TITLE				
		Not Addressed	Partially Addressed	Fully Addressed	SAN & LBL Aware But Not Reported
Quality Assurance					
QA/CF-1	Lack of Quality Assurance Plans for Environmental Protection, Environmental Restoration, and Waste Management Programs and Projects at LBL		LBL		
QA/CF-2	Inadequate Divisional Quality Assurance Plans		LBL		
QA/CF-3	Lack of Quality Assurance Procedures for the Procurement and Audits of Contracted Services for Environmental Protection, Environmental Restoration, and Waste Management Programs		LBL		
QA/CF-4	Lack of Quality Assurance Plans for Environmental Analytical Laboratories	LBL			
QA/CF-5	Lack of Quality Assurance Plans for SAN Environmental Protection, Environmental Restoration, and Waste Management Programs				SAN
QA/CF-6	Lack of LBL Internal Reviews of Quality Assurance in Environmental Protection, Environmental Restoration, and Waste Management Programs and Projects	LBL			
QA/CF-7	Deficiencies in SAN's Oversight of Quality Assurance in LBL's Environmental Protection, Environmental Restoration, and Waste Management Programs			SAN	
QA/BMPF-1	Deficiencies in Good Laboratory Practices		LBL		
Radiation					
RAD/CF-1	Deficiencies in Radiological Dose Assessment Practices		LBL		
RAD/CF-2	Lack of a Formal, Documented Environmental As Low as Reasonably Achievable Program	LBL			
RAD/CF-3	Deficiencies Associated with Decontamination and Decommissioning Activities	LBL			
RAD/CF-4	Lack of a Formal Calibration Schedule for Radiological Environmental Monitoring Equipment			LBL	
RAD/BMPF-1	Inadequate Staffing Levels, Training, and Procedures for Emergency Response		LBL		
Inactive Waste Sites					
IWS/CF-1	Inadequate Preliminary Assessment	LBL			
IWS/CF-2	Unreported Releases of Radioactive Contamination into the Environment	LBL			
IWS/CF-3	Inadequate Strategy for Identifying and Meeting Applicable Regulatory Requirements		LBL SAN		
IWS/CF-4	Inadequate SAN Oversight		SAN		
IWS/CF-5	Inadequate Conduct of Natural Resource Trustee Responsibilities	SAN			
IWS/BMPF-1	Inadvertent Disturbances of Potentially Contaminated Soils		LBL		
IWS/BMPF-2	Deficient Health and Safety Plans		LBL		

TABLE H-1 (Continued)
SAN AND LBL SELF-ASSESSMENT EVALUATION

DISCIPLINE/ FINDING NUMBER	FINDING TITLE				
		Not Addressed	Partially Addressed	Fully Addressed	SAN & LBL Aware But Not Reported
IWS/BMPF-3	Preliminary Work in the Site Characterization Project Proceeding in Advance of a Final Project Management Plan, a Final DOE Headquarters Quality Assurance Project Plan, or a Final Project Sampling and Analysis Plan		LBL		
IWS/BMPF-4	Undetermined Need for SARA Title III, Section 313 Reporting		SAN		
National Environmental Policy Act NEPA/CF-1	LBL and SAN National Environmental Policy Act Guidance Inconsistent DOE Headquarters Guidance			LBL SAN	
NEPA/CF-2	Inadequate National Environmental Policy Act Review and Inappropriate National Environmental Policy Act Determination of Ongoing and Proposed Actions		LBL		
NEPA/CF-3	National Environmental Policy Act Documentation is Not Completed Prior to Either Project Start or Decisionmaking Process		LBL SAN		
NEPA/CF-4	Inadequacy of National Environmental Policy Act Documentation		LBL		
NEPA/CF-5	Inadequate Tracking and Recordkeeping for National Environmental Policy Act Documentation		LBL SAN		
NEPA/CF-6	Incomplete Implementation of SEN-15-90 and DOE Order 5440.1C			LBL SAN	
Environmental Monitoring EM/CF-1	Inconsistencies and Deficiencies in the LBL Environmental and Effluent Monitoring Procedures		LBL		
EM/CF-2	Annual Site Environmental Report Deficiencies		LBL		
EM/CF-3	Deficiencies in the General Environmental Protection Program			LBL	
EM/BMPF-1	Lack of an Environmental Monitoring Plan			LBL	
Soils, Sediments, and Biota SSB/CF-1	Inadequate Characterization of Soil, Sediment, and Biota at LBL			LBL	
Environmental Oversight, and Reporting EOR/CF-1	Lack of Appropriate Level of Involvement by SAN in Regulatory Agency Interactions		SAN		
EOR/CF-2	Inadequate SEN-7A Reporting	SAN			
EOR/CF-3	Lack of Implementation and Tracking for Corrective Actions in Response to the 1988 Environmental Survey Findings	LBL		SAN	

TABLE H-2
COMPARISON OF S&H SUBTEAM CONCERNS AND SELF-ASSESSMENT FINDINGS

<u>Concern Number</u>	<u>Potential Hazard Level</u>	<u>Compliance Level</u>	<u>Addressed</u>	<u>Partially Addressed</u>	<u>Not Addressed</u>
OA.1-3	2	2			X
OA.1-4	1	2		X	
OA.1-5(SAN)	2	1	X		
OA.2-3	2	2	X		
OA.3-2	3	2		X	
OA.5-2	2	2	X		
OA.6-1	2	2	X		
OA.7-3	3	1			X
OA.8-2	2	2	X		
QV.1-2	2	1			X
QV.1-3(SAN)	3	2	X		
QV.1-4(SAN)	2	1			X
QV.2-1	3	2			X
QV.2-2	2	2			X
QV.3-2	2	2		X	
QV.4-2	2	2		X	
QV.5-1	2	2		X	
OP.2-2	3	2	X		
OP.2-3(ER)	3	2	X		
OP.2-4	2	3			X
OP.2-5	2	2	X		
OP.5-2	2	2		X	
MA.1-2	1	2		X	
MA.2-2	2	2			X
MA.3-2	2	2	X		
MA.4-2	2	2		X	
MA.7-2	3	2	X		

TABLE H-2 (Continued)
COMPARISON OF S&H SUBTEAM CONCERNS AND SELF-ASSESSMENT FINDINGS

<u>Concern Number</u>	<u>Potential Hazard Level</u>	<u>Compliance Level</u>	<u>Addressed</u>	<u>Partially Addressed</u>	<u>Not Addressed</u>
MA.8-2	3	2		X	
TC.1-3	3	2	X		
TC.1-4	3	2	X		
TC.4-1	2	1	X		
TC.8-1	3	2	X		
TC.9-1	2	2			X
TC.9-2	2	1	X		
TC.10-1(SAN)	3	2	X		
AX.3-1	2	2			X
AX.5-1	2	2			X
EP.1-1	2	1		X	
EP.1-2	2	1		X	
EP.1-3	3	1		X	
EP.1-4	3	1	X		
EP.2-1	3	1			X
EP.2-2	3	1			X
EP.2-3	2	1			X
EP.2-4	3	1			X
EP.2-5(SAN)	2	1			X
EP.3.2	3	1		X	
EP.4-2	2	1			X
EP.4-3	3	1			X
EP.5-2	3	1		X	
EP.6-1	3	1			X
EP.6-2	3	1			X

*Designates a Category II Concern

TABLE H-2 (Continued)
COMPARISON OF S&H SUBTEAM CONCERNS AND SELF-ASSESSMENT FINDINGS

<u>Concern Number</u>	<u>Potential Hazard Level</u>	<u>Compliance Level</u>	<u>Addressed</u>	<u>Partially Addressed</u>	<u>Not Addressed</u>
EP.7-1	2	1			X
TS.2-4	2	1	X		
TS.2-5	2	2	X		
TS.2-6	2	1			X
TS.3-2	2	2	X		
TS.4-3	2	2		X	
PT.1-3	2	1		X	
PT.2-1	2	1	X		
PT.4-2	2	1	X		
PT.5-2	3	2			X
PT.6-1	3	2	X		
PT.8-1	3	2	X		
PT.10-1	2	1	X		
PT.11-1	3	1	X		
PT.12-1	2	1	X		
EA.4-1	3	1			X
FR.1-1	3	1			X
FR.2-1	3	1			X
FR.3-1	3	1			X
FR.5-1	3	1			X
RP.1-1	2	2	X		
RP.1-2	2	2			X
RP.2-1	2	1	X		

*Designates a Category II Concern

TABLE H-2 (Continued)
COMPARISON OF S&H SUBTEAM CONCERNS AND SELF-ASSESSMENT FINDINGS

<u>Concern Number</u>	<u>Potential Hazard Level</u>	<u>Compliance Level</u>	<u>Addressed</u>	<u>Partially Addressed</u>	<u>Not Addressed</u>
RP.2-2	2	1			X
RP.2-3(SAN)	2	1		X	
RP.3-4	2	1		X	
RP.3-5	2	2	X		
RP.3-6	2	2			X
RP.3-7	2	1	X		
RP.3-8	2	1	X		
RP.3-9	2	1			X
RP.3-10	2	1	X		
RP.5.3*	2	1	X		
RP.6-1	2	2		X	
RP.7-2	3	1		X	
RP.7-3	2	2	X		
RP.7-4	2	2			X
RP.8-3*	2	1	X		
RP.8-4	2	1			X
RP.9-1	2	1	X		
RP.9-2	2	2	X		
RP.10-2*	2	1			X
RP.10-3	2	2	X		
RP.10-4	2	2			X
RP.11-1	2	1	X		
WS.4-1*	1	1			X
WS.4-2	2	1	X		
WS.4-3	2	1	X		
WS.4-4	2	1	X		
WS.4-5	2	1	X		

*Designates a Category II Concern

TABLE H-2 (Continued)
COMPARISON OF S&H SUBTEAM CONCERNS AND SELF-ASSESSMENT FINDINGS

<u>Concern Number</u>	<u>Potential Hazard Level</u>	<u>Compliance Level</u>	<u>Addressed</u>	<u>Partially Addressed</u>	<u>Not Addressed</u>
WS.4-6	2	1	X		
WS.4-7	3	1			X
WS.4-8	3	1		X	
WS.4-9	1	1			X
WS.4-10	2	1	X		
WS.5.1	1	1	X		
WS.5-2	2	1	X		
WS.5-3	2	1	X		
WS.6-1	2	1	X		
IH.1-1	2	1	X		
IH.2-2*	1	1	X		
IH.2-3	2	1	X		
IH.2-4*	1	1		X	
IH.2-5	2	1	X		
IH.2-6	2	1		X	
IH.3-2	2	1		X	
OS.1-1	3	2			X
OS.1-2	3	2	X		
OS.2-1	2	2	X		
OS.2-2*	2	1		X	
OS.2-3	2	1			X
OS.2-4	2	1		X	
OS.4-1	3	1			X
FP.1-6	2	2			X
FP.1-7	2	2			X

*Designates a Category II Concern

TABLE H-2 (Continued)
COMPARISON OF S&H SUBTEAM CONCERNS AND SELF-ASSESSMENT FINDINGS

<u>Concern Number</u>	<u>Potential Hazard Level</u>	<u>Compliance Level</u>	<u>Addressed</u>	<u>Partially Addressed</u>	<u>Not Addressed</u>
FP.2-2	1	1	X		
FP.6-2	1	1			X
FP.6-3	2	2			X
FP.7-11(SAN)	2	1			X
FP.7-12	2	2			X
MS.2-1	3	1	X		
MS.3-1	3	1	X		
MS.3-2	2	1	X		
MS.3-3	3	1	X		

*Designates a Category II Concern

TABLE H-3
COMPARISON OF MANAGEMENT SUBTEAM AND SELF-ASSESSMENT FINDINGS

<u>Finding Number</u>	<u>Organization</u>	<u>Addressed</u>	<u>Partially Addressed</u>	<u>Not Addressed</u>
MF-1	LBL	X		
MF-2	LBL		X	
MF-3	LBL		X	
MF-4	LBL		X	
MF-5	LBL	X		
MF-6	ER	X		
MF-7	LBL	X		
MF-8	LBL			X
MF-9	LBL		X	
MF-10	LBL			X
MF-11	LBL	X		
MF-12	SAN		X	
MF-13	LBL	X		
MF-14	LBL			X
MF-15	LBL		X	
MF-16	UC	X		
MF-17	LBL/SAN	X		
MF-18	LBL			X
MF-19	UC	X		
MF-20	SAN			X
MF-21	ER/SAN		X	
MF-22	LBL		X	
MF-23	SAN		X	

Executive Summary

1.0 Introduction

2.0 Key Findings, Root Causes, and Noteworthy Practices

3.0 Environmental Assessment

4.0 Safety and Health Assessment

5.0 Management Assessment

6.0 Evaluation of LBL and SAN Self-Assessment Reports and Programs

Appendix A — Biographical Sketches of Team Members

Appendix B — Environmental Subteam Assessment Plan

Appendix C — Environmental Subteam Daily Agendas

Appendix D — Environmental and Management Subteams Contacts and Interviews

Appendix E — Site Documents Reviewed by the Environmental Team

Appendix F — OSHA Noncompliances

Appendix G — Tiger Team Hot Line Calls and Responses

Appendix H — Comparison of Tiger Team and Self Assessment Findings