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Environment, Safety, and Health

Tiger Team Assessment of the Lawrence Livermore National Laboratory

June 1990

PREFACE

This document contains findings and concerns identified during the Tiger Team Assessment of the Department of Energy's (DOE's) Lawrence Livermore National Laboratory (LLNL) in Livermore, California. The assessment was directed by the Department's Office of Environment, Safety and Health (ES&H) and was conducted from February 26 to April 5, 1990.

The LLNL Tiger Team Assessment is comprehensive in scope. It covers the Environmental, Safety and Health (including Occupational Safety and Health Act Compliance), and Management areas and determines the site's compliance with applicable Federal (including DOE), State, and local regulations and requirements.

The LLNL Tiger Team Assessment is one component of a larger, comprehensive DOE Tiger Team Assessment program to eventually encompass over 100 of the Department's operating facilities. This assessment is part of a 10-point initiative announced on June 27, 1989, by the Secretary of Energy, Admiral James D. Watkins, USN (Ret.), to conduct independent oversight compliance and management assessments of the ES&H programs at DOE facilities. The objective of the assessment program is to provide the Secretary with information on the current ES&H compliance status of DOE facilities, root causation for noncompliance, adequacy of DOE and site contractor ES&H management programs, response actions to address the identified problem areas, and DOE-wide ES&H compliance trends and root causes.

May 1990
Washington, D.C.

TIGER TEAM COMPLIANCE ASSESSMENT REPORT

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EXECUTIVE SUMMARY

This report documents the results of the Tiger Team Assessment of the Lawrence Livermore National Laboratory (LLNL) (including the Site 300 area), Livermore, California, conducted from February 26 to April 5, 1990. The purpose of the assessment was to provide the Secretary of Energy with the status of Environment, Safety and Health (ES&H) Programs at LLNL. LLNL is operated by the University of California for the Department of Energy (DOE), and is a multi-program, mission-oriented institution engaged in fundamental and applied research programs that require a multidisciplinary approach.

The Tiger Team Assessment was conducted by a team comprised of professionals from DOE, contractors, and consultants.

The Tiger Team concluded that curtailment or cessation of any operations at LLNL is not warranted. Compliance issues identified by the Tiger Team are known to Federal, State, and local permitting agencies. Nevertheless, there are a significant number of ES&H findings and concerns identified in the report that require prompt management attention. Although LLNL management subscribes to the recent Secretarial ES&H initiatives and acknowledges the imperative for action, a significant change in culture is required before LLNL can attain consistent and verifiable compliance with statutes, regulations, and DOE Orders. Environmental and safety activities are informal, fragmented, and inconsistently implemented. In general, there is no comprehensive sitewide strategy and coordinated direction for ES&H programs.

Although formal management self-assessment has not historically been a part of LLNL culture and, consequently, has not been integrated into formal management controls, LLNL has taken some positive first steps in assessing its status relative to the Secretary's ES&H initiatives (e.g., safety team reviews, environmental compliance reviews/audits, Occupational Safety and Health Act audits, and audits conducted in preparation for the Tiger Team Assessment). While these activities have been conducted generally on an ad hoc, limited basis, they have generated a body of useful information for determining current status and initiating a plan of corrective action.

DOE San Francisco Operations Office (SAN) management is committed to change in its oversight responsibility at LLNL for ES&H matters and has done a self-assessment of its ES&H activities. SAN is aware of ES&H problems and issues at LLNL, has plans to locate ES&H oversight personnel at LLNL, and has had discussions with the DOE Headquarters Program Office on these issues. However, DOE Headquarters has not clearly defined its expectations of SAN in this regard. Consequently, there is no comprehensive plan for DOE oversight of LLNL ES&H programs.

Summary of Key Findings and Probable Root Causes

Environmental

Strengths noted were that LLNL has the highly skilled professional resources to resolve the technical issues associated with the findings of this Assessment (although they may not be involved with environmental activities), and LLNL's analytical laboratories have state-of-the-art instrumentation which can serve the environmental program well.

The Environmental Subteam identified findings of potential noncompliance with Federal and State regulations and DOE Orders; and nonattainment of acceptable best management practices. However, none of these deficiencies present an immediate risk to public health or the environment.

Environmental findings, associated root causes, and observations of LLNL operations reveal an environmental protection program that is informal, fragmented, inconsistently implemented, uncoordinated, and hindered by poor communications. Major concerns relate to organization and implementation of programs, although technical deficiencies have been identified. The key areas of concern are: environmental programs lack key elements needed for effective implementation, air monitoring programs do not have some necessary elements for accurate characterization and monitoring, systems are not in place to properly characterize and manage wastes, and quality assurance programs for environmental activities have not been developed or implemented.

In characterizing potential root causes, the Environmental Subteam constructed a three-tier system to define the relationship between the findings and root causes. The fundamental nature of many of the findings is such that the findings themselves are root causes of other more specific findings. There is one underlying root cause for all the findings: Although top management has indicated that environmental protection is a top priority, environmental concerns have yet to become an integral part of LLNL operations.

Safety and Health

Strengths were noted in health programs, technical competence, criticality safety, medical services, laser safety, training programs provided by the Hazards Control Department, and emergency response capability (exclusive of planning and training, which was in the early stages of development).

Safety programs, however, were generally informal and inconsistently implemented. Responsibility and authority for safety were diffused; training programs were deficient in structure, documentation, and implementation; management controls for safety were inadequate; maintenance of systems related to safety was deficient in a number of areas; and noncompliance with Federal and local regulations and DOE Orders was widespread.

Areas of principal concern were the direct result of informality and lack of management involvement in safety activities. There is an assumption on the part of management that safety is inherent in LLNL operations, which is not supported by independent verification and self-assessment. Likewise, SAN has not exercised close oversight of safety and health activities at LLNL, nor established effective controls to verify compliance. Many of the areas of

noncompliance were the direct result of informality in safety operations and weaknesses in training.

Occupational Safety and Health Act (OSHA) Compliance

An inspection of OSHA compliance revealed a total of 247 inconsistencies: 208 in the area of general industry and 39 in construction. The majority of the inconsistencies would be classified by OSHA as "other-than-serious." The findings generally related to electrical hazards, the Hazard Communication Program, walking/working surfaces, and compressed gas storage. Observations specific to construction were related chiefly to fire hazards: improper storage of flammable materials and availability of fire extinguishers.

The deficiencies identified were attributable largely to the absence of training, formal procedures, and an internal audit program, as well as lack of supervisors carrying out responsibilities with respect to container labeling, providing Material Safety Data Sheets, and communicating safety information to employees.

Management and Organization

Key management findings are supported by the environmental, and safety and health assessments, especially with respect to discipline, formality, management controls, and self-assessment in programs related to ES&H compliance. Roles, responsibilities, and expectations at all levels throughout LLNL were not clearly defined, communicated, or understood relative to ES&H activities. There were no sitewide strategic and subordinate implementation plans to define and accomplish ES&H objectives. Although SAN appreciates the need for more aggressive oversight of ES&H at LLNL, the absence of formal authority from Defense Programs at DOE Headquarters and limited onsite resources have hindered development of SAN's role, as well as the establishment of an effective onsite program of oversight.

The Management Subteam identified three root causes for the findings and concerns identified in the Assessment. LLNL management does not yet have a full appreciation of all the DOE ES&H requirements or their impact on LLNL operations. Secondly, LLNL's collegial and informal management culture is not well suited to the demands of ES&H compliance, which require formality, goals, plans, and a disciplined management control system. Finally, there is a long-standing tradition of direct linkage from DOE Headquarters to LLNL, with minimal oversight and virtually no involvement by SAN.

1.0 INTRODUCTION

On June 27, 1989, the Secretary of Energy, Admiral James D. Watkins, USN (Ret.), announced a 10-point initiative to strengthen environmental protection and waste management activities in the Department of Energy (DOE). One part of the initiative involves conducting Tiger Team Assessments at the Department's operating facilities. This report presents the assessment of the Lawrence Livermore National Laboratory (LLNL) in Livermore, California.

1.1 PURPOSE

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

- Current environment, safety and health (ES&H) compliance status of each facility and associated vulnerabilities;
- Root causes for noncompliance;
- Adequacy of DOE and site contractor ES&H management programs;
- Response actions to address identified problem areas; and
- Input to evaluation of DOE-wide ES&H compliance trends and root causes.

1.2 SCOPE

The scope of the LLNL Tiger Team Assessment is comprehensive and includes, but is not limited to, the following ES&H areas:

- Compliance with applicable Federal, State, and local regulations, permits, agreements, and enforcement actions;
- Compliance with DOE Order requirements for ES&H activities;
- Adequacy of LLNL, and the site Contractor's ES&H management programs, including planning, organization, resources, training, and relationships with regulatory agencies;
- Conformance with applicable "best" and "accepted industry practices"; and
- Identification of root causes.

1.3 APPROACH

The LLNL Tiger Team Assessment 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 (February 1990), and generally accepted audit techniques. The assessment was conducted by a team of specialists managed by a Tiger Team Leader and four discipline Team Leaders, one each for Environmental and Management, and two for Safety and Health. Each of the discipline Subteams was made up of technical specialists

from other DOE offices and support contractors. Team organization, member names, their areas of responsibility on the Tiger Team, and work-related experience are provided in Appendix A.

A systematic flowdown approach was implemented to perform the root cause analyses. This approach, depicted in Figure 1-1, begins with the collection of detailed background information and assessment data that are then analyzed by the individual subteams to develop their findings and concerns. These individual findings are integrated through further analysis and refinement. The last step in the process is a collective determination of a minimal set of root causes for the findings and concerns identified.

1.3.1 Pre-Assessment Site Planning

Planning for the LLNL Tiger Team Assessment included the issuance of an introduction and information request memorandum and pre-assessment site visits by the Team Leaders.

A pre-assessment planning meeting was conducted on January 18, 1990, at DOE Headquarters. The formal pre-assessment site visit was conducted on January 24 and 25, 1990, at LLNL. LLNL provided overviews of site operations and the LLNL ES&H program. Discussions were held to inform the site representatives about the scope and purpose of the Tiger Team assessment program and necessary support requirements (office space, materials and office equipment, administrative support, etc.) for the actual assessment. Federal, State, and local regulators were invited and participated in the pre-assessment activity.

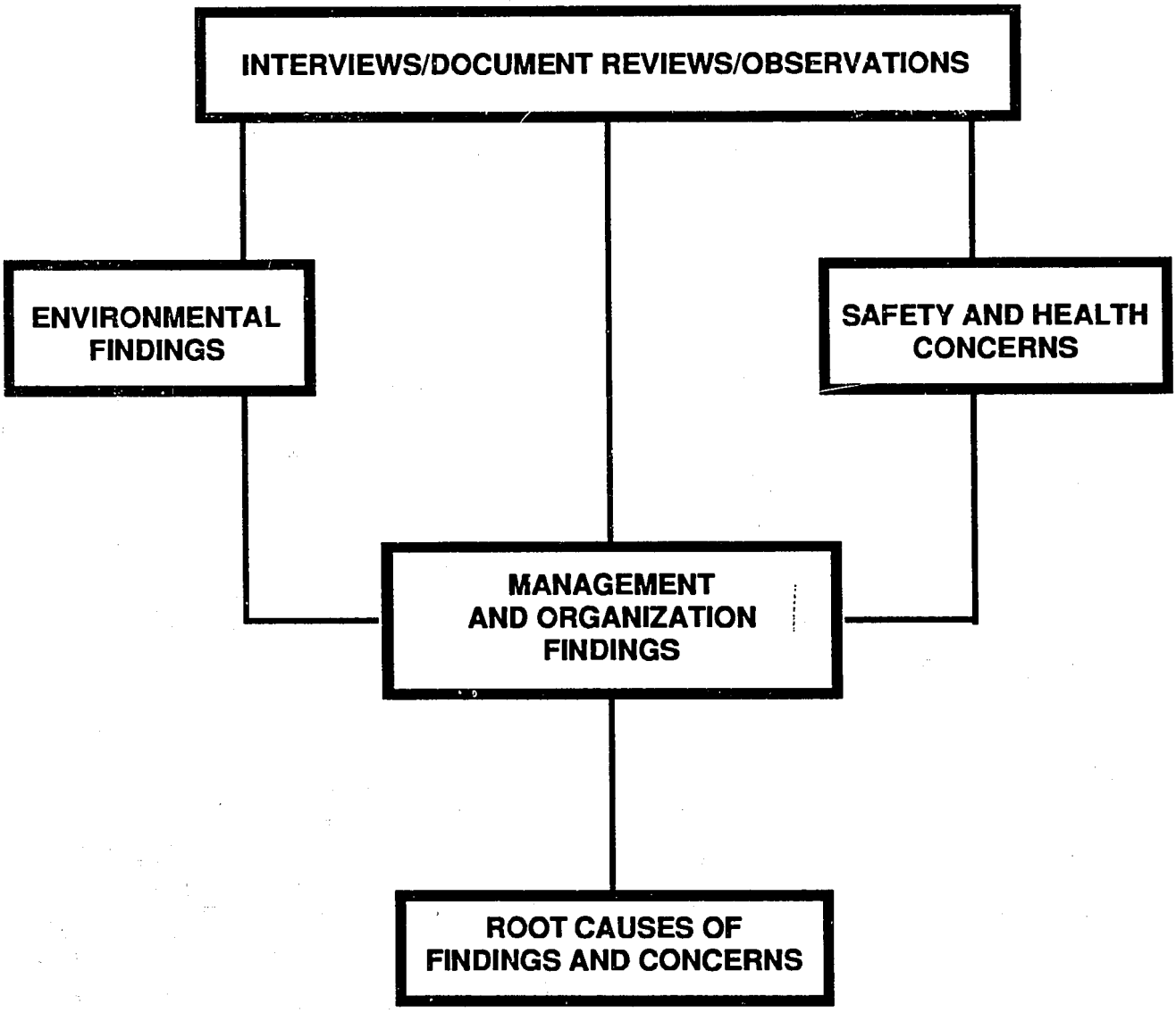
1.3.2 Onsite Activities

The onsite activities for the assessment took place from February 26 to April 5, 1990. Onsite activities included field observations, document reviews, reviews of previous audits and assessments, and interviews with DOE, contractor, and subcontractor site personnel, and with personnel from Federal, State, and local regulatory agencies, as well as interviews with local government officials, citizens groups, and community-based service organizations.

Using these sources of information, Tiger Team members developed findings (Environmental and Management) and concerns (Safety and Health). Environmental Subteam findings fall into three general categories: compliance findings, best management practice (BMP) findings, and noteworthy practices. Compliance findings are conditions that, in the judgment of the Assessment Team, may not satisfy applicable environmental or safety and health regulations, DOE Orders (including internal DOE memoranda, where referenced), enforcement actions, agreements with regulatory agencies, or permit conditions. BMP findings are derived from regulatory agency guidance, DOE draft Orders, accepted industry practices, and professional judgment.

Management Subteam findings supplement the environmental, safety and health findings/concerns obtained in these reviews. Unlike the environmental, and safety and health assessments, identification of management and organizational concerns are essentially subjective, and based upon the expertise of the reviewers. They are supported by other Subteam findings/concerns and information gathered during reviews conducted by the Management Subteam.

Figure 1-1 Tiger Team Assessment Approach



Technical Safety Appraisals were conducted by two Safety and Health Subteams as part of the Tiger Team Assessment. Technical Safety Appraisals are operationally focused evaluations. As such, they appraise how safely a facility or site is being operated and the condition of its equipment. The concerns identified by the Safety and Health Subteams 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.

1.3.3 Reporting

Section 2.0 is an overall summary of the key Tiger Team assessment findings, concerns and noteworthy practices that were identified by the discipline Subteams. Sections 3.0 through 6.0 contain the Environmental, Safety and Health, Occupational Safety and Health Act Compliance, and Management findings and concerns, respectively.

For the Environmental Subteam, each finding is categorized as either "Compliance Finding" or "Best Management Practice Finding." Within these categories, the finding is prefaced by a statement of the Performance Objectives. The Performance Objectives for Compliance Findings are derived from promulgated regulations and final DOE Orders, consent orders, agreements, and permit conditions. The Performance Objectives for BMP findings are derived from regulatory agency guidance, accepted industry practices, and professional judgment. The findings within each Section are not arranged in order of relative significance.

The Safety and Health Subteams employed a format that maintains consistency and integrity with the Technical Safety Appraisal process. A concern, as indicated in Section 4.0, addresses a situation that, in the judgment of the Team members, meets one or more of the following three criteria: (1) does not comply with a DOE safety and health requirement or mandatory safety standard, (2) threatens to compromise the safe operation of the facility, or (3) if properly addressed, would substantially improve 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, which is designed to enhance the excellence of the operation, more concerns are reported than would result from a strictly compliance-oriented appraisal.

For the Safety and Health Assessment, each concern is supported by several findings and has the characteristics of being explicit, identifying the problem, being measurable (auditable) and being justifiable. 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 Management Subteam did not categorize findings according to compliance or performance objectives. Rather, the findings were derived from analysis of key management areas that impact on ES&H activities. Each finding is supported by a summary and/or discussion which identify further detail as to the background, factual basis, and management implications of the finding.

In addition to identifying findings and concerns, the Subteams looked for exceptional practices in meeting ES&H objectives. The exceptional practices have been identified as "Noteworthy Practices" and are presented in Section 4.6 of this report. No Noteworthy Practices were identified by the Environmental or Management Subteam.

The assessment reflects a fixed point in time. As a result, improvements that were planned or completed during the assessment are identified as findings or concerns to provide a complete and accurate picture of the site's conditions from the onset of the assessment.

The process used to complete the assessment report included submission of preliminary findings and concerns in a Draft Report to the Manager, San Francisco Operations Office (SAN), and the site contractor at the conclusion of the onsite assessment for factual accuracy review . These groups reviewed the report for technical accuracy, and their review comments, suggested changes, and modifications, as well as input from other Secretarial Offices, have been incorporated, as appropriate, into this final LLNL Tiger Team Assessment Report.

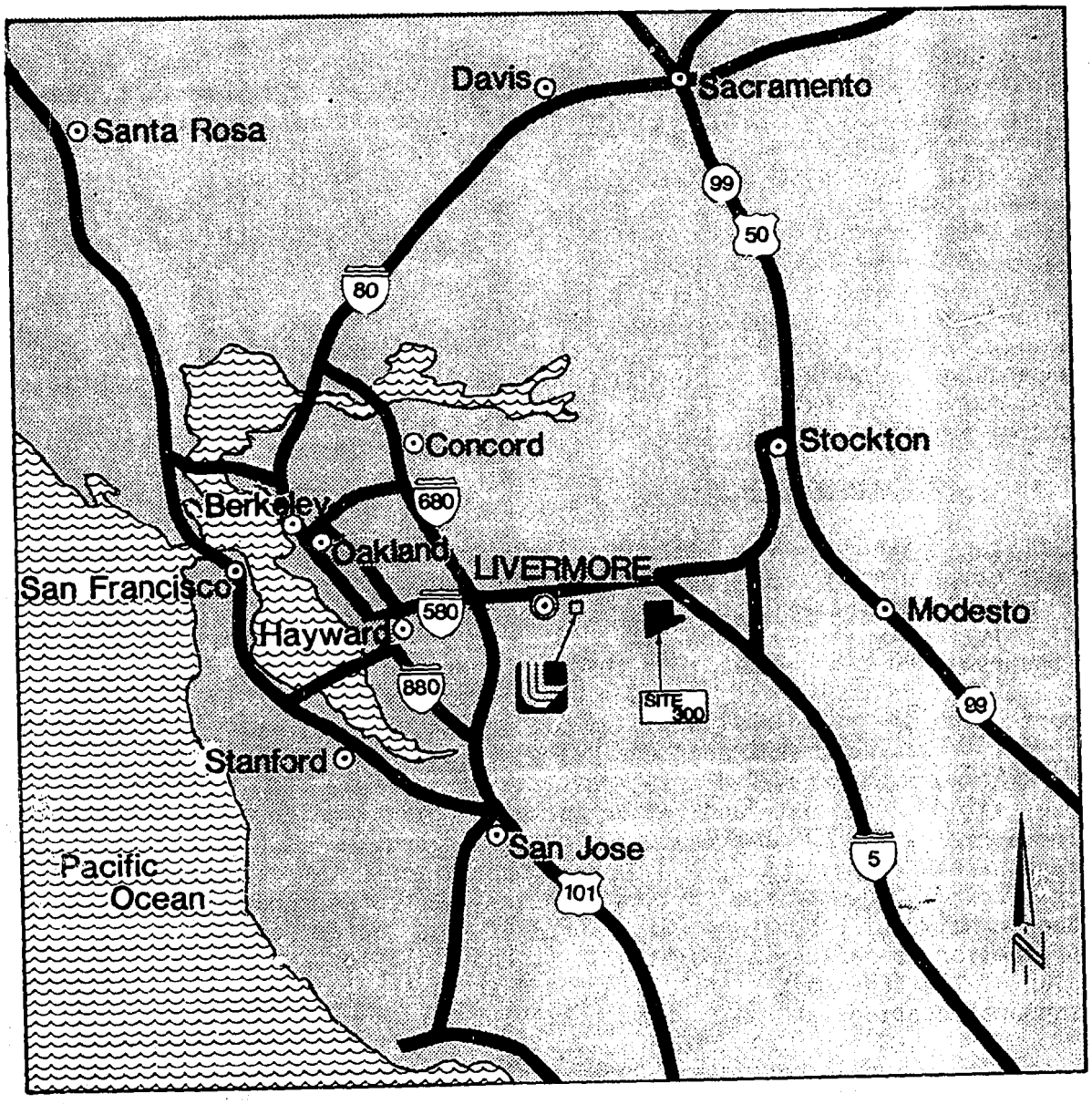
In addition, the Program Secretarial Office is responsible to prepare a draft action plan that addresses the concerns identified during the Tiger Team Assessment. The draft action plan will be submitted by the Program Office to EH-1 for review and comment. The Secretary will approve the final action plan and direct its implementation.

1.4 SITE DESCRIPTION

LLNL is located on an 821-acre site, at the eastern end of Livermore Valley in southeastern Alameda County, California, approximately 50 miles southeast of San Francisco. (See Figure 1-2.) The Livermore Valley is the eastern part of a valley system lying south of Mt. Diablo and east of the hills surrounding San Francisco Bay. Farther to the east, another low range of hills separates the Livermore Valley from the San Joaquin Valley of central California; to the north rise the higher hills of the Diablo Range, a sparsely settled region of forest, chaparral, and rangeland. The hills around the Livermore Valley are for the most part covered with grasses. Agriculture remains the major land use east of LLNL, but land to the north is being developed for light industrial uses. To the west, agricultural land is being developed - with land sales, subdivisions, and annexations by the city of Livermore increasingly common. On its southern perimeter, LLNL shares East Avenue with Sandia National Laboratory, with which it also shares facilities such as fire protection, a cafeteria, parking lots, and utilities. Figure 1-3 shows a site plan of the LLNL main site. Figure 1-4 shows the location of major program support locations at the LLNL main site.

Site 300, which is considered to be part of LLNL, comprises 11 square miles, located in both Alameda and San Joaquin counties, about 18 miles east of the LLNL main site. It was established as a remote explosives facility to support theoretical and developmental work performed at the LLNL main site. Site 300 is used primarily for performing high explosive tests, although assembly testing and particle beam research is also accomplished there. Portions of Site 300 used to support these activities include the firing and test areas, chemistry and process areas, and the general administration and support areas.

Figure 1-2. LLNL Location



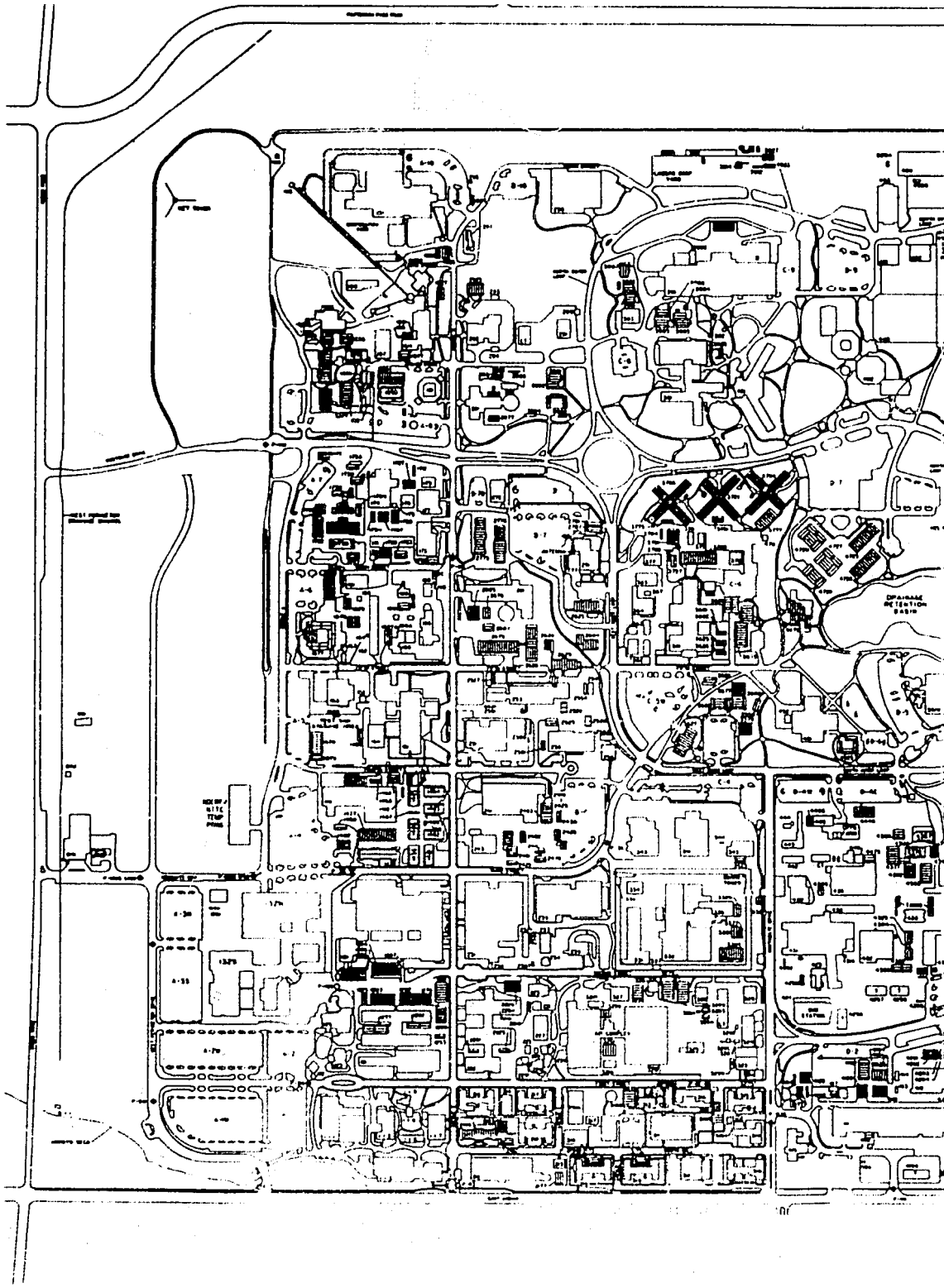
with which it also shares facilities such as fire protection, a cafeteria, parking lots, and utilities. Figure 1-3 shows a site plan of the LLNL Main Site. Figure 1-4 shows the location of major program support locations at the LLNL Main Site.

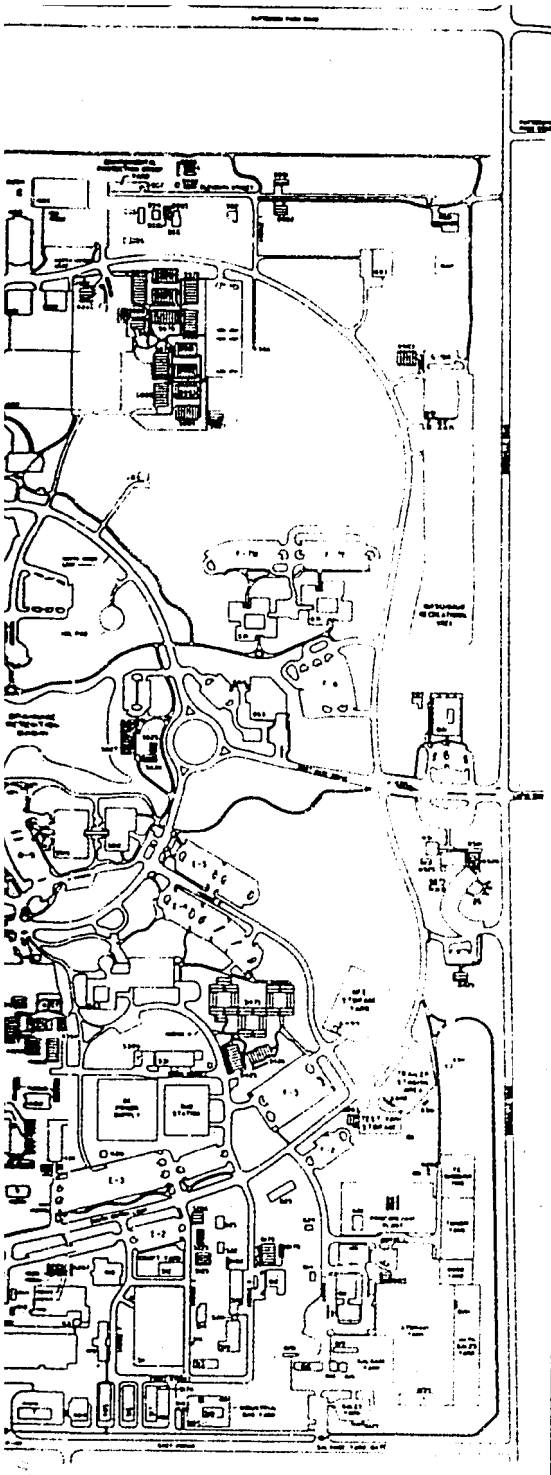
Site 300, which is considered to be part of LLNL, comprises 11 square miles, located in both Alameda and San Joaquin counties, about 18 miles east of the LLNL main site. It was established as a remote explosives facility to support theoretical and developmental work performed at the LLNL main site. Site 300 is used primarily for performing high explosive tests, although assembly testing and particle beam research is also accomplished there. Portions of Site 300 used to support these activities include the firing and test areas, chemistry and process areas, and the general administration and support areas. The area surrounding Site 300 is sparsely populated, with the majority of the land used to support sheep and cattle ranching operations. Figure 1-5 shows the major activity areas at Site 300.

LLNL is operated by the University of California (UC) under contract with the U.S. Department of Energy (DOE). Founded as a nuclear weapons design laboratory in 1952, it was officially established as the Lawrence Radiation Laboratory, the nation's second laboratory dedicated to nuclear weapons research and development. LLNL has been operated by UC ever since - for the Atomic Energy Commission until 1975, then for the Energy Research and Development Administration (ERDA) until 1977, and now for DOE. LLNL is now a multi-program, mission-oriented institution engaged in abstract and applied research programs that require a multi-disciplinary approach.

Major programs include: research, development, and test activities associated with the nuclear design aspects of the nuclear weapons life cycle and related national security tasks; inertial confinement fusion; magnetic fusion energy; biomedical and environmental research; laser isotope separation; energy-related research; beam research physics; and support to a variety of Defense and other Federal agencies. Site 300 supports LLNL's primary mission in the design of nuclear weapons through facilities that allow multiple, simultaneous diagnostics capability for hydrodynamic testing. Site 300 provides the ability to develop new high explosives or fabricate any high explosives from raw materials, the ability to manufacture and assemble parts for testing, test facilities for destructive and non-destructive testing, support for projects using high explosives, diagnostics, and the capability to perform particle beam research.

LLNL also operates some facilities at DOE's Nevada Test Site.





SCALE NONE

LEGEND

EXISTING FACILITY — PROPOSED FACILITY

BUILDINGS

BOUNDARY

PARKING LOT

ROADS

PATHS

ANTENNAS

TRANSPORTABLE STORAGE SHED

VEHICLE GATE

PEDESTRIAN GATE

BLOCKED STREET

100	[illegible]
101	EXPERIMENTAL PHYSICS
102	WC MONITORING STATION
103	THEORETICAL AND COMPUTATIONS
104	COMPUTER
105	COMPUTER PROGRAMMING
106	COMPUTER
107	CONFERENCE CENTER (SOUTH)
108	PIONEER TEST
109	EXPERIMENTAL PHYSICS
110	[illegible] BRIDGE OFFICE
111	[illegible]
112	[illegible] CAFETERIA
113	ENGINEERING
114	[illegible]
115	[illegible]
116	ELECTRONICS ENGINEERING
117	EMERGENCY GENERATOR HOUSE
118	[illegible] FAB
119	[illegible] CHEM LOT LAB
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121	LASER ISOTOPE SEPERATION
122	[illegible] DEVELOPMENT LABORATORY
123	LASER RESEARCH
124	[illegible] PIT
125	[illegible] DIVISION
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128	LASER RESEARCH
129	SPECIAL RESEARCH
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172	CHEMISTRY
173	CHEMISTRY (MS/SPECTRA)
174	EXPLOSIVES CHEMISTRY
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202	LASER ELECTRO-OPTICS
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204	[illegible] CHEMISTRY
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208	[illegible] STATION
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211	[illegible] IV
212	[illegible] STORAGE CATERING LAB
213	[illegible] HOUSE
214	CLASSIFIED WASTE DISPOSAL
215	[illegible] TARGET DEVELOPMENT
216	[illegible] 4
217	[illegible]
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220	MAIN SERVICES/BRIDGE OFFICE
221	PHYSICS
222	SOUTH CAFETERIA
223	EMERGENCY COMMUNICATIONS
224	[illegible]
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226	[illegible]
227	COMPUTATIONS/PHYSICS
228	[illegible]
229	EMERGENCY WATER STORAGE
230	PHYSICS/IGOP
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233	PLATING SHOP
234	PLATING SHOP
235	FIRE HOUSE
236	HAZARDS CONTROL
237	UTILITIES CONTROL
238	MATERIALS FABRICATION SHOP
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412	BIOMED LAB
413	MARINE BIOLOGY LAB
414	COLD STORAGE
415	SECURITY ADMINISTRATION
416	STEAM PLANT
417	STORAGE
418	PAINT SHOP
419	DECONTAMINATION
420	[illegible]
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423	RFE SHOP
424	ELECTRICAL SUBSTATION
425	MOOD 1
426	RFE RESEARCH
427	[illegible]
428	RFE
429	RFE SHOPS
430	RFE
431	RFE
432	RFE RESEARCH
433	RFE CAPACITOR
434	RFE SHOP
435	RFE COMPUTER CONTROL
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438	COIL SHOP
439	MAGNET COIL STORAGE
440	RFE MAGNET LAB
441	POWER SUPPLY
442	MOOD 8
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445	WAFEC STORAGE
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511	CRAFTS SHOP
512	CRYO MATERIAL ASSEMBLY
513	LIQUID WASTE STORAGE
514	WASTE DISPOSAL
515	EQUIPMENT STORAGE
516	PE
517	PE/CUST LAUNDRY ROOM
518	PE/HOUSE BIRK ELECTRONICS
519	GAS CYLINDER DOCK
520	EQUIPMENT MAINTENANCE
521	PE STORAGE
522	PE RESTROOM
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593	SHEEP SHED
594	PLANT GROWTH
595	EARTH HOUSE
596	METEOROLOGICAL STATION
597	ENV PROTECTION
598	MOOD 5 6
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662	HEALTH SERVICES
663	MOOD 7
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The area surrounding Site 300 is sparsely populated, with the majority of the land used to support sheep and cattle ranching operations. Figure 1-5 shows the major activity areas at Site 300.

LLNL is operated by the University of California (UC) under contract with the DOE. Founded as a nuclear weapons design laboratory in 1952, it was officially established as the Lawrence Radiation Laboratory, the nation's second laboratory dedicated to nuclear weapons research and development. LLNL has been operated by UC ever since - for the Atomic Energy Commission until 1975, then for the Energy Research and Development Administration (ERDA) until 1977, and now for DOE. LLNL is now a multi-program, mission-oriented institution engaged in abstract and applied research programs that require a multidisciplinary approach.

Major programs include: research, development, and test activities associated with the nuclear design aspects of the nuclear weapons life cycle and related national security tasks; inertial confinement fusion; magnetic fusion energy; biomedical and environmental research; laser isotope separation; energy-related research; beam research physics; and support to a variety of programs for the Department of Defense and other Federal agencies. Site 300 supports LLNL's primary mission in the design of nuclear weapons through facilities that allow multiple, simultaneous diagnostics capability for hydrodynamic testing. Site 300 provides the ability to develop new high explosives or fabricate any high explosives from raw materials, the ability to manufacture and assemble parts for testing, test facilities for destructive and non-destructive testing, support for projects using high explosives, diagnostics, and the capability to perform particle beam research.

LLNL also operates some facilities at DOE's Nevada Test Site (NTS).

Figure 1-4. **LLNL Programs and Support Locations**

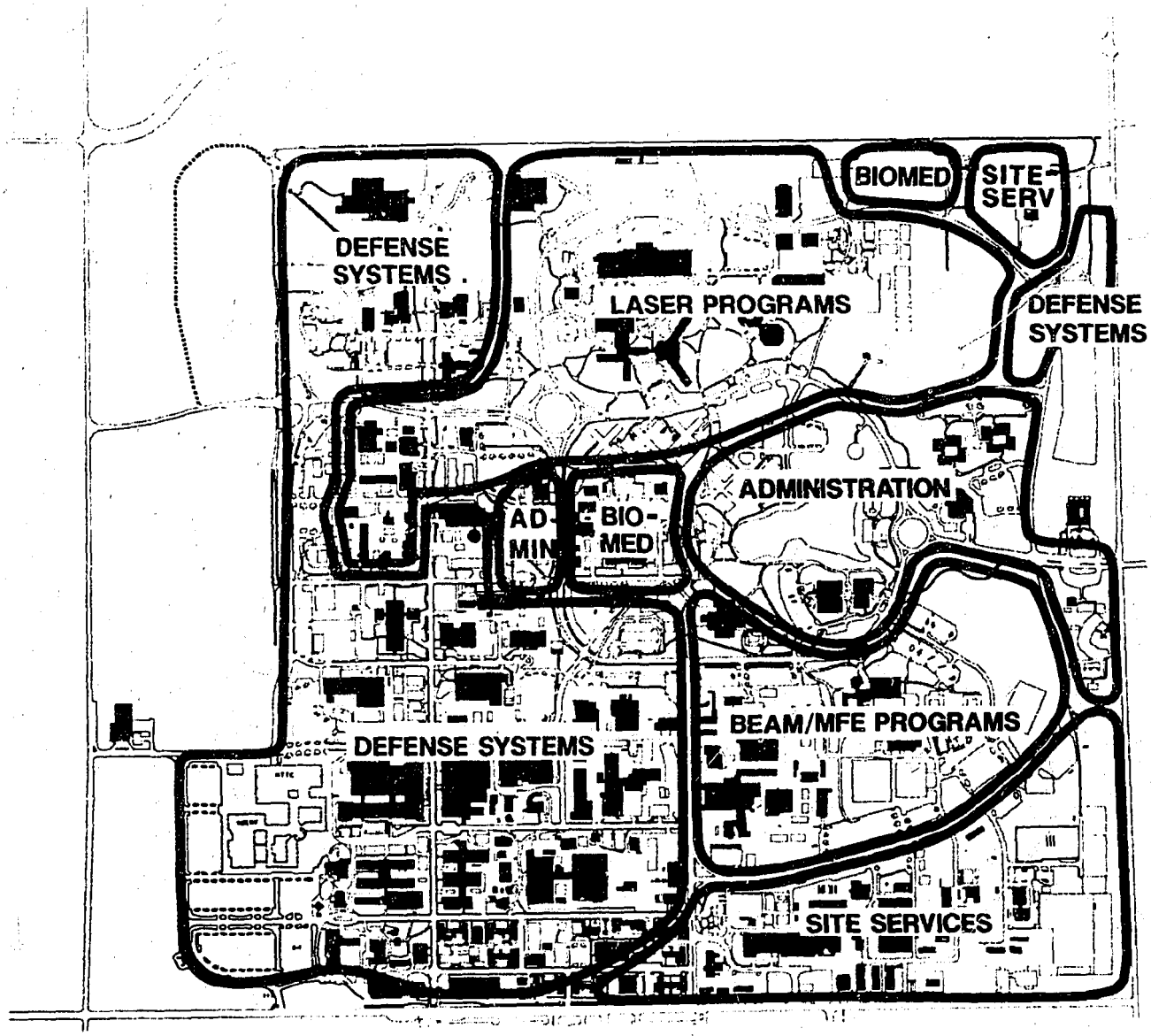
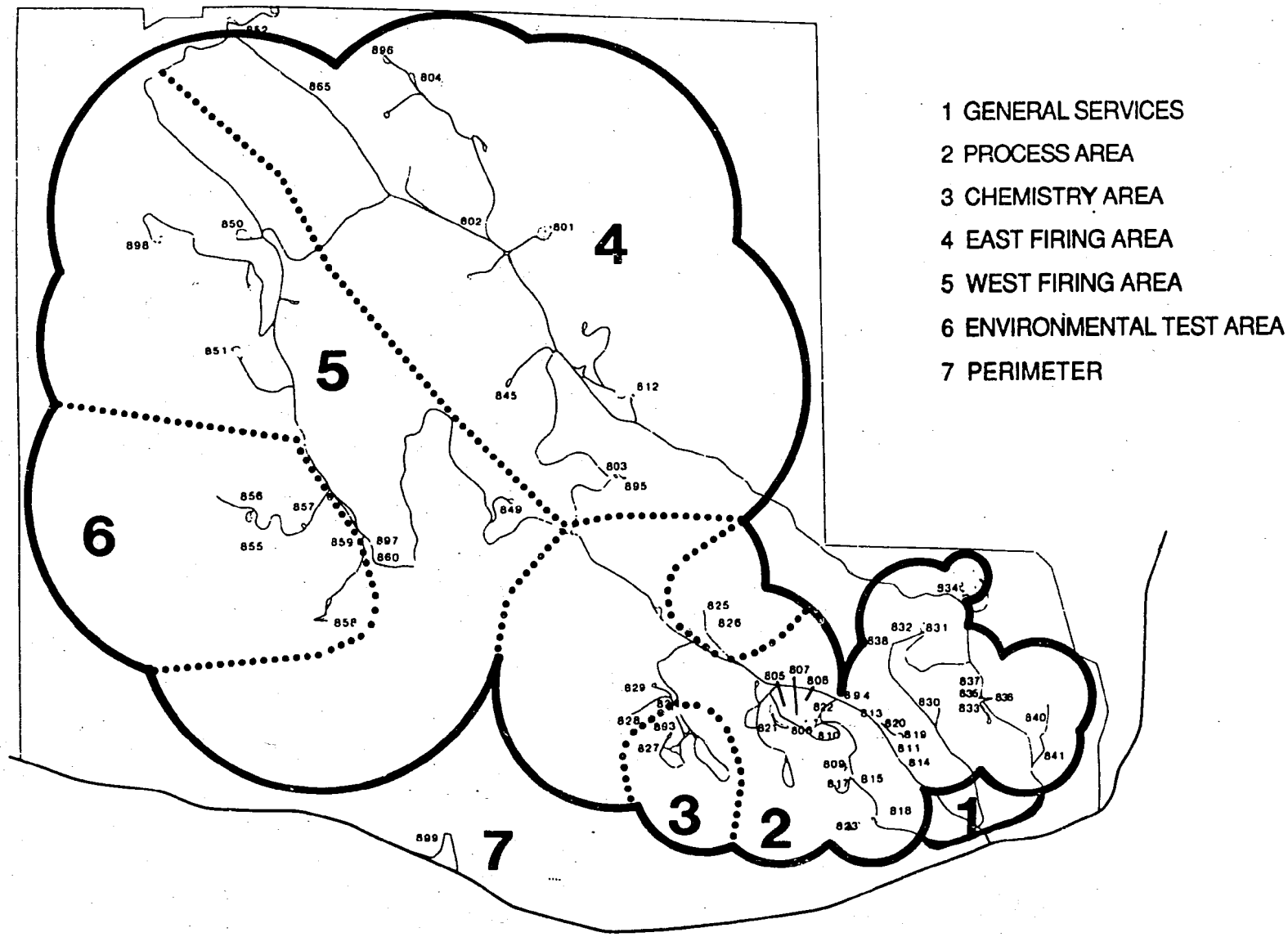


Figure 1-5. Site 300 Activity Areas



2.0 KEY FINDINGS AND NOTEWORTHY PRACTICES

2.1 ENVIRONMENTAL

2.1.1 Key Findings

The Environmental Subteam has identified four key findings, each of which is comprised of several of the findings in Section 3.5. Although the component findings may not all appear on the surface to be significant, collectively they represent those issues that are of greatest concern. The key findings are as follows:

- Quality assurance programs have not been developed or implemented for many environmental activities to assure that they are being conducted in accordance with applicable environmental regulations and DOE Orders.

- Environmental programs are not effectively implemented, due to a lack of key programmatic elements such as sitewide consistent guidance, formal procedures, and a sitewide quality assurance program.

- Adequate systems are not in place to properly characterize and manage wastes.

- Air monitoring programs and systems do not include all of the elements necessary to accurately characterize and monitor emissions and ambient air conditions.

2.1.2 Root Causes

The task of characterizing root causes is complicated by the fundamental nature of many of the findings. In fact, some of the findings are themselves root causes of others. The Environmental Subteam has chosen to represent the root causes as interrelated tiers to better define the relationship to the findings. This is presented schematically in Figure 2-1.

At the tier closest to the findings are four potential root causes: (1) insufficient procedures, (2) insufficient training, (3) lack of performance indicators, and (4) poor communications.

Rather than controlling environment-related operations with a system of formally-controlled and documented procedures and guidance documents, LLNL has an informal system based on the premise that "good people will do the right thing." While the premise itself may be valid, formal procedures and guidelines are necessary to clearly establish the requirements to which personnel must conform. The procedures also help form a basis for developing training programs, establishing performance objectives, and communicating the requirements.

Personnel cannot conform to environmental requirements unless they understand them and the role individuals play in protecting the environment in the everyday conduct of their jobs. This type of understanding can best be achieved through a formal training program. LLNL has a good training course

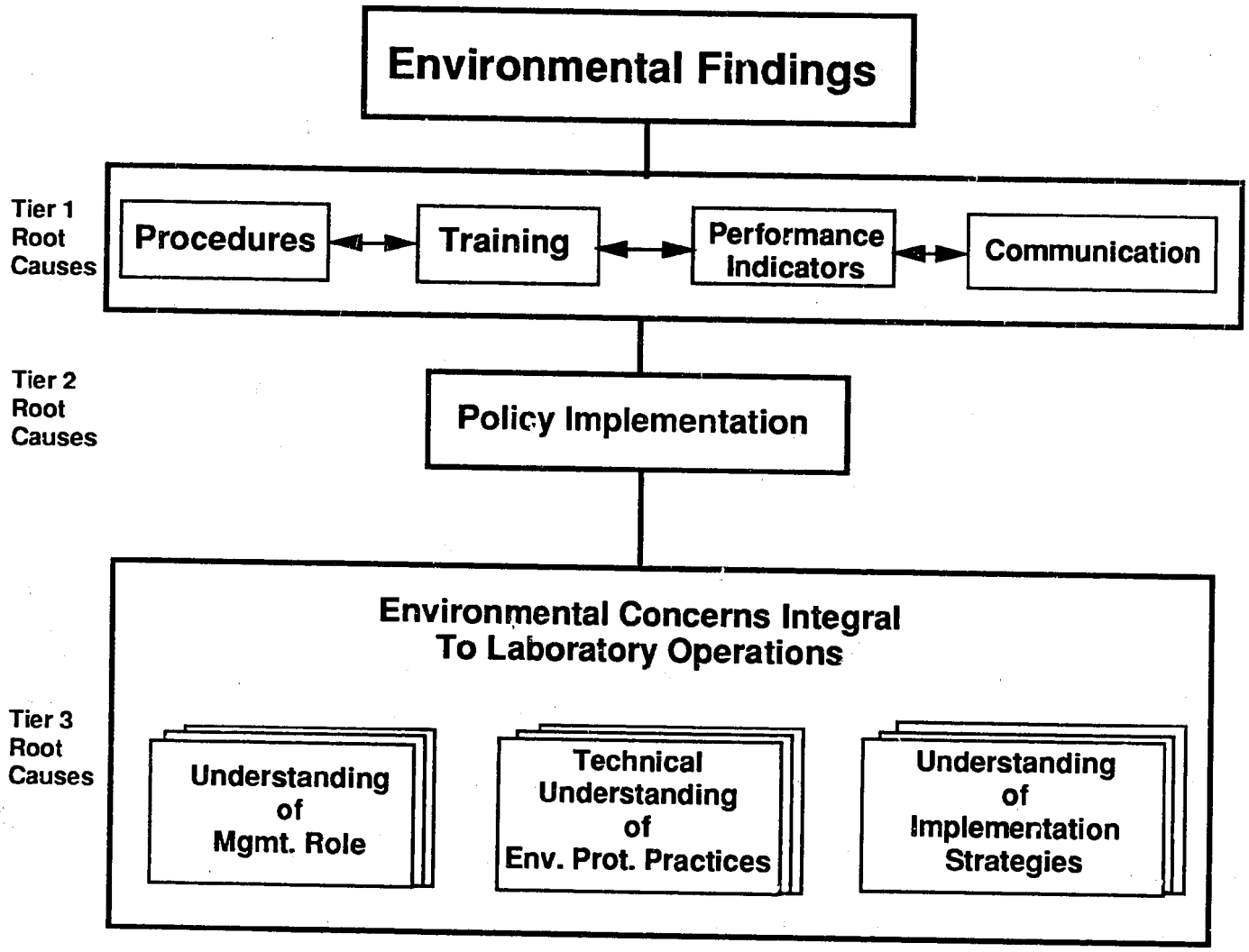


Figure 2-1. Environmental Root Causes

for hazardous waste generators, but other topics are not covered and specialized training for environmental professionals and technicians is either not available or insufficient. There is a heavy reliance on informal on-the-job training which typically results in an inconsistent level of training and understanding.

Formalized performance indicators are necessary to allow an assessment of the adequacy of procedures and training, and the effectiveness of environmental program implementation. LLNL does not have an effective system for monitoring environmental protection performance. Sufficient formal quality assurance is not in place and there is no Laboratory-wide environmental quality assurance program. Where formal inspections are in use, their findings are not tracked, trended, or used in a way that would allow identification of problem areas and development of corrective actions.

Effective implementation of environmental programs requires that there be a free flow of information between managers at all levels and LLNL personnel. Two-way communication is essential for all personnel to understand the importance of environmental protection and its relationship to LLNL's programmatic goals, and for management to remain cognizant of the effectiveness of the implementation of DOE's environmental policy. The Environmental Subteam has concluded that communications related to environmental issues are deficient at LLNL and is one of the factors leading to many of the findings.

While the first tier root causes relate directly to most of the findings, the question that must be answered is why these problems exist. **The Environmental Subteam has concluded that the second tier root cause is that LLNL has not developed or carried out a comprehensive, integrated plan that effectively implements DOE's environmental policies.** In an organization as large, complex, and varied as LLNL, an environmental policy can be implemented only through detailed, well-considered plans initiated and mandated at the top level of management. The relationship between all corollary plans must be clear and formally defined. The basic precepts and technical details must be communicated to the appropriate personnel through procedures, training and other means, and a system for tracking performance must be in place to keep upper management apprised of the effectiveness of policy implementation and LLNL's conformance to environmental requirements. These concepts have not been incorporated into the LLNL management system.

As with the first tier root causes, the second tier has an underlying cause. The Environmental Subteam has concluded that ineffective policy implementation is a consequence of the past failure of SAN and LLNL to acknowledge and communicate that environmental objectives are more important than programmatic objectives. During the onsite portion of the assessment, the Environmental Subteam saw little evidence of a strong SAN presence with regard to environmental concerns; nor did interviews with LLNL managers at various levels indicate that they sufficiently emphasized environmental priorities. This situation applies to members of the Environmental Protection Department as well as others throughout LLNL. **There are three general manifestations of this that lead to the first and second tier root causes: (1) managers at all levels do not understand their role in environmental protection, (2) LLNL management does not understand strategies for the implementation of**

environmental protection programs, and (3) managers do not have sufficient technical knowledge of environmental protection.

On the basis of observations, environmental findings and associated root causes, the Environmental Subteam's overall assessment is that the environmental programs and efforts at LLNL are fragmented, lack coordination, are inconsistently implemented, and are hindered by poor communications.

2.2 SAFETY AND HEALTH

2.2.1 Key Concerns and Noteworthy Practices

The Health and Safety (Technical Safety Appraisal) Subteam identified concerns in all of the safety disciplines examined during the appraisal, except in the areas of Medical Services and Experimental Activities. The most important concerns, based upon hazard severity and compliance considerations, were related to Organization and Administration, Quality Verification, Operations, Maintenance, Packaging and Transportation, Technical Support, Training and Certification, Fire Protection, and Occupational Safety.

The key concerns in these areas indicate:

- **The matrix management system used at LLNL has resulted in diffusion of safety responsibility and authority.** The safety line of responsibility is inconsistent, existing as multitiered, multipathed, unique combinations of senior management positions, safety teams, review committees, facility managers, supervisors, and division-level organizational elements. Several organizational elements share safety responsibility, resulting in some duplication of resources, conflicting approaches, and lack of cross-communication.

- **Training is inconsistent sitewide in its formality, documentation, and methodology.** Results are mixed; training is ineffective or non-existent for hazards communication, emergency preparedness, maintenance, and quality control inspectors.

- **Application of formal management controls is lacking.** Deficiencies in LLNL's audit program include lack of consistency, frequency, quality, and independence. The safety review program has an inherent conflict of interest. Administrative controls are inconsistent or absent. Safety Analysis Reports and Operational Safety Requirements are inconsistent from program to program, deficient, or absent. Procedures have different meanings to different organizational entities of LLNL. There is a need to establish a requirement for sitewide consistency in safety performance.

- **Maintenance of safety systems is deficient.** Current "as-built" drawings are often not available; the state of repair of older equipment and facilities is detrimental to safety. The Whiz Tag System is one of several means allowing circumvention of safety, fire protection, and security review of maintenance and modification activities.

- **Widespread noncompliance exists relative to DOE Orders, Federal regulations, and LLNL procedures.** Numerous packaging and transportation violations of Department of Transportation (DOT) regulations were found. Many instances of noncompliance with Occupational Safety and Health Act (OSHA) regulations were found in electrical safety, storage of flammables in construction areas, fire protection, and the use of warning tags in lockout/tagout situations. Quality verification discrepancies were found in calibration and procurement of materials and equipment. Fire protection systems used unlisted components and were not in compliance with National Fire Protection Association (NFPA) requirements for voice alarm systems.

Five Category II concerns were expressed, addressing significant risks or substantial noncompliance with DOE Orders (but not involving a situation where a clear and present danger exists to workers or members of the public). These concerns are summarized below.

Maintenance:

The Whiz Tag System does not contain guidance, criteria, and controls to ensure safe conduct of maintenance of plant systems and facilities nor control of safety system design features.

Packaging and Transportation:

LLNL does not have a system for handling, identifying, and transporting packages of hazardous materials, in compliance with the safety policies and criteria prescribed in DOE 1540.1, DOE 5480.1, and DOE 5480.3, and in Federal and State regulations.

Shipping manifests do not consistently meet DOT and U.S. Environmental Protection Agency (EPA) regulations in that they do not provide the required information in the specified format.

Occupational Safety:

Plant Engineering and program controls over construction activities are not effective in ensuring that construction work conforms to OSHA requirements in 29 CFR 1926.

Fire Protection:

The sitewide fire alarm system is deficient in meeting requirements (NFPA-720) for the use of listed or approved fire alarm components and does not provide for automatic notification to building occupants.

Noteworthy Practices were observed in several disciplines:

- In the area of Emergency Preparedness, LLNL has encouraged volunteer participation of LLNL employees in first aid, medical support teams, and two self-help programs.

- The LLNL Fire Department has an excellent, well-designed, mobile incident response command vehicle with notable capabilities to support an on-scene command post operation.

- Each facility and zone has individual emergency lockers that contain resources to support credible emergency situations.

- In Criticality Safety, LLNL has developed and implemented a manual to ensure consistency and quality in criticality safety audits.

- In Industrial Hygiene, LLNL has a comprehensive, state-of-the-art workplace surveillance program which includes both technical and medical aspects to address exposures to toxic metallic compounds.

- In the area of Occupational Safety, LLNL has initiated a preplacement testing pilot program targeted at jobs that have been identified as clearly having a high incidence of overexertion injuries.

- LLNL's Health Services Department has developed a high-quality Operating Procedures Manual which is placed at various locations throughout the facility. An outstanding reference, it also serves as a useful training tool.

- LLNL's Health Services' Melanoma Clinic, an active outreach program, addresses potential medical problems that may be unique to the geographic area.

- LLNL's Health Services Department also conducts a Biohazard Medical Surveillance Program.

2.2.2 Root Causes

Five root causes have been identified for the deficiencies in LLNL safety performance:

- **SAN and LLNL management have not established controls that are effective in verifying compliance with safety procedures and requirements.**

- **Weaknesses in training and a lack of formality in safety-related operations have resulted in widespread noncompliance.**

- **Senior management involvement and independent verification of adequate safety is lacking.**

- **SAN has not exercised close safety oversight of LLNL.**

- **There is an expectation and assumption of safety rather than an inquisitiveness to challenge a suspect assessment or demonstrate its safety.**

2.3 OCCUPATIONAL SAFETY AND HEALTH ACT COMPLIANCE

An OSHA-style assessment was conducted at LLNL. Assessment criteria were the OSHA regulations for general industry (29 CFR 1910) and construction (29 CFR 1926). For the assessment, 6 construction sites were selected at random; and 25 buildings were selected based on facility hazard classification, number of employees, level of activity, and the inspectors' professional judgment. A total of 208 inconsistencies with general industry standards were noted, as well as 39 inconsistencies with construction standards. The majority of these inconsistencies would be classified by OSHA as "other-than-serious."

Details of the assessment are included in Appendix F.

2.3.1 Key Findings

Approximately 40 percent of all findings related to electrical hazards. Included were a significant number of nonfunctioning ground fault circuit interrupters, cut or frayed power cords, and temporary wiring used for more than 90 days.

The effectiveness of the Hazard Communication Program, which accounted for 10 percent of all findings, appeared to vary according to first-line supervisor enthusiasm for the program. The supervisors have responsibility for providing safety information, including Materials Safety Data Sheets (MSDSs), to their employees; however, in all but one instance, employees interviewed could not provide information in their own words about the chemicals with which they worked daily. In addition, MSDSs were not consistently available or accessible; numerous unlabeled or partially labeled chemical containers were noted.

In the area of walking/working surfaces (which accounted for 13 percent of the general industry-related concerns), the outdoor storage of portable wooden ladders was the chief concern. These ladders were deteriorating, had splinters and sharp edges, and had missing or damaged non-skid safety feet.

A few instances of noncompliance with OSHA standards for compressed gas storage were observed; in particular, the chains or belts used to secure these cylinders were sometimes loose.

In addition to the electrical hazards, observations specific to construction were related chiefly to fire hazards. Flammable materials were found to be improperly stored repeatedly; and fire extinguishers either were not available or were not available in sufficient numbers at the sites inspected.

2.3.2 Root Causes

The deficiencies identified during this assessment exist largely as a consequence of the lack of training, procedures, and an audit program. Some supervisors are not carrying out their responsibilities in the areas of available and accessible MSDSs, labeling of containers with a description of the contents and hazard rating, and consistently communicating safety information to working-level employees.

2.4 MANAGEMENT

2.4.1 Key Findings

A total of 16 findings were identified by the Management Subteam. The following five key findings capture the substance of the Management Subteam's findings:

- **The ES&H roles, responsibilities and expectations of SAN and LLNL management are not clearly defined, communicated or well-understood throughout their organizations.** The Senior Managers at SAN and LLNL have articulated their visions for the ES&H roles, responsibilities and expectations of their respective organizations. However, these visions have not been clearly defined or communicated throughout SAN and LLNL. Consequently, the ES&H responsibilities of lower-level managers and staff are not well understood and do not provide the basis for effective ES&H implementation. Furthermore, the necessary, multilevel interfaces between SAN and LLNL counterparts have not been established.

- **LLNL does not have a sitewide strategic plan with subordinate implementation plans to define and accomplish its ES&H objectives.** LLNL has not responded to the DOE ES&H initiatives with a formal process to produce a sitewide strategic plan. Such a plan would incorporate management's vision of ES&H implementation into the LLNL mission.

- **LLNL management systems lack the control, discipline and formality necessary to consistently accomplish ES&H objectives.** The consistent accomplishment of ES&H objectives, including strict compliance with regulatory requirements and DOE Orders, demands a rigorous, disciplined management approach. LLNL's management systems do not embody such rigor and discipline. Nor do they have the necessary controls in place to assure safe, reliable and environmentally sound operations. These inadequacies in essential management systems, such as quality assurance, operating policies and procedures, and operational document control, substantially impair the effectiveness of the ES&H implementation program.

- **LLNL does not have an adequate sitewide system to assess its accomplishment of ES&H objectives.** A comprehensive and effective ES&H program would be one that allows management to know where it stands and to constantly strive to improve. LLNL's ES&H program meets neither requirement. There is a general absence of safety goals, performance indicators, deficiency trend analyses, corrective action-tracking systems and applications of lessons learned from inside or outside LLNL. The large number of noncompliance findings/concerns found during this Assessment provides strong evidence that LLNL's self-assessment programs are inadequate.

- **DOE oversight of LLNL ES&H activities is hindered by unclear guidance from DOE Headquarters, incomplete planning, and insufficient onsite SAN resources.** DOE Headquarters has not clearly defined its expectations of SAN's oversight of LLNL operations.

Consequently, SAN has not been able to articulate its responsibilities for oversight of LLNL's ES&H and related program activities in a comprehensive plan. Furthermore, SAN has not been able to finalize subordinate plans for such matters as SAN's increased onsite presence, increased SAN understanding of LLNL programs, and a general upgrading of SAN's technical expertise. In addition, the need for cultural changes within DOE Headquarters, SAN and LLNL has not been addressed.

2.4.2 Root Causes

The Management Subteam has identified **three root causes** for the findings and concerns discussed in this Assessment.

The first root cause is that LLNL management does not have a full appreciation of all of the requirements for the new DOE ES&H initiatives and their manifold impact on LLNL operations.

The strict, legalistic, compliance nature of the requirements, and the imperative for a reversal of the traditional emphasis on scientific programs are matters with which LLNL is not generally familiar or as yet comfortable. Understandably, it has fashioned a cautious, evolutionary response, when in fact, it is a revolutionary response being demanded. Symptoms of this root cause abound in the findings and concerns identified in this Assessment, and collectively they point to an organization struggling on unfamiliar ground to refocus its excellence.

Some appreciation of the challenge facing LLNL is manifested in the LLNL Director's Environmental Policy Statement, the formation of an ES&H Council and the heightened awareness of ES&H importance at varying levels of LLNL. However, full appreciation of all the rigorous demands required for the ES&H program has yet to be demonstrated.

The second root cause is that LLNL's collegial and informal management culture is not well-suited to the demands of strict ES&H compliance.

The LLNL management culture values and encourages: informal organizational controls; mutual trust among peers in program execution; institutional decisions by consensus; management by committees; technical operations by talented people with informal controls; and secrecy-driven insulation from public scrutiny. By contrast, the strict accomplishment of ES&H objectives requires: formal relationships based on clearly defined goals, objectives, responsibilities and decision authorities; rigid, procedure-based controls on operations; documented systems for training, verification and self-assessment; and "fishbowl-like" exposure to public concerns. LLNL's collegial management style has not been augmented by these additional elements of discipline.

The third root cause is the long-standing tradition of direct linkage from DOE Headquarters to LLNL, with virtually no involvement by SAN and minimal oversight.

Under this arrangement, LLNL has produced nearly 40 years of outstanding programmatic achievements and, were it not for the Secretary's new ES&H initiatives, there might be no compelling reason for more direct DOE oversight

of LLNL. The new ES&H initiatives, however, require strong DOE oversight of ES&H activities at all DOE facilities. This demands an expanded ES&H oversight role on the part of DOE and, thus, a decision by DOE Headquarters about its role and that of SAN. However, DOE Headquarters has not made such a decision or clearly expressed its expectations of SAN. It is in this vacuum that SAN is attempting to develop its plan for increased oversight of ES&H activities at LLNL and for acquisition of the necessary resources to implement the plan.

3.0 ENVIRONMENTAL ASSESSMENT

3.1 PURPOSE

This assessment report presents the findings made by the Environmental Subteam during the Tiger Team Assessment of the Department of Energy's Lawrence Livermore National Laboratory (LLNL) in Livermore, California. The Tiger Team Assessment of LLNL is part of a larger, comprehensive assessment program encompassing over 100 DOE facilities. The assessment program is part of a 10-point initiative announced by Secretary of Energy, Admiral James D. Watkins, USN (Ret.), on June 27, 1989, to strengthen environmental protection and waste management activities in the Department. The results of the program will provide the Secretary with information on current environment, safety and health (ES&H) regulatory compliance status and associated vulnerabilities of each facility, root causes for noncompliance, adequacy of DOE and site contractor ES&H management programs, response actions to address the identified problem areas, and DOE-wide ES&H compliance trends.

3.2 SCOPE

The scope of the LLNL environmental assessment was comprehensive, covering all environmental media and applicable Federal, State, and local regulations and requirements, DOE Orders, and best management practices. The environmental disciplines addressed in this assessment include air, soil, surface water, groundwater, waste management, toxic and chemical materials, radiation, quality assurance, inactive waste sites, and requirements of the National Environmental Policy Act (NEPA).

3.3 APPROACH

The Environmental Subteam Assessment of LLNL was conducted in accordance with the Tiger Team Guidance Manual (February 1990) and followed accepted audit techniques. The assessment was conducted by a team managed by a Team Leader and Assistant Team Leader from the DOE Office of Environmental Audit and technical specialists from other DOE offices and support contractors. The names, responsibilities, affiliation, and biographical sketches of the team members are provided in Appendix A. The Environmental Assessment of LLNL included three phases: planning, onsite activities, and reporting.

The Environmental Assessment Plan, which outlines the key issues to be addressed, general approach, and specific onsite activities, is provided in Appendix B. The Environmental Subteam Tentative Agenda, included as part of the Assessment Plan, was continually refined during the onsite assessment to accurately reflect the daily activities of the team. The finalized daily agenda is included as Appendix C. Appendices D and E reflect the Contacts/Interviews and Site Documents the Environmental Subteam used to develop its assessment and findings.

A Pre-Assessment site visit was conducted on January 24-25, 1990, for the Tiger Team to become acquainted with both the main site and Site 300 of LLNL, and to facilitate planning and explain the purposes and assessment methodology to personnel of LLNL and the DOE San Francisco Operations Office (SAN).

Onsite activities took place from February 26 to April 5, 1990 and included: document review; observation of site operations; interviews with DOE and site-contractor staff, personnel from Federal, state, regional, and county regulatory agencies, as well as representatives of local community and environmental action groups; review of previous audits and assessments; daily debriefs; and the development of the findings presented in this section of the report. During their observation of site operations, technical specialists from the Environmental Subteam were occasionally accompanied by personnel from regulatory agencies, including the U.S. Environmental Protection Agency (EPA), California Department of Health Services, and the Bay Area Air Quality Management District. The regulators participated as observers when accompanying the technical specialists and during the daily debriefs.

The Environmental Subteam identified findings in three categories: Compliance Findings, Best Management Practice (BMP) Findings, and Noteworthy Practices. Compliance findings are conditions that, in the judgment of the Subteam, may not satisfy environmental regulations, applicable DOE Orders (including internal DOE Memoranda, where referenced), consent orders, agreements with regulatory agencies, or permit conditions. BMP findings are conditions, where, in the judgment of the Subteam, best management practices could and should be employed. In addition to these two types of findings, the Subteam could have identified practices, which in their judgment, may be noteworthy and have general application to DOE facilities and should be documented for the purposes of information transfer.

3.4 ENVIRONMENTAL ASSESSMENT SUMMARY

The Environmental Subteam identified 70 findings in its assessment of LLNL. None of the findings reflect situations that present an immediate risk to public health or the environment. Forty-nine findings reflect problems that do not meet the requirements of Federal, State of California, California regional, county environmental regulations, or DOE Orders. Twenty-one findings represent conditions in which best management practices are not employed. There were no noteworthy practices identified by the Environmental Team. The titles of the environmental findings are presented in Table 3-1 by media or discipline, as appropriate.

As part of the Environmental Subteam assessment, other reports on environmental compliance or environmental problems were reviewed. The Lawrence Livermore National Laboratory Environmental Survey Action Plan (August 1988) was developed by LLNL in response to the findings identified in the Environmental Survey Preliminary Report of the Lawrence Livermore National Laboratory (December 1987). The Action Plan identifies compliance or initial remediation requirements, reviews the status of efforts to satisfy those requirements, and prescribes future efforts to resolve remaining remediation needs. Many of the Environmental Survey findings require long-term budgetary commitments to complete the corrective actions, while others require shorter term commitments. Finally some findings required administrative actions such as obtaining permits or submitting closure plans to regulators.

LLNL has made progress in correcting many of the problems identified during the 1987 Environmental Survey. For example, the site has made significant improvements in waste retention tank systems, replacing many of the single tank systems with dual tank or double-shelled tank systems. In addition, LLNL

has made progress in reducing the analytical time necessary to correctly characterize chemical constituents in wastewater before it can be properly disposed of. Nevertheless, several operations reported that they are still periodically forced to curtail or slow-down their operations because of sampling and analysis delays. LLNL has upgraded or refurbished over 9000 feet of the sanitary sewer system and has evaluated an additional 20,000 feet to assess needed repairs. However, considerably more remains to be done to complete the upgrade of the sanitary sewer system. Other milestones since the Survey include removal of the remaining PCB transformers from service. In addition, LLNL has done extensive work in evaluating potential sources of groundwater contamination both at the Main Site and at Site 300, both as part of the Remedial Investigation (RI) Process and on a continuing basis. Landfills at Site 300 that were active at the time of the Survey and identified as possible sources of hazardous leachates to the groundwater are now in the planning stages for Resource Conservation and Recovery Act (RCRA) closure.

In other areas, LLNL has made comparatively little progress since the Survey; some problems that resulted in findings in the Environmental Survey remain findings in this assessment. For example, no Laboratory-wide closure procedures have been developed and adopted. As a result, there is still the potential that chemicals and equipment can accumulate in laboratories or facilities when a project is completed or funding is terminated. The chemicals and equipment could remain long enough that some of it would need to be treated as hazardous wastes, and may have to be handled by people who are unfamiliar with its properties. Also, the monitoring of HEPA filters continues to be inadequate. Although magnehelics have been replaced or added to systems, they are not always put to use. A contributing factor could be the lack of formal procedures available to workers for reading, recording, or interpreting pressure drop across the filter. As a consequence, radioactive particles may still be unnecessarily released because the lack of filter monitoring fails to alert when a filter may be damaged or overloaded. Finally, many deficiencies in quality assurance/quality control remain, including a lack of formal (written) procedures for maintenance and calibration of analytical instruments, a paucity of internal audits on the handling of environmental samples, and a general absence of formal procedures for identifying and rectifying unsatisfactory sampling and analysis results.

The Environmental Subteam also reviewed findings and observations of recently conducted SAN and LLNL self-assessments of the environmental compliance status of LLNL. The Environmental Subteam was interested in determining the extent to which findings surfacing as a result of the Tiger Team Assessment were being identified by self-evaluation. Results of these various assessments were assembled by LLNL into a Program Compliance Log, covering assessment activities for the period from January 1, 1988 to February 28, 1990. The compliance log included identified deficiencies, programs or buildings where problems were observed, proposed actions to correct the deficiencies, and estimated completion dates or, if the action was complete, when it was finished.

Conclusions drawn by the Environmental Subteam review of the Program Compliance Log, the Tiger Team Preparation Audit, and the Independent Environmental, Safety, and Health Review of LLNL Nuclear Material Handling Facilities (October 1989) are that LLNL was aware of the general issues that

are addressed in the environmental findings. However, LLNL was not aware of all of the specifics or the extent of some of the problems identified.

In preparation for the Tiger Team, LLNL made considerable "housekeeping" efforts. While most DOE sites that have been the subject of a Tiger Team Assessment made efforts to prepare their facilities for inspection, those of LLNL were larger in scale. Each program area participated in a 2-day "rolling standdown" where most normal program functions ceased. During these periods, program offices were asked to segregate, identify, and package chemicals that had exceeded their shelf life or were no longer needed, as well as wastes. The lack of closure procedures, as discussed previously, had contributed to a build-up of excess chemicals in many facilities. Some of the chemical material had to be disposed of as hazardous waste. As a result of the standdown days, much of this material was packaged, labeled, and moved into waste storage areas, and chemical product storage areas were cleaned. The volume of wastes generated caused nearly all waste storage areas to be temporarily expanded.

As a consequence of the standdown days, especially in waste management, there were at first relatively few obvious problems visible. While the standdown days served a useful purpose, the Environmental Subteam was concerned that LLNL had practices defined, in place, and understood by personnel that would make events such as the standdown days unnecessary in the future. To this end, the Environmental Subteam carefully evaluated program practices and formal (written) standard operating procedures (SOPs). Many waste handling procedures were implemented just prior to the arrival of the Tiger Team. In one case, employees of a building had received training on new waste segregation practices the day before waste management specialists from the Environmental Subteam visited the facility. However, in observing typical work practices and operations-as-usual, it was possible to evaluate the storage and handling of wastes that were generated after the standdown days and the collection of waste containers from the standdown days. Repeat visits were made to some buildings to see if new waste management procedures implemented near the beginning of the assessment continued to be effective or were implemented correctly. Many of the supporting examples for the Waste Management findings were the result of observed deficiencies in waste management practices made during the repeat visits. Findings in incomplete waste characterization, inadequate practices in labeling of hazardous, radioactive, and mixed wastes, and improper handling of hazardous wastes indicate that many of the procedures and programs in waste management are still far from being thorough, completely implemented, or understood by waste generators at LLNL.

LLNL has made an effort to initiate corrective actions for some findings which were amenable to "quick fixes" such as relocating improperly stored drums, preparing draft procedures, or correcting labeling deficiencies. However, the root causes of these findings remain to be addressed.

The most significant findings or issues presented in the Environmental Subteam Assessment include the following:

- <u>Inadequate Quality Assurance Program</u> -- Quality assurance is receiving a very low priority at LLNL. Specific deficiencies include absence of a visible or effective environmental quality

assurance organization, the absence of software validation and verification practices, a scarcity of quality assurance plans and procedures, and lack of quality assurance coordination between different laboratories. The weakness of quality assurance programs and procedures at LLNL means that the validity of analytical results cannot be adequately verified. These results must serve as a defensible basis for remedial action programs and for assessments of environmental compliance and impacts from site activities.

- Inadequate Practices in Characterization and Handling of Radioactive and Hazardous Wastes -- Adequate systems are not in place to sufficiently assure that radioactive and hazardous wastes are being accurately and completely characterized and handled. For example, methods used to characterize low-level waste (LLW) by waste stream are not defined nor documented. In addition, no quality control checks are performed to verify that waste generators, on whom is placed the responsibility of waste characterization, are performing the task accurately and completely. Finally, the procedures and requirements of the Hazardous Waste Management Division are not documented in formal (written) procedures to assure that wastes are being properly characterized, handled, and disposed.

- Deficiencies in the Air Monitoring Program -- Overall, the deficiencies in the Air Monitoring Program at LLNL have the potential to adversely affect the accuracy and defensibility of the data. For example, no calibration has been performed on much of the equipment used in the monitoring program for ambient air particulate radionuclides such as flow-rate recorders, hi-vol samplers, and orifice calibration units. Other deficiencies in the effluent monitoring program include a lack of knowledge of total air flows through exhaust streams, and failure to achieve isokinetic sampling for air streams that may have particulate emissions. In addition, LLNL has neglected to investigate the causes of measurable offsite airborne plutonium contamination. LLNL has not developed uniform or formal standards for stack monitoring equipment, for maintenance of stack monitoring equipment, and for ventilation system design.

- General Lack of Formal Procedures for Environmental Practices -- Although not singled out as a separate finding in the report, findings in several environmental disciplines indicated the lack of formal (written) procedures to guide environmental activities. Procedures have not been developed, for example, to guide use of monitoring devices on HEPA filters; for disposal of purged groundwater, drill cuttings, core samples, and drilling muds associated with groundwater monitoring activities; to direct disposal of chemicals or wastes when laboratory projects are terminated; to ensure proper use and calibration of equipment used for airborne particulate environmental sampling and monitoring, and to put in place many quality assurance activities in analytical laboratories.

3.5 ENVIRONMENTAL FINDINGS

The findings are presented under chapters identified by media (e.g., Air, Surface Water) or regulation (e.g., National Environmental Policy Act). Titles chosen for the individual findings are topical, rather than descriptive. Each finding is preceded by a Performance Objective. The Performance Objectives for Compliance Findings are derived from promulgated environmental regulations and applicable DOE Orders, compliance agreements, and permit conditions. The Performance Objectives for BMP findings are derived from regulatory agency guidance, accepted industry practices, and the professional judgment of the technical specialists. The findings within each chapter are <u>not</u> arranged in order of relative significance.

TABLE 3.1
ENVIRONMENTAL FINDINGS

AIR FINDINGS

A/CF-1	Monitoring of Radionuclide Emissions to the Atmosphere
A/CF-2	Ambient Air Monitoring Program for Particulate Radionuclides
A/CF-3	Reporting of Airborne Beryllium Concentrations in Annual Environmental Report
A/CF-4	Solvent Use Records at Solvent Cleaning Stations
A/CF-5	Report on Cooling Towers
A/CF-6	Gasoline Dispensing Facilities at Main Site and Site 300
A/CF-7	Burning at Site 300
A/CF-8	Cold Cleaners at Site 300 Paint Shop
A/BMP-1	Guidelines for Use of Magnehelic Pressure-Drop Gauges on HEPA Filters

SURFACE WATER FINDINGS

SW/CF-1	Sanitary Sewage Collection System
SW/CF-2	SPCC Plan
SW/CF-3	Discharge of Filter Backwash from Bldg. 318
SW/CF-4	Surface Water Discharge at Site 300
SW/CF-5	Site 300 Sewage Treatment Pond
SW/BMP-1	Analytical Lag Times - Retention Tanks
SW/BMP-2	Site 300 Potable Water System

GROUNDWATER/SOIL FINDINGS

GW/BMP-1	Standard Operating Procedures on Disposal of Investigation-Derived Wastes and Purged Groundwater
GW/BMP-2	Closure of Wells and Boreholes at Site 300

WASTE MANAGEMENT FINDINGS

WM/CF-1	Operations and Quality Assurance Program of the Hazardous Waste Management Division
WM/CF-2	LLNL Waste Management Plan for 1990
WM/CF-3	Characterization of Radioactive Materials in Low-Level Waste
WM/CF-4	Waste Characterization
WM/CF-5	Handling of Hazardous Wastes
WM/CF-6	Radioactive Waste Reduction Program
WM/CF-7	Training of Hazardous Waste Generators and Handlers
WM/CF-8	Monitoring of Regulated Underground Storage Tanks
WM/CF-9	Hazardous Waste Inspection Forms and Records
WM/CF-10	Storage of Mixed Wastes Subject to Land Disposal Restrictions
WM/CF-11	Hazardous Waste Characterization Program
WM/CF-12	Radioactive Waste Certification
WM/BMP-1	Implementation of Waste Minimization Plan
WM/BMP-2	Laboratory Closeout Procedures
WM/BMP-3	Hazardous, Radioactive, and Mixed Waste Labels
WM/BMP-4	Containment of Infectious Waste

TOXIC AND CHEMICAL MATERIALS FINDINGS

TCM/CF-1	PCB Spill Cleanup
TCM/CF-2	PCB Contamination
TCM/CF-3	Aboveground Storage Tanks
TCM/BMP-1	Storage of Hazardous and Toxic Materials
TCM/BMP-2	Storage of Incompatible Chemicals
TCM/BMP-3	PCB Labeling
TCM/BMP-4	Annual PCB Status Report
TCM/BMP-5	Secondary Containment

TOXIC AND CHEMICAL MATERIALS FINDINGS

TCM/CF-1	PCB Spill Cleanup
TCM/CF-2	PCB Contamination
TCM/CF-3	Aboveground Storage Tanks
TCM/BMP-1	Storage of Hazardous and Toxic Materials
TCM/BMP-2	Storage of Incompatible Chemicals
TCM/BMP-3	PCB Labeling
TCM/BMP-4	Annual PCB Status Report
TCM/BMP-5	Secondary Containment

QUALITY ASSURANCE FINDINGS

QA/CF-1	Environmental Quality Assurance Programs at LLNL
QA/CF-2	Implementation of Environmental Guidance Documents
QA/CF-3	Radiological Environmental Monitoring Program
QA/CF-4	Radiological Quality Assurance Practices: Environmental Analytical Sciences Laboratory
QA/CF-5	General Quality Assurance Practices in LLNL Environmental Laboratories
QA/CF-6	Radiological Quality Assurance Practices in the Safety Services Division Laboratories
QA/CF-7	Quality Assurance Plan and Operations Procedures in the Wastewater and Tank Systems Group
QA/CF-8	Software Control
QA/CF-9	Radiological Quality Assurance Practices: Nuclear Chemistry Division
QA/BMP-1	Procurement of Analytical Services

RADIATION FINDINGS

RAD/CF-1	Safety Analysis and the Evaluation of Offsite Impacts
RAD/CF-2	Radiological Stack Effluent Monitoring Program
RAD/CF-3	Assessment of Airborne Effluents
RAD/CF-4	Assessment of Impact to the Public and the Environment in Emergency Situations
RAD/CF-5	LLNL Environmental Report
RAD/CF-6	Decontamination and Decommissioning Activities at LLNL
RAD/BMP-1	Environmental Protection Implementation Plan
RAD/BMP-2	Plutonium in Soil at the Livermore Water Reclamation Plant

INACTIVE WASTE SITES FINDINGS

IWS/CF-1	Administrative Record for Remedial Investigation Activities at the Main Site
IWS/BMP-1	Residual Soil Contamination with Immobile Constituents
IWS/BMP-2	Chemical Tracking System
IWS/BMP-3	Spill Reporting Procedures

NATIONAL ENVIRONMENTAL POLICY ACT FINDINGS

NEPA/CF-1	Inconsistent NEPA Guidance
NEPA/CF-2	Inadequate NEPA Review
NEPA/CF-3	Outdated Sitewide Environmental Impact Statement
NEPA/CF-4	Deficiencies in Environmental Assessments
NEPA/CF-5	Inappropriate NEPA Determinations
NEPA/BMP-1	Inadequate NEPA Records

3.5.1 Air

3.5.1.1 Overview

The purpose of the air portion of the Environmental Subteam Assessment of LLNL was to evaluate the current operating practices of the facility with regard to (1) regulations promulgated under the Clean Air Act by the Federal EPA, the Bay Area Air Quality Management District, and the San Joaquin County Air Pollution Control District, and permits issued pursuant to these regulations; (2) DOE Orders; and (3) best management practices.

The general approach to the air assessment included the following activities: (1) physical examination of major facilities and major sources, including emission control and emission sampling/monitoring systems; (2) examination of ambient air quality monitoring and meteorological monitoring programs; (3) interviews with personnel in the Environmental Protection Department, the Hazards Control Department, Plant Engineering, and the various program areas; and (4) review of site documents including air permits, correspondence with regulatory agencies, standard operating procedures, and the Environmental Report for 1988.

Air contaminant emissions at LLNL include both radioactive and nonradioactive materials. The major radionuclide being emitted is tritium from Bldg. 331 in the form of the elemental gas (HT) and tritiated water vapor (HTO). The tritiated water vapor is the main contributor to the offsite radiological dose. Other radionuclides potentially emitted include plutonium and uranium and a variety of other radionuclides in lesser quantities. These materials are potentially emitted from machining operations, chemical processing activities, and laser operations. Nonradioactive particulates, oxides of nitrogen, carbon monoxide, and sulfur dioxide are potential emissions from fuel-burning sources such as hot-water and steam boilers, and at Site 300, grass and high-explosive (HE) waste-burning activities. Volatile organic compounds that are precursors to ozone formation in the atmosphere are potentially released from degreasers and cold cleaners, gasoline dispensing facilities, and paint spray booths. Chlorofluorocarbons used in laser operations as a coolant/dielectric can also be released to the atmosphere. The radionuclide emissions are regulated by DOE Orders and by the Federal EPA NESHAP on radionuclides from DOE facilities. The nonradioactive emissions are regulated by the Bay Area Air Quality Management District and, at Site 300, by the San Joaquin County Air Pollution Control District.

The air program at LLNL generally addresses applicable requirements set forth in DOE Orders and the rules and regulations of responsible air pollution control agencies. The site, in general, has recognized the need for and has provided emission control devices such as high-efficiency particulate air (HEPA) filters, cyclones, and scrubbers to minimize emissions to the atmosphere. A new emission control process, which is currently undergoing an operational readiness review, will oxidize tritium to tritiated water that will be absorbed onto molecular sieves, with the objective of decreasing tritium emissions from Bldg. 331 by about 90 percent. Programs for sampling/monitoring of effluent emissions to the atmosphere and for surveillance monitoring of particulate radionuclides, beryllium, and lead as well as airborne tritiated water vapor are in effect. However, deficiencies related to both programs were found and are addressed in the air findings and

in the findings of the Radiation Section 3.5.7 of this report. The site's efforts to identify and evaluate processes, equipment, or activities that may require a Permit-to-Operate appears to be working well. Overall, the air program does not have current standard operating procedures, documentation of systems and activities, and formal quality assurance procedures.

The air portion of the Environmental Subteam Assessment identified eight compliance findings and one best management practice (BMP) finding. The compliance findings deal with a lack of air permits for cold cleaners and for an open burning activity at Site 300, failure to submit a report on cooling tower operations, improper signs at gasoline dispensing facilities at the Main Site and Site 300, inadequate training of operators on the use of solvent records at cleaning stations, deficiencies in the programs to sample/monitor radionuclide emissions to the atmosphere and to monitor particulate radionuclides in the ambient air, and inappropriate reporting of airborne beryllium concentrations. The BMP finding involves a lack of guidelines on the use of pressure-drop gauges on HEPA filters. Other findings related to emissions of radionuclides to the atmosphere are addressed in the Radiation Section 3.5.7.

No Noteworthy Practices were identified.

As part of this assessment, a review was made of air findings from the 1986 DOE Environmental Survey at LLNL and the air-related issues compiled in the Site's Program Compliance Log. LLNL has resolved some of the Survey findings, but others that were also identified during this assessment remain to be addressed. Many of the comments recorded in the Program Compliance Log relate to sources that appear to need air permits. Careful reading of the regulations shows that most "small" sources do not require permits. Each audit or assessment seems to comment on the lack of permits, as was the case in the Tiger Team Assessment. When LLNL performs an environmental review of a process and demonstrates that a permit is not needed, it would be useful to post a notice to that effect in lieu of a permit at the source. Future comments could thus be avoided.

3.5.1.2 Compliance Findings

ASSESSMENT DISCIPLINE: AIR

ASSESSMENT FINDING NUMBER: A/CF-1

ASSESSMENT FINDING TITLE: MONITORING OF RADIONUCLIDE EMISSIONS TO THE ATMOSPHERE

PERFORMANCE OBJECTIVE: Draft DOE 5400.xy, June 15, 1989, requires that all effluents released to the atmosphere shall be evaluated to assess their potential for release of radionuclides. This assessment is required to determine whether any such releases are adequately controlled and their environmental impacts properly evaluated. DOE 5400.1, November 9, 1988, requires that effluent monitoring shall be conducted at all DOE sites to verify compliance with applicable Federal, State, and local regulations and DOE Orders. The National Emission Standards for Emissions of Radionuclides from DOE Facilities (54 FR 51695, December 15, 1989) requires that radionuclide emissions shall be determined to permit calculation of the effective dose equivalent to members of the public.

FINDING: LLNL effluent sampling/monitoring activities are inadequate to identify and quantify releases of radionuclides to the atmosphere to accomplish a thorough assessment of the effective dose equivalent to the public.

- o An internal 1988 review of LLNL radionuclide stack sampling systems (A-16) pointed out numerous deficiencies that tend to degrade the validity of the results. In most instances, the systems do not meet ANSI N13.1 - 1969 standards. Some of the deficiencies that were identified include:
  - The total volume flows of the exhaust streams are not accurately known.
  - Sampler probe configuration and location in the exhaust duct are not documented.
  - Sample transport lines are long, with sharp bends.
  - Air flow through the sample filters is not adequately controlled or monitored.
  - Isokinetic sampling is not achieved for air streams potentially bearing particulate emissions.
- o A 1989 internal assessment of potential emissions from unsampled stacks (A-39) dealt with stacks at 12 buildings; Bldgs. 231, 514, and 624 were not included.

LLNL has made improvements to exhaust monitoring at Bldg. 332 by installing Passive Air Monitors to augment the Continuous Air Monitors that are equipped with alarm devices (A-3). Monitoring of

emissions through two major stacks at Bldg. 331 appears to be adequate (A-23).

ASSESSMENT DISCIPLINE: AIR

ASSESSMENT FINDING NUMBER: A/CF-2

ASSESSMENT FINDING TITLE: AMBIENT AIR MONITORING PROGRAM FOR PARTICULATE RADIONUCLIDES

PERFORMANCE OBJECTIVE: DOE 5400.1, "General Environmental Protection Program Requirements," establishes general environmental protection requirements. Draft DOE 5400.xy, "Radiological Effluent Monitoring and Environmental Surveillance," sets forth an objective to properly and accurately measure radionuclides in effluents and in ambient environmental media, and, specifically for air sampling systems, requires that the total air flow or total running time be indicated, and directs that systems be leak-tested and flow-calibrated on a routine basis. Requirements for calibration of the calibration-transfer device, the sampler flow indicator, and the sampler are detailed in 40 CFR 50, Appendix B, "Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method)."

FINDING: The Environmental Subteam noted several deficiencies in the airborne particulate sampling program that have the potential to adversely affect the accuracy and defensibility of the data:

1. The Standard Operating Procedure (SOP) "Airborne Particulate Environmental Sampling" (EMP-AP-S), is out-of-date. The SOP was prepared June 15, 1988, and bears an expiration date of June 15, 1989 (A-12). The SOP is cluttered with information on samplers that are no longer in service and that were replaced on January 1, 1990, by new General Metal Works (GMW) samplers.

2. The flow-rate recorders have not been calibrated and are not being used to record flow rate. The portion of the SOP for the current GMW samplers requires that flow-rate recorders be read to assure that the rate has been constant. According to the SOP, the technicians performing the chart change-out are to perform this assessment; however, they made no note of the flow condition, a situation that appears to have existed for some time. This may be an indication of inadequate training in this procedure. The recorder charts are only used by LLNL to indicate total time of sampler operation. The current LLNL practice of assuming that the flow controller provides constant flow is indefensible. When calibrated and used properly, the recorder can provide a continuous and permanent record of the actual flow rate during the sampling period. The record can also indicate whether the constant flow controller functioned properly. Thus, the total air volume sampled would be known with demonstrably greater accuracy. In response to Environmental Subteam comments, LLNL has ordered a calibration device and will develop a calibration routine for the flow-rate recorders.

3. During observation of routine filter changes on samplers at the Main Site, no indication of the last date of calibration of the sampler air-flow rate was found. Also, blower motors were changed during servicing, but the samplers were not recalibrated.

SOP EMP-AP-S requires calibrations to be performed at 3-month intervals, but does not specify what calibration equipment or procedures are to be used. EPA quality assurance procedures (A-38) state that hi-vol samplers should be calibrated with an orifice calibration unit: (a) when installed, (b) after motor maintenance, (c) any time the flow-rate recorder or controller is repaired or replaced, and (d) any time the difference between the sampler flow rate and a one-point audit deviates more than ±7 percent. A draft SOP covering the sampler calibration was prepared by LLNL while the Environmental Subteam was on site (A-33).

4. An orifice calibration unit used in a demonstration to the Environmental Subteam was overdue for calibration against a primary standard. The last calibration sticker was dated January 9, 1988. EPA quality assurance procedures (A-38) state that the calibration unit should itself be calibrated annually. A requirement for periodic calibration of this device is not established. Technicians using this device did not identify that it was out of calibration. The manometer hoses were worn and cracked. Maintenance and operating procedures should establish requirements for an instrument check before it is used. The hoses were repaired when their condition was discussed by the Environmental Subteam. The unit was subsequently calibrated and used to check and calibrate the air flow rate on all hi-vol samplers at the Main Site and at Site 300. An SOP covering calibration of the hi-vol samplers (A-33) was drafted while the Environmental Subteam was on site. However, the SOP does not address inspection of the calibration equipment prior to use.

5. Some of the air samplers, Main Site perimeter and community, were located in areas obstructed by buildings, trees and other obstacles, which prevents them from getting a representative sample of the ambient air.

ASSESSMENT DISCIPLINE: AIR

ASSESSMENT FINDING NUMBER: A/CF-3

ASSESSMENT FINDING TITLE: REPORTING OF AIRBORNE BERYLLIUM CONCENTRATIONS IN ANNUAL ENVIRONMENTAL REPORT

PERFORMANCE OBJECTIVE: DOE 5400.1 requires that data resulting from environmental sampling programs be compared with applicable environmental standards. The Bay Area Air Quality Management District (BAAQMD) ambient concentration limit for beryllium is 0.01 ug/m^3 (1000×10^{-5} ug/m^3) averaged over a 30-day period (Regulation 11, Rule 3).

FINDING: The Environmental Report for 1988 makes inappropriate comparisons of beryllium concentrations in ambient air against the BAAQMD concentration limit. Table A-5 compares the yearly averages of monthly beryllium concentrations at the 6 perimeter sampling locations against the 30-day concentration limit, while Figure 16 compares the monthly 6-station average against the 30-day limit. The consequence of reporting in this manner is that there is a potential for an increased value to be obscured by averaging. It should be noted, however, that past concentrations of beryllium in ambient air have been well below the BAAQMD limit. DOE 5400.1 requires comparison with applicable environmental standards. There are no standards for yearly average or sitewide average. The appropriate comparison would be each individual sampling location 30-day maximum against the BAAQMD 30-day limit. The monthly reports to the BAAQMD meet this requirement.

ASSESSMENT DISCIPLINE: AIR

ASSESSMENT FINDING NUMBER: A/CF-4

ASSESSMENT FINDING TITLE: SOLVENT USE RECORDS AT SOLVENT CLEANING STATIONS

PERFORMANCE OBJECTIVE: The Bay Area Air Quality Management District requires in Regulation 8, Rule 16 that records be kept of solvent usage in solvent cleaning operations. Users of trichloroethylene (TCE) are required to keep records on a source-specific, daily basis showing the amount of make-up TCE used in any solvent cleaning operation. Use of solvents other than TCE must be recorded on a facility-wide, quarterly basis showing the type and total amount of makeup solvent used in all solvent cleaning operations subject to the Regulation. Such records are to be available for inspection for each year and retained for 2 years.

FINDING: Solvent use records are not kept in a uniform manner by all users of solvent cleaners. Consequently, the required data are not available for all locations. Although LLNL has made an effort to comply with this requirement through the preparation and distribution of a Solvent Log Form accompanied by explanatory material and an example, the users have not, in all instances, understood what information is required to be on the Form. This is especially true of users of Safety Kleen services. Safety Kleen is a vendor that provides cold cleaners, removes dirty solvent from the cleaners, and refills them with recycled solvent. It appears that user training has not been adequate.

ASSESSMENT DISCIPLINE: AIR

ASSESSMENT FINDING NUMBER: A/CF-5

ASSESSMENT FINDING TITLE: REPORT ON COOLING TOWERS

PERFORMANCE OBJECTIVE: On November 15, 1989, the Bay Area Air Quality Management District (BAAQMD) adopted Regulation 11, Rule 10, which relates to hexavalent chromium emissions from cooling towers. The Rule (11-10-501) requires that a written report be submitted to the BAAQMD by December 1, 1989, that provides the following information

1. The location of the cooling tower.
2. The owner/operator of the cooling tower.
3. Cooling tower type and materials of construction.
4. Whether hexavalent chromium-based treatment chemicals were or are used in the cooling tower.
5. If hexavalent chromium-based chemicals were previously used, when was their use discontinued.
6. A description of the alternate treatment program chosen, as well as the circulating water monitoring plan.

FINDING: The required report has not been prepared and submitted to the BAAQMD. Site personnel had not recognized the need for the report until the requirement was pointed out by the Environmental Subteam.

ASSESSMENT DISCIPLINE: AIR

ASSESSMENT FINDING NUMBER: A/CF-6

ASSESSMENT FINDING TITLE: GASOLINE DISPENSING FACILITIES AT Main Site AND SITE 300

PERFORMANCE OBJECTIVE: The EPA, in 40 CFR 80.22(d) and (e), requires that the following signs be posted at gasoline dispensing facilities:

1. In the immediate area of each pump stand, the sign shall state:

   Federal law prohibits the introduction of any gasoline containing lead or phosphorous into any motor vehicle labeled "UNLEADED GASOLINE ONLY."

   Such notice shall be no smaller than 36-point bold type and shall be located so as to be readily visible to the retailer's or wholesale purchaser-consumer's employees and persons operating vehicles into which gasoline is to be dispensed.

2. For gasoline pump stands containing pumps for introduction of unleaded gasoline into motor vehicles, the label shall state: **"Unleaded gasoline."**

3. For gasoline pump stands containing pumps for introduction of leaded gasoline into motor vehicles, the label shall state: **"Contains lead anti-knock compounds."** Any label required under this paragraph shall be located so as to be readily visible to the retailer's or wholesale purchaser-consumer's employees and persons operating motor vehicles into which gasoline is to be dispensed.

FINDING: At both the Main Site and Site 300, the pump stands did not have the sign required in paragraph (1) above. Although the gasoline pumps were labeled "REGULAR" AND "NON-LEADED," neither label met the EPA requirements. Site personnel were aware and concerned that they did not have correct signs and were seeking help in defining the proper terminology. The Environmental Subteam provided the information needed that enabled LLNL to obtain and post the required signs.

ASSESSMENT DISCIPLINE: AIR

ASSESSMENT FINDING NUMBER: A/CF-7

ASSESSMENT FINDING TITLE: BURNING AT SITE 300

PERFORMANCE OBJECTIVE: San Joaquin County Air Pollution Control District (SJCAPCD) Regulation IV, Rule 415 prohibits the burning of any refuse or other material in an open outdoor fire. Rule 417 prohibits burning in any incinerator unless it is a multiple-chamber incinerator. Rule 401 prohibits the discharge of emissions into the atmosphere if the visible emissions are as dark or darker in shade as No. 1 on the Ringelmann Chart. Rule 416.1 for Agricultural Burning prohibits burning of rubbish and any material that is not produced in any agricultural operation.

FINDING: Waste high-explosive (HE) materials, sludges contaminated with HE materials, and cardboard cartons, plastic bags, and other rubbish that is contaminated by HE materials are being burned at the Site 300 burn pit without a Permit-to-Operate from the SJCAPCD. Burning of these materials is practiced as "the only safe way to dispose of HE-contaminated materials" (I-A-55). A Permit for Agricultural Burning (A-35) has been issued to LLNL by the SJCAPCD (Permit No. 700052-01, expires December 31, 1990) to cover the annual controlled grass-burn activity that is practiced to prevent uncontrolled fires that might result from HE testing. LLNL has attempted to obtain a permit to burn HE wastes (I-A-55). However, it appears that SJCAPCD does not believe the activity needs to be permitted by their agency to proceed. Prior to conducting a burn (grass or HE wastes), LLNL telephones SJCAPCD to determine if a "Burn Day" is authorized (I-A-55). Quarterly reports of burn activities are submitted to SJCAPCD (A-36) that detail the materials and quantities burned during the quarter. During the Environmental Subteam visit, a steel-wire cage contained approximately 2 to 3 cubic yards of materials to be burned. Burning of this quantity of material, in its compacted form, has the potential to produce visible emissions in excess of the Ringelmann No. 1 shade.

3.5.2 Surface Water

3.5.2.1 Overview

The purpose of the surface water portion of the environmental assessment was to review all issues related to compliance with regulations promulgated in response to the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA). The review included assessments of compliance with the National Pollutant Discharge Elimination System (NPDES) requirements, various California Regional Water Quality Control Board (CRWQCB) orders, and local regulations imposed by the City of Livermore's Water Reclamation Plant (LWRP). Existing treatment systems were reviewed for their effectiveness in treating hazardous liquid wastes, groundwater remediation waters, and pretreating process wastewaters prior to release to the sanitary sewer-system. The effectiveness of the LLNL surface water monitoring sampling and analysis program was assessed, and procedures for notification of permit violations and spills were reviewed. The integrity of the sanitary sewage collection system and the ongoing program for remediation of possible infiltration/exfiltration from the system were investigated.

Drinking water issues at both the Main Site and Site 300 were investigated, including reviews of backflow prevention measures and cross-connection inspection records. The sampling and analysis of the potable water systems were reviewed to ensure that adequate protection was provided for all users throughout the Main Site and Site 300. Programs to comply with SDWA and CWA requirements at both sites are in a state of transition, but obvious improvements have been steadily made since the DOE Environmental Survey in December 1986. Permit applications have been completed for all required waste streams. Permits have been issued for all except the sanitary sewer effluent to the LWRP, which is in negotiation with the local authority. Categorical pre-treatment standards are the major factor holding up issuance of the permit. LLNL continues to conduct point-source monitoring, as required by letters requesting such self-assessments, while the LWRP management and EPA decide how the requirements will be incorporated into the new permit. The sanitary sewage collection system rehabilitation investigation has confirmed that root intrusion, breaks, holes and offset joints exist, especially in the older sections of the system. Over 9,000 feet of main lines and laterals have already been relined, and over 20,000 additional feet have been videotaped. The total length of the system is estimated at 96,850 feet. A Conceptual Design Report for continuing the rehabilitation has been developed to support an FY 92 funding request.

LLNL relies heavily on administrative and engineering controls such as waste minimization, dual retention tank systems, and segregation of potentially hazardous or radioactive waste liquids to minimize impacts to the LWRP or the environment. Despite these precautions, the Main Site also uses an on-line continuous monitoring and alarm system to track pH, radioactivity, and nine selected metals so that releases to the LWRP may be minimized. This program continues to evolve into a more fail-safe means of control. Construction has begun on a new sewage diversion system adjacent to the monitoring station into which effluents could be diverted prior to treatment or release if the monitoring system detects any of the measured pollutants outside prescribed limits. Satellite monitoring stations are also being located upstream of the main system to aid in isolating sources of problems.

The majority of the Surface Water findings are related to administrative regulatory requirements. They involve unpermitted releases to the environment either directly at both sites, or through leaks or breaks in the sanitary sewer system at the Main Site. Of the seven compliance or best management practice findings, two were immediately mitigated by LLNL staff, and the other five are either in the process of being corrected or options are being evaluated. Site personnel were aware of most of the problems related to the findings, and are actively pursuing efforts to remediate all findings.

3.5.2.2 Compliance Findings

ASSESSMENT DISCIPLINE: SURFACE WATER

ASSESSMENT FINDING NUMBER: SW/CF-1

ASSESSMENT FINDING TITLE: SANITARY SEWAGE COLLECTION SYSTEM

PERFORMANCE OBJECTIVE: The California Porter-Cologne Water Quality Control Act (CPCWQCA) (SW-21) is a State Act regulating liquid waste discharge by prohibiting discharge of any liquid to the environment which may have adverse effects. Sewage is specifically noted as such a liquid in the definition of "waste" at Section 13050(d), and exfiltration resulting in such discharge to the environment could be considered an unauthorized discharge. The Safe Drinking Water Act (SDWA) is a Federal Act designed to prohibit contamination of any supply of water that could potentially become a source of drinking water. The aquifers in the Livermore area have been designated as possible supply zones by State water management directives.

The CPCWQCA at Section 13260(a) requires that a report of all discharges "that could affect the quality of the waters of the state" be prepared and submitted to the appropriate Regional Water Quality Control Board (RWQCB). Section 13264(a) forbids any "new discharge of waste or any material changes in any discharge...prior to the filing of the report required by Section 13260."

FINDING: Although there was no evidence of significant infiltration or exfiltration, evidence does exist (SW-25) that the LLNL sanitary sewage collection system has defects. The major defect encountered was root intrusion, with some joint offsets and structural cracks and breaks also evident. During prolonged dry periods untreated wastewater may exfiltrate from the sewage collection system to the surrounding unsaturated soils, eventually reaching the groundwater. This may be considered a violation of CPCWQCA requirements. Also, the current City of Livermore Water Reclamation Plant Discharge Limits impose a maximum acceptable flow requirement of 1,170 gallons per minute (GPM) for effluent from the LLNL monitoring point. During the wet seasons as the ground becomes saturated with rainfall, infiltration of rainwater, when combined with the normal weekday wastewater discharges from the facility, could exceed the flow limit requirements of the local sewage treatment facility.

Despite LLNL's active sanitary sewer rehabilitation program, a number of sections of the sanitary sewers still need rehabilitation to minimize the potential for infiltration or exfiltration. A total of 9,140 feet of main lines and laterals have been relined, and videotaping of over 20,000 feet of other mains and laterals has been completed. The segments chosen for videotaping are those with suspected defects. The total length of the system is estimated to be 56,715 feet of mains plus 39,865 feet of laterals for a total of 96,850 feet. One-third of the total system has been inspected by videotaping, and less than 10 percent has been repaired (SW-25).

A Conceptual Design Report on the Sanitary Sewer Rehabilitation Project (SW-25), prepared to support an FY 92 funding request, provides recommendations for repair or replacement of 49,226 feet of lines, or 51 percent of the system to minimize the potential for infiltration or exfiltration. Since about 10 percent has already been repaired, the remaining 39 percent was identified as not being in need of repair. Specific locations on the sanitary sewer system that need replacement or refurbishment have been identified in the above report. In general, recommendations call for replacement of the damaged laterals and relining of damaged mains.

ASSESSMENT DISCIPLINE: SURFACE WATER

ASSESSMENT FINDING NUMBER: SW/CF-2

ASSESSMENT FINDING TITLE: SPCC PLAN

PERFORMANCE OBJECTIVE: Regulations promulgated in 40 CFR Part 112 establish 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 waters 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 Spill Prevention Control and Countermeasure Plans (SPCCs) at 40 CFR 112.3(a) set a due date of six months after the effective date (March 26, 1976) for preparation of the Plan, and a due date "not later than one year after the effective date" for full implementation of the SPCC Plan. Other provisions of 40 CFR Part 112 provide guidelines for preparation and implementation of an SPCC Plan.

FINDING: Although a number of individual spill prevention and response plans existed throughout the site describing building-specific contingency plans (usually included as sections of the Facility Safety Procedures (FSPs) for the locations affected), no overall sitewide SPCC Plan was identified during the assessment. A draft version (SW-29) was prepared in January 1990, but has not been signed by the Director of LLNL. The draft reviewed by the Environmental Subteam is also awaiting SAN approval prior to distribution to all LLNL locations where it might be needed.

The draft SPCC Plan (SW-29) reviewed during the assessment has several shortcomings which could be rectified prior to final approval. The following items are not to be considered compliance issues or deficiencies, but are suggested as best management practice issues for improving the final SPCC Plan:

- Table 1-1 lists deadlines for implementation requirements. The first four items on the list give dates that have already passed. A footnote or statement should be added to indicate which deadlines were not met.

- Paragraph 1.1 states that "The plan will have applicability to the Livermore Site and Site 300 of the LLNL." There are several disadvantages to combining the two sites:

  - The two sites are very diverse in terms of the mission, facilities, and physical environment.

  - Requirements of 40 CFR 112 often speak of "the facility." Combining both facilities in the same SPCC plan may not meet the requirements of 40 CFR 112.

- Implementation Responsibility Assignments in Table 2-1 would be clearer if separate listings for each site were provided.

- Specific tank lists, spill histories, and appendices should apply to only one facility or the other, not to the combined sites.

o Table 3-1, Petroleum Product Spill History, makes no distinction between the two sites. Supporting text discusses Main Site buildings and events only. Site 300 should either have a separate spill history, or a statement should be added to explain that no spills have been reported at Site 300, if that is the case.

o The text is often too general to be useful in the event of a spill or other emergency. For example, in Section 3.3.2, paragraph 2, the second sentence reads "Only one tank is located aboveground outside." It would have been much more useful to identify the tank or the associated building.

o Statements in the text often indicate needs or corrections that should be made, without linking them to proposed actions cited elsewhere in the plan. For example, Section 4.2 describes the need for improving secondary containment, but fails to relate the need to the action deadlines proposed in Table 1-1. In the case of secondary containment, all needs will be listed by April 1, 1990, and implemented by December 31, 1990. Also in the same section, cathodic protection upgrades are cited, but no corrective action is proposed. Table 1-1 provides for identification of problems by May 1, 1990, and correction by November 1, 1991. Section 6.3 further provides this information.

o The Facility Drainage descriptions at Section 5.0 state that neither site contains any navigable waterways. While this is true from the standpoint of a dictionary definition of "navigable," 40 CFR 112.2(k)(1) redefines the term "navigable waters" to include not only the obviously navigable streams, but also "tributaries of such waters." Since Arroyos Seco and Las Positas at the Main Site and Corral Hollow Creek at Site 300 are tributaries of navigable streams or their tributaries, they would be "navigable waters" under 40 CFR 112.2. Interpretation of this definition may have contributed to the delay in complying with the requirement to develop an SPCC Plan.

o Section 6.1 discusses Appendices A and B and indicates that the "unknown" information will be collected by February 1, 1990, and added to the plan. This remains to be done in an updated version.

o Table 7-1 has many "unknown" items to be resolved.

- Appendix A lists the capacity of all tanks and gives a total capacity of 149,975 gallons. A more useful total capacity would list the totals for Livermore Site and Site 300 separately, to illustrate the magnitude of oil storage at each site.

- Appendix B is a very generic breakdown of categories of tanks. No count of the number of fiberglass versus steel underground tanks is provided. The types of construction for aboveground tanks and transformer oil tanks are not provided either. The descriptions for drums, cans and bottles are more complete, but tank information, in general, needs to be more specific.

- Appendix C provides separate lists for the Main Site and Site 300. The note at Table C-2 is confusing. It states "Estimates rounded to nearest 50 gals"; however, the quantity of the gasoline in tanks is shown as 18,465 gallons, a number that is not a whole number divisible by 50.

ASSESSMENT DISCIPLINE: SURFACE WATER

ASSESSMENT FINDING NUMBER: SW/CF-3

ASSESSMENT FINDING TITLE: DISCHARGE OF FILTER BACKWASH FROM BLDG. 318

PERFORMANCE OBJECTIVE: California Regional Water Quality Control Board (CRWQCB), San Francisco Bay Region Order No. 88-103 (SW-28) states that "The discharge of wastes or hazardous materials through direct surface discharge or runoff or subsurface transport which will degrade the water quality and adversely affect the beneficial uses of the surface waters of the State is prohibited." California's Porter-Cologne Water Quality Act (SW-21) in Chapter 2, Section (3050(d)) defines "waste" to include "sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation of whatever nature, including such waste placed within containers of whatever nature prior to, and for the purpose of, disposal." These rules preclude discharging waste liquids to surface water pathways if any possibility exists that they could "degrade the water quality and adversely affect the beneficial uses of the surface waters of the State."

FINDING: Filter backwashes from the Bldg. 318 filtration system serving the LLNL swimming pool are released directly to the stormwater drainage system. Such releases routinely occur weekly during the warmer months and 1-2 times a month the rest of the year (SW-49). Typical volumes released range from 40,000 to 45,000 gallons each time. Flow rates for backwashing approach 1000 GPM, making it impractical to drain the backwash to the sanitary sewer because there is a Livermore Water Reclamation Plant-mandated maximum total discharge flow rate of 1170 GPM. The addition of 1000 GPM filter backwash water to the normal daytime flow would exceed this limitation for short periods of time. Discharge limits on dissolved solids and chlorides would also be exceeded at the beginning of each cycle.

Sampling and analysis of filter backwash was performed on two occasions in September and October of 1987 (SW-34). Depending on the time within the backwash cycle, chlorides ranged from 8 to 552 mg/l, suspended solids from 1 to 70 mg/l, dissolved solids from 69 to 1220 mg/l and chemical oxygen demand (COD) from 10 to 53 mg/l. The concentrations at the upper ends of the above ranges would be considered capable of degradation of surface or groundwaters. Secondary drinking water regulations published in 40 CFR 143.3 have established maximum contaminant levels for non-community, non-transient public water systems of 250 mg/l for chlorides and 500 mg/l for total dissolved solids. Samples from the stormwater drainage ditch conveying backwash flows from Bldg. 318 contained chlorides at 11.5 to 41.3 mg/l, suspended solids at <20 to 20 mg/l, dissolved solids at 40 to 216 mg/l, and COD from 5 to 70 mg/l.

ASSESSMENT DISCIPLINE: SURFACE WATER

ASSESSMENT FINDING NUMBER: SW/CF-4

ASSESSMENT FINDING TITLE: SURFACE WATER DISCHARGE AT SITE 300

PERFORMANCE OBJECTIVE: The California Regional Water Quality Control Board's Central Valley Region Order 85-188 (SW-4) states "The direct discharge of wastes other than cooling tower wastewaters to surface waters or surface water drainage courses is prohibited."

FINDING: Well-drilling activities observed by the Environmental Subteam on March 1, 1990, in the vicinity of the Site 300 pistol range and Pit #6 were being conducted in a manner that allowed drill cuttings to flow away from the drilling area and move downhill, eventually collecting in a shallow ditch along the edge of Corral Hollow Road. Since drill cuttings are considered waste materials, and the path to the ditch along Corral Hollow Road constitutes a surface water drainage course, Order 85-188 was being violated. The Site 300 Environmental Restoration Leader contacted the drilling contractor to have the problem corrected. Drilling fluids (SW-9) were contained within an impervious bermed area and drummed for proper disposal. The entrance to the open ditch was fitted with a temporary dike to prevent accidental spills from flowing downhill. Subsequent visits to the site confirmed that corrective measures were effective.

ASSESSMENT DISCIPLINE: SURFACE WATER

ASSESSMENT FINDING NUMBER: SW/CF-5

ASSESSMENT FINDING TITLE: SITE 300 SEWAGE TREATMENT POND

PERFORMANCE OBJECTIVE: California Regional Water Quality Control Board, Central Valley Region Order No. 85-188 (SW-4) states that "The by-pass or overflow of untreated or partially treated waste is prohibited." The Order further states that "The direct discharge of wastes other than cooling tower wastewater to surface waters or surface water drainage sources is prohibited." No other discharges to the ground or to surface water drainage pathways are permitted under Order No. 85-188.

FINDING: During the Site 300 assessment, partially treated wastewaters were observed flowing discontinuously through a discharge pipe to the roadway between the primary aeration pond and the evaporation/ percolation pond. This discharge resulted in a shallow pool of wastewater on the roadway adjacent to a newly installed monitoring well that was undergoing testing at the time. After the Plant Engineering Department (I-SW-5) was notified, the discharge pipe was plugged to prevent further releases from this source.

3.5.2.3 Best Management Practice Findings

ASSESSMENT DISCIPLINE: SURFACE WATER

ASSESSMENT FINDING NUMBER: SW/BMP-1

ASSESSMENT FINDING TITLE: ANALYTICAL LAG TIMES - RETENTION TANKS

PERFORMANCE OBJECTIVE: LLNL Guidelines for Discharge to the Sanitary-Sewer System (SW-27) state that "No discharge may be made from any retention tank to the sanitary-sewer system until the contents of the tank have been sampled and analyzed to determine if they are sewerable." The guidelines also state that "Retention-tank contents can only be discharged to the sanitary-sewer system after discharge has been properly authorized." This latter step cannot take place until tank contents have been sampled by the Health and Safety (H&S) Technician, the Hazardous Waste Management Field Technician, or by a program representative designated to do the sampling; analyses have been conducted and completed by the analytical laboratories, results forwarded to the Environmental Technician in the Guidance and Monitoring Division for review, and a decision regarding appropriate disposal; and, finally, notification back to the originating H&S Technicians. The process must proceed at a pace that allows for release of approved wastewaters in time to provide sufficient volume for accumulating the next batch of wastewaters in the retention tank system.

FINDING: The long analytical lag time, particularly for low-level radiation measurements, has forced certain program operations in the recent past to reduce their activities until retention-tank holding capacities became available again. In addition, the low-level radiological laboratory has recently begun requiring radiological screening of all samples prior to transfer to the analytical lab to minimize the risk of introducing high level radiation, thus providing an additional source of delays. There has been no evidence of any releases to the sanitary sewer system that do not comply with all guidelines for discharge. However, the potential exists for continuing to fill a tank after sampling has been performed, rendering previous analytical results invalid.

Operations which have reported lengthy analytical lag times include, but are not limited to

- Bldg. 151 - Long radioactivity counts at low activity levels (I-SW-26).
- Bldg. 322 - Screening for radioactivity slows down the analytical process; screening is required even when the generator can certify that no radioactive parts have been worked on for months (I-SW-56).
- Bldg. 514 - Dorr-Oliver filtration operations have been put on hold at times awaiting analytical results for retention tank contents (I-SW-51).

- Bldg. 879 (Site 300 Garage) - Steam cleaning and vehicle wash-down operations have been curtailed at times due to 4- to 6-week analytical turn-around times (I-SW-8).

In all cases, the need for protection of the environment should be the determining factor in decisions relating to retention tanks. No releases should occur until discharges are analyzed to confirm that all contents are sewerable, and that discharge has been properly authorized. Any other practice, such as continuing to fill tanks after samples have been withdrawn, or any releases without appropriate analysis and authorization, could have severe environmental impact at the Livermore Water Reclamation Plant.

In recent months, analytical laboratory management has taken steps to improve response times for environmental samples. There have been additions to analytical staff, to instrumentation and sample preparation apparatus, and to laboratory space availability. Weekly sample backlogs are now being reduced, indicating steady improvement in laboratory turn-around times (I-SW-32).

ASSESSMENT DISCIPLINE: SURFACE WATER

ASSESSMENT FINDING NUMBER: SW/BMP-2

ASSESSMENT FINDING TITLE: SITE 300 POTABLE WATER SYSTEM

PERFORMANCE OBJECTIVE: Although well water at Site 300 is potable, Site 300 routinely provides chlorinated water for potable use in all parts of the water distribution system (I-SW-5). Sampling and analysis are conducted weekly at most locations and bimonthly at a few others to confirm that there is a free chlorine residual of at least 0.2 mg/l at all times (I-SW-7).

FINDING: Unchlorinated water from Well #1 could potentially enter the chlorinated potable water distribution system. Currently Well #1 is on standby, and would only be used in case of fire emergencies or during disruption of service from Wells #20 and #18. Chlorination is provided at the wellheads for the latter two wells, and is also added whenever water is released from storage tanks prior to distribution. However, Well #1 cannot be chlorinated at the source. Distribution tanks in the Well #1 area currently hold over 300,000 gallons of chlorinated water pumped up from Wells #20 and #18 and the storage tanks which do provide chlorination. In the event of a fire or service disruption which could drain down the 300,000 gallons of water in reserve, Well #1 would be activated, thereby introducing unchlorinated potable water into the chlorinated potable water distribution system. Appropriate actions would have to be taken at that time to ensure that drinking water quality would not be disrupted (I-SW-84).

3.5.3 Groundwater/Soil

3.5.3.1 Overview

The groundwater/soil portion of the Environmental Subteam Assessment at LLNL involved an evaluation of the groundwater monitoring program and current groundwater and soil remediation activities at both the Main Site and Site 300. The assessment included tours of active and inactive waste disposal sites, observation of well sampling, visits to groundwater treatment facilities, review of site documents, and interviews with LLNL, SAN, and regulatory personnel. Compliance with groundwater requirements was evaluated on the basis of the following Orders, regulations, and guidelines:

- o DOE 5400.1 - General Environmental Protection Program
- o Title 40 CFR Part 265, Subpart F - Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities - Groundwater Monitoring
- o California Code of Regulations, Title 22 Division 4, Chapter 30 - Minimum Standards for Management of Hazardous and Extremely Hazardous Wastes
- o California Code of Regulations, Title 23, Chapter 3, Subchapter 15 - Discharges of Waste to Land
- o OSWER Directive 9950.1 - RCRA Groundwater Monitoring Technical Enforcement Guidance Document (TEGD)
- o OSWER Directive 9950.2 - RCRA Comprehensive Groundwater Monitoring Evaluation Document

Groundwater-related activities at LLNL consist of three programs. The first is an environmental monitoring program conducted according to the requirements of DOE 5400.1 by the Environmental Quality Verification Group of the Environmental Protection Department. Quarterly reporting of routine groundwater monitoring for interim status facilities under State and Federal law is also performed by this group. The second program is the Livermore Site Restoration Program, which is conducted under the Federal Facility Agreement (FFA) under CERCLA Section 120 (GW-2) signed in November 1988. The FFA involves SAN, the EPA, the California Department of Health Services, and the California Regional Water Quality Control Board, San Francisco Bay Region. The third program is the Site 300 Restoration Program, performed under orders from the California Regional Water Quality Control Board, Central Valley Region (CRWQCB-CV). Both a draft RCRA 3008(h) Corrective Action Order (GW-1) from the EPA and a Draft Cleanup and Abatement Order (GW-19) from the CRWQCB-CV are pending for Site 300. Both the Livermore Site and the Site 300 Restoration Programs are conducted by the Environmental Restoration Division of the Environmental Protection Department. In addition, soil cleanups that

must be performed in the case of leaks from underground tank systems are performed by the Remediation Design and Operations Group within the Environmental Restoration Division.

At the Livermore Site, groundwater occurs at depths of 25 to 140 feet in valley fill deposits. This water-bearing zone is an important water source for municipal and agricultural use, as well as other uses in the area (GW-20). Groundwater contamination by volatile organic compounds (VOCs) is present both on site and offsite. Minor tritium contamination is also present in groundwater on site. The threat of contamination to municipal water supply wells within 3 miles of the offsite VOC plume was the basis for placement of the Main Site on the Superfund National Priorities List. VOC levels offsite reach 100 ppb, while those on site reach the 1-10 ppm range (GW-47). A pilot groundwater cleanup project is in operation for the VOC plume, using extraction wells, a UV/hydrogen peroxide water treatment system, and air stripping of the system effluent.

At Site 300, groundwater occurs in pores and fractures in permeable bedrock. Groundwater flow direction generally follows the dip of the beds. Folds, faults and other geologic structures exert a local influence on groundwater movement. In addition to water-bearing zones in bedrock, groundwater is present in alluvial deposits in the Corral Hollow area on the southern boundary of the site. The water supply for Site 300 is drawn from a deep, confined aquifer; shallow water-bearing zones are not used as water sources. Localized perched water-bearing zones are present in several parts of the site (GW-20).

Groundwater is contaminated by both VOCs and tritium at Site 300. Tritium is the major contaminant in some onsite areas. This contamination is a result of the former use of tritium in high explosives (HE) testing, and the subsequent disposal in landfills on site of contaminated gravel from the HE firing tables. VOC contamination is present in the General Services Area near the southeastern boundary of Site 300. This contamination has moved offsite a few hundred feet at levels up to 35 ppb (GW-45). Pump tests conducted in 1989 suggest that some hydraulic communication exists between shallow VOC-containing water bearing zones and deeper uncontaminated aquifers tapped by offsite water supply wells (GW-53). This area has the highest priority for investigation and remediation at Site 300 because of offsite migration. However, groundwater treatment has not begun, in part because the USEPA, the CRWQCB-CV, and LLNL have not agreed on the manner of discharge for treated groundwater and appropriate permits have yet to be obtained (GW-25, GW-26).

High levels of VOC contamination (up to 270 ppm) are also present in groundwater in a localized perched water-bearing zone beneath the Bldg. 834 complex. Because this water-bearing zone is constrained to the top of a small hill, there is virtually no chance of VOC contaminants moving offsite from Bldg. 834. Trichloroethene (TCE) is used as a heat-exchange medium at this facility, and TCE spills and releases have occurred. A pilot treatment system for vapor extraction from contaminated soil and groundwater has been tested at Bldg. 834 but is not in current operation. TCE emissions must be reduced to essentially undetectable levels with activated carbon for the unit to be permitted.

In general, areas of groundwater contamination at both the Main Site and Site 300 have been well characterized. Many areas that were under initial investigation at the time of the 1986 Environmental Survey have now been studied to the extent necessary for planning of remediation work. Pilot remediation activities are in progress, adequate monitoring systems are in place, and work is conducted in apparent compliance with existing regulations and orders.

The groundwater/soil assessment identified two best management practice findings. They concern the lack of Standard Operating Procedures for disposal of purged groundwater, drill cuttings, core samples and drilling muds; and incomplete closures of water wells at Site 300. There were no compliance findings or Noteworthy Practices identified.

3.5.3.2 Compliance Findings

None

3.5.3.3 Best Management Practice Findings

ASSESSMENT DISCIPLINE: GROUNDWATER

ASSESSMENT FINDING NUMBER: GW/BMP-1

ASSESSMENT FINDING TITLE: STANDARD OPERATING PROCEDURES ON DISPOSAL OF INVESTIGATION-DERIVED WASTES AND PURGED GROUNDWATER

PERFORMANCE OBJECTIVE: Documentation of procedures used for disposal of purged groundwater, drill cuttings, core samples, and drilling mud is necessary in order to demonstrate compliance with State and Federal hazardous waste requirements. Such requirements include 40 CFR Part 261 and California Administrative Code, Title 22, Articles 9 and 11. In addition, written procedures are essential for ensuring consistent performance and for transmitting information to new employees and contractors.

FINDING: No Standard Operating Procedures (SOPs) concerning the disposal of purged groundwater, drill cuttings, core samples, and drilling muds existed at the onset of the Tiger Team Assessment (GW-7). Draft versions of SOP 4.9 (Site 300), SOP 1.10 (Site 300), and SOP 1.10 (LLNL) (GW-17, 18, and 48) on these subjects were prepared, and then later revised, and renumbered (GW-49) during March 1990 as part of Revision 1.4 of the Environmental Restoration Program SOPs.

These draft SOPs are based on the CERCLA Compliance with Other Laws Manual: Draft Guidance (U.S. EPA, August 1988; EPA 540 G-89006, p. 1-9). CERCLA guidance is relevant because remedial investigation activities at the Livermore Site are being conducted under CERCLA requirements, as incorporated into the Federal Facility Agreement (GW-2). Similar activities at Site 300 are being conducted under authority of the California Regional Water Quality Control Board, Central Valley Region (CRWQCB-CV), although a draft order (GW-1) under Section 3008(h) of the Resource Conservation and Recovery Act, as amended (RCRA), is pending.

The LLNL Program Compliance Log raised the issue of drilling muds, drill cuttings, and purge water as possible hazardous wastes under State regulations. The draft SOPs demonstrate that procedures for handling these materials are in apparent compliance with State regulations. The existence of these written procedures provides the opportunity to inform EPA Region IX of disposal practices and to seek EPA's confirmation, preferably in writing, that these practices are in compliance with Federal regulations.

ASSESSMENT DISCIPLINE: GROUNDWATER

ASSESSMENT FINDING NUMBER: GW/BMP-2

ASSESSMENT FINDING TITLE: CLOSURES OF WELLS AND BOREHOLES AT SITE 300

PERFORMANCE OBJECTIVE: Environmental Restoration Division Standard Operating Procedure SOP 1.7 describes best management practice concerning well closures. This SOP states that well abandonment decisions are based on the present or future potential of a well to act as a conduit for vertical migration of hazardous materials. Wells to be considered for closure include those with sand packs or well screens that extend between polluted and non-polluted water-bearing zones, or those with unknown or undocumented well construction details. In addition, SOP 1.3 states that boreholes to be abandoned should be sealed by grouting from the bottom of the hole or well to ground surface (GW-7).

These SOPs correspond to recently enacted (effective January 1, 1990) provisions of the California Health and Safety Code, Section 24400 (GW-43), which state that "every person...who knowingly permits the existence...of any permanently inactive well...which constitutes a known or probable preferential pathway...for vertical movement of pollutants, contaminants, or poor quality water below ground, and that movement poses a threat to the quality of the waters of the state, shall be guilty of a misdemeanor...A 'permanently inactive well' is a well which has not been used for a period of one year, unless the person...demonstrates an intent for future use...Permanently inactive wells shall be destroyed in accordance with standards developed by the Department of Water Resources..." Both the SOPs and the new regulations emphasize that closure requirements pertain to wells that are known or probable conduits for contamination. No actual closure requirement exists for wells or boreholes that are not a potential threat.

FINDING: Water supply wells at Site 300 that may act as vertical conduits for migration of hazardous materials have not yet been closed according to the provisions of Environmental Restoration Division SOP 1.3 and SOP 1.7; inactive wells and boreholes that are located outside areas of known contamination have not been investigated to determine if closure is prudent.

Three water supply wells (W-1, W-4, and W-19) are scheduled for closure by the end of June 1990. Two of these wells (W-1 and W-4) have not been pumped for a year; all three wells are potential conduits for contamination. One (W-1) is on standby as an emergency water source for fire fighting and must be replaced by an equivalent water source for this purpose before it can be closed. However, this well (W-1) has shown tritium levels above background and is in an area under investigation for tritium contamination. Wells 4 and 19, although they have not shown clear evidence of contamination, are open through several permeable zones and are in areas of groundwater pollution by volatile organic compounds. Pumps have been removed from these two wells (I-GW-38).

Nine additional wells or boreholes appear on various maps, and are described by driller's logs or geologic logs. All are clearly inactive; some never produced water or were never cased (GW-46). An attempt was made to locate these wells in the field in early 1988; however, the results of this search were not documented (I-GW-57). In some cases, only concrete pads were present; at other locations, there was no visible evidence of the existence of a well. No record of an abandonment date is available, and the boreholes may have been left open or allowed to collapse. These wells or boreholes are outside areas of known groundwater contamination, but locations and borehole conditions should be investigated to ensure compliance with State regulations.

An additional well (W-7) that had been closed in late 1988 contained standing water at the onset of the Tiger Team Assessment and was not properly covered. Despite the fact that this well had been grouted to the surface, the cement-bentonite grout had apparently subsided 4 feet. Well piping with deteriorated insulation had apparently been allowed to lie in the open at the well site for over a year. The insulation on the piping has since been sampled to determine proper disposal, and the well has been topped off with cement and covered. No other closed wells had indications of insufficient attention to closure details.

3.5.4 Waste Management

3.5.4.1 Overview

The waste management assessment involved the evaluation of waste generation and management activities for conformance with applicable State and Federal regulations, and DOE Orders. Major statutes and regulations that conformance was evaluated against include the Resource Recovery and Conservation Act (RCRA) and the Hazardous Waste Amendments (HSWA), EPA Hazardous Waste Regulations and Guidance, California Hazardous Waste Regulation covering hazardous wastes and solid wastes, The California Hazardous Waste Control Act, The California Underground Storage Act, The California Underground Tank Rules, and DOE 5400.1, DOE 5400.3, and DOE 5820.2A. The approach used in the assessment included (1) inspection of waste generating operations and waste management facilities; (2) interviews with waste generators, particularly those personnel responsible for short-term storage areas, and personnel of the Environmental Protection Department; (3) a review of relevant waste management documentation, including training files, manifests, inspection files, permits and permit applications, procedures, standards and plans; and (4) comparison of onsite observations with SAN and contractor reports and procedures.

Summary of Findings

Compliance findings at LLNL were related to non-conformance with regulatory standards for satellite and ninety day accumulation areas, land disposal restricted (LDR) waste storage prohibitions; insufficient training of hazardous waste generators and handlers, inadequate waste characterization, deficiencies in hazardous waste inspection forms and their use, and inadequate secondary containment or monitoring of underground storage tanks (USTs).

Best management practice (BMP) findings concern failure of LLNL to implement waste minimization programs or plans in full accordance with EPA and DOE guidance, the lack of laboratory closeout procedures with the resultant potential that chemicals and waste could accumulate in laboratories; inadequate management of infectious wastes, and lack of distinct labels for hazardous, radioactive, and mixed waste containers.

Hazardous Waste Management of LLNL

Although it has lost primacy for RCRA, the State of California does have its own hazardous waste program. Therefore, LLNL must comply with both California and USEPA hazardous waste regulations including non-HSWA requirements as promulgated by USEPA. LLNL has submitted several Part A permit notifications to EPA, filed an interim status document with the State, and submitted a RCRA Part B permit application to the USEPA and California for storage, treatment and incineration facilities at the Main Site. The RCRA Part B permit application was proposed to be denied for all facilities other than Bldg. 693 and continued storage of already solidified mixed units in the 612 yard, and wastes hazardous only by California definition by USEPA in 1989. It was subsequently revised by LLNL in December 1989, and resubmitted. The resubmittal did not include provisions for a hazardous/mixed waste incinerator. If the denial becomes final, interim status would terminate for all units including the Bldg. 612 and Bldg. 514 complexes. These facilities would have to be closed with RCRA wastes removed, and the areas

decontaminated. Wastewaters containing hazardous constituents and treated at Bldg. 514 would not have any onsite treatment option. LLNL would have only storage capacity at Bldg. 693, but this capacity would not be available until Bldg. 693 is permitted by both USEPA and the State of California. The impacts of the denial include curtailment of hazardous waste generating research activities.

The new hazardous waste storage building (Bldg. 693) at the Main Site is a state-of-the-art facility and has been ready for use for 2 years. However, while USEPA has informally agreed that Bldg. 693 meets requirements and is ready for use, the California Department of Health Services (DOHS) has not yet granted LLNL permission to use the facility. DOHS has raised issues as to whether Bldg. 693 results in an increase in storage capacity at LLNL, and has also made permission to utilize the facility contingent upon settlement of other hazardous waste issues including approval of a closure plan for the Bldg. 612 storage area which would be replaced by Bldg. 693. In the interim, hazardous wastes continue to be stored outdoors at the Bldg. 612 Storage Area, on an asphalt surface, and exposed to the elements under conditions clearly inferior to those at Bldg. 693. DOHS has regulatory discretion to decouple utilization of Bldg. 693 from other hazardous waste issues by allowing the facility to operate under interim status, contingent upon closure of the Bldg. 612 hazardous waste storage yard.

Hazardous waste is generated at Site 300 as a result of high explosives (HE) manufacturing, materials testing, and associated maintenance activities. Hazardous wastes generated at Site 300 are stored until offsite disposal is arranged, with the exception of HE hazardous waste which is thermally treated on site in burn pits. The two most recently active landfills at Site 300 are undergoing closure and mixed wastes are no longer disposed of on site. These hazardous waste activities are set forth in the most recent RCRA Part A permit application for waste generated at Site 300. Wastes that are not RCRA-regulated include oils, small capacitors containing PCBs, asbestos, and low-level radioactive gravels although PCBs, asbestos and oils are California hazardous wastes. Prior to 1987, lead bricks were used at the firing tables and HE detonations resulted in a gravel waste that was mixed producing RCRA-regulated mixed waste. These gravels were placed in Landfills 1 and 7 (on site); these landfills are presently undergoing closure. Landfills 2, 3, 4, and 5 were previously closed. The majority of the gravel waste is now classified as a radioactive waste and will be shipped offsite to the Nevada Test Site (NTS).

LLNL has submitted its Part A permit and Part B permit application for Site 300 and received its Final RCRA Hazardous Waste Storage Facility permit from both the Environmental Protection Agency and the Department of Health Services in September 1989 for container storage. The operations permit incorporates provisions from Section 3004(u) of RCRA (Section 206 of the Hazardous and Solid Waste Amendments of 1984) which requires corrective action for all releases of hazardous waste or constituents from any of 179 solid waste management units (SWMU). The permit requires the site to conduct a RCRA Facility Investigation (RFI) for 30 SWMUs and prepare a description of the current conditions of 149 (other) SWMUs.

LLNL, as a research facility, generates a wide variety of hazardous wastes, many in relatively small quantities, at a wide variety of locations.

Initially wastes are usually collected in containers in satellite accumulation areas, and are then transferred to 90-day waste accumulation areas prior to shipment to Bldg. 612. Once the waste containers are taken to the Bldg. 612 Hazardous Waste Management Facility, the hazardous wastes are processed for offsite shipment. Plans have been made to close the currently used interim status hazardous waste storage yard at Bldg. 612 once permission is obtained to utilize the Bldg. 693 storage. LLNL is providing excellent written guidance to generators on utilization of waste accumulation areas for hazardous waste. However, the implementation of this guidance is not always effective as evidenced by the findings concerning deficiencies in waste characterization, hazardous waste labeling and handling, and hazardous waste generator training.

Federal land disposal restrictions for hazardous wastes are not currently a regulatory concern at LLNL. Offsite treatment and/or destruction options are available for all hazardous wastes currently subject to the land ban. In May 1990 USEPA will promulgate land disposal restrictions for all remaining hazardous wastes. It is anticipated that where treatment capacity is lacking for hazardous wastes, USEPA will grant national capacity variances. Thus LLNL should have commercial treatment capacity available for all hazardous wastes subject to the land ban.

California has enacted its own land disposal restriction (LDRs) program for hazardous wastes. The California LDRs are effective only for wastes which are not covered by EPA LDRs. This includes wastes which are hazardous according to California definition, but not by USEPA. These include non-RCRA solvents, sludges with metals, asbestos containing wastes, aqueous waste with organics, infectious waste, PCB wastes and paint wastes among others. Treatment standards for these wastes are being developed and will be effective as promulgated after June 1990. The effect on LLNL cannot be determined at this time since the standards have not been promulgated and the applicability of California regulations to wastes containing radionuclides is uncertain.

Radioactive and Mixed Waste Management at LLNL

LLNL generates a variety of radioactive wastes (low level, TRU and mixed wastes). Containerized radioactive and mixed wastes are handled in satellite accumulation areas and 90-day areas along with hazardous wastes. The major receiving point for most containerized radioactive wastes is the Bldg. 612 Hazardous Waste Management Facility. This facility receives, processes, repackages, stores and ships radioactive wastes. Low level radioactive and TRU wastes are shipped to NTS. Most mixed wastes are not shipped offsite since there are currently few available treatment/disposal options available to LLNL on site or offsite. Some mixed classified waste is sent to Idaho National Engineering Laboratory (INEL). This results in the long-term storage of mixed wastes on site.

Some of the mixed wastes are currently subject to the land disposal restrictions (solvents, California List Wastes, dioxins) and, thus, also to the storage prohibitions for LDR wastes. Storage is allowed only for the purposes of accumulating such quantities as necessary to facilitate proper recovery, treatment or disposal. In the future all mixed wastes will become subject to LDRs. California also has its own land disposal restriction requirements, which include a variety of waste streams which, while not

hazardous according to USEPA criteria, are hazardous under California criteria. These California LDR wastes include non-RCRA solvents, sludges with metals, and aqueous and solid wastes with organics. These wastes, including mixed wastes, may become subject to California LDRs over the next 2 years, although the applicability of California regulations to radioactive wastes is not clear. Thus, appropriate treatment capacity may have to be made available for increasing varieties and quantities of mixed wastes. Storage of mixed waste subject to LDR is not an issue limited to LLNL, but is a DOE-wide problem.

Liquid wastes containing radioactive and/or hazardous waste constituents are collected in retention tanks, Tuff tanks, and drums and taken to the Bldg. 514 Wastewater Treatment Facility for treatment. After a treatment involving precipitation, coagulation, and filtration, the liquids are discharged to the sanitary sewer system if they meet sewer discharge limits for radioactive and hazardous constituents. Dorr-Oliver filtration solids are drummed and taken to the Bldg. 612 hazardous waste storage facility for storage. These Dorr-Oliver solids are mixed wastes, and are being stored indefinitely due to lack of treatment and/or disposal capacity.

Bldg. 419 was used as a size reduction and decontamination facility for radioactively contaminated equipment. Solidification of radioactive (low-level and TRU) wastes in paint cans also took place. A seismic evaluation, conducted for all hazardous waste facilities at LLNL at the request of DOHS demonstrated that the Bldg. 419 facility did not meet seismic standards. As a result the facility was shutdown in 1989. Equipment that would have previously been decontaminated and reused now must be treated as radioactive waste. Evaluations are currently being conducted as to whether this facility should be upgraded or the decontamination and size reduction facilities moved elsewhere. Presently, all solidification of radioactive wastes has been suspended pending evaluations of new solidification agents.

LLNL currently has an inventory of 160 30-gallon drums of depleted uranium (D-38) shavings accumulating since 1985. These shavings are stored under a mixture of trimsol and water to prevent them from spontaneously igniting. Although they possess the hazardous characteristic of ignitability, they are considered exempt under the Atomic Energy Act exclusion based on the premise that the hazardous characteristic is due to the radioactive components. According to site personnel, current FSPs allow the storage of D-38 up to a limit of 8.0 Curies, while the current D-38 inventory has a total Curie content of 7.871 Curies. The site has initiated a sampling and analysis program to characterize the wastes, and determine a method of treatment. LLNL utilizes NTS for interim storage of TRU wastes and disposal of low level wastes. NTS is not authorized to receive mixed wastes from LLNL. Currently LLNL is shipping radioactive wastes to NTS subject to the criteria in NVO-185. However, after April 1990, LLNL must meet the criteria in NVO-325. The laboratory is preparing an application to NTS, based on NVO-325, to allow continued shipment of radioactive wastes to NTS. LLNL made a shipment of TRU wastes to NTS which was rejected and is being returned to LLNL and other shipments are being held up. The rejection was based on the inability of LLNL to certify that mixed waste kimwipes were not present in the shipment. If the certification issue is not settled and shipments resumed, the Bldg. 612 storage limits of 1000 grams of radionuclides establish by the FSP may be reached. This could result in a need to curtail TRU waste generating

activities. The certification issue regarding mixed wastes will also apply to shipments of low-level waste to NTS.

Non-Radioactive/Non-Hazardous Waste Management at LLNL

Solid wastes (non-hazardous and non-radioactive) are regulated by State of California solid waste management regulations. Included are all wastes without hazardous, radioactive or PCB constituents or asbestos. Infectious/medical wastes are also regulated by California. LLNL does not have any onsite solid waste disposal facilities. Solid wastes are collected in dumpsters and other similar containers and taken to offsite landfills for disposal. Infectious wastes from the Biomedical Sciences Division are sterilized prior to disposal, while those from Medical Services are not sterilized, but are sent to an offsite, authorized medical waste incinerator.

Classified Waste Management at LLNL

Wastes can be classified due to constituent concentrations and/or the shape, and/or presence of constituents. Classified wastes generated by LLNL include radioactive, mixed, hazardous and solid wastes. Classified parts may be declassified by altering shapes and/or composition and can then be handled in the normal waste streams. Certain classified waste streams are sent to NTS while others are sent to the Idaho National Engineering Laboratory (INEL) for incineration.

Waste Management Training

LLNL has implemented a waste generator training program. Training for generators is available in several areas including hazardous waste handling practices, TRU waste certification, TRU waste data collection, and waste documentation. Additional training being developed includes courses in waste accumulation areas, waste sampling, wastewater discharges, and laboratory closeout procedures. The primary initial training efforts have been directed toward hazardous waste generators. However, a program to fully identify all generators who require training and ensuring that they are trained in a timely manner has not been implemented. Training programs for generators on waste minimization techniques are not currently available. The training program for hazardous waste handlers needs to be further developed. For example, specialized training is currently not being provided to program personnel responsible for waste accumulation areas despite their greater level of responsibility to ensure proper labeling, storage, and handling of wastes. On-the-job training of Hazardous Waste Management personnel is based on the discretion of supervisors. On-the-job training is not based on a formal job-needs analysis and proceeds without formally established guidelines and evaluation criteria.

Waste Minimization

LLNL has developed an overall Waste Minimization Program Plan and created two full-time positions for waste minimization in the Environmental Protection Department. The Program Plan was developed by the Waste Minimization Steering Committee, a group that had representatives from each of the Directorates. One element of the program is that each directorate was charged with developing a waste minimization "mini" plan based on the formal LLNL Program

Plan. However, the quality of the mini programmatic plans varies widely. Also the Program Plan, as developed, does not include all the elements of effective waste minimization plans as spelled out in EPA and DOE Guidance. One major element of the LLNL Program Plan, providing waste minimization incentives by means of a charge-back plan, is not being implemented as a result of changes in the way DOE is funding hazardous waste management. Alternative systems that would have the same effect, i.e., to serve as an incentive to generators to reduce costs by reducing the amount of waste generated, have not been developed. The generator chargeback system that was developed would not have allocated the full costs of waste management to generators.

3.5.4.2 Compliance Findings

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/CF-1

ASSESSMENT FINDING TITLE: OPERATIONS AND QUALITY ASSURANCE PROGRAM OF THE HAZARDOUS WASTE MANAGEMENT DIVISION

PERFORMANCE OBJECTIVE: DOE 5400.3 states it is the policy of DOE to manage all departmental hazardous waste according to the requirements of RCRA Subtitle C, which covers waste characterization, manifest and tracking, labeling, and all other aspects of hazardous waste handling.

DOE 5820.2A, Chapter III, Section 3.1, requires quality assurance for low-level waste operational and disposal practices that is conducted consistent with DOE 5700.6B and in accordance with applicable requirements of ANSI/ASME NQA-1 and other appropriate national consensus standards.

FINDING: Hazardous waste management operations and quality assurance activities conducted by the Hazardous Waste Management Division (HWMD) of the Environmental Protection Department are not consistently performed in accordance with the requirements of DOE Orders and commonly accepted best industry practices (R-18, R-20, R-21, R-23, R-49, R-50). These deficiencies are primarily in the areas of quality control, performance indicators, and performance tracking. Correction of these deficiencies would allow HWMD to demonstrate that its activities are being conducted in a manner that ensures compliance with its procedures, DOE Orders, and regulatory requirements.

The following specific deficiencies have been observed by the Environmental Subteam:

1. HWMD utilizes checklists to review waste containers in order to verify compliance with Nevada Test Site (NTS) Waste Acceptance Criteria (WAC). The required use, method of implementation, tracking, storage, and documentation associated with these forms is not documented in a procedure. Quality assurance audits of these activities are required by HWMD QA Plan; however, the plan does not include periodic surveillance or other quality control methods to ensure that the checklists are used in a manner that ensures compliance with NTS WAC and WIPP WAC.

2. HWMD employs controls that ensure Hazardous Waste Requisitions are reviewed for adequacy, completeness, and qualitatively observable deficiencies. A checklist is used to identify and record deficiencies. This checklist is then returned to the generator along with the requisition for correction. There is no procedure or other formal document that describes use of this checklist and delineates tracking, trending and reporting, which are requirements associated with these checklists. This information is not being used as a performance indicator or

quality control check of the generator. This information is not used to identify program, procedural or training weaknesses or to identify chronic individual, group, division, program or department offenders.

3. HWMD employs controls that ensure hazardous waste packages are reviewed for adequacy or observable deficiencies. A waste pickup rejection form is used to identify and record deficiencies during the waste run pre-check on the day before the pickup. The form is attached to the waste container if it is rejected, the technician notes the problem on the pickup run list, and the container is not picked up during the following day's pickup run. The generator is responsible for correcting the deficiencies and the container will be re-inspected for pickup on the following week's run. HWMD stated that they also inspect the containers the day of the pickup and when they are brought into the Bldg. 612 storage yard; however, the rejection form is not necessarily used as a part of these other review processes.

   There is no procedure or other formal document that describes use of the rejection form or delineates tracking, trending and reporting, requirements associated with it. This information is not tracked or used as a performance indicator or quality control check of the generator, nor to identify program, procedural or training weaknesses, nor to identify chronic individual, group, division, program or department offenders.

4. HWMD is subject to non-conformance and non-compliance findings by NTS based on their inspection of LLW received from LLNL. LLNL does not have a procedure that describes how such findings are tracked, documented, and resolved, or how corrective actions are identified and implemented. Resolution and tracking of these and similar findings by organizations external to the HWMD is not part of the HWMD Quality Assurance Plan.

5. HWMD is responsible for labeling of LLW shipments. Technicians are responsible for understanding the regulations, and labeling is verified by the yard supervisor or shipping coordinator. A procedure is being developed to cover labeling activities but is not yet completed. The HWMD Quality Assurance Plan does not require periodic surveillance or other quality control requirements for this process to ensure that it is performed in accordance with applicable regulations.

6. HWMD does not perform any quality control checks on the waste characterization and quantification performed by the generator; however, they are responsible for certifying that the waste complies with the WAC. DOE 5820.2A requires accurate and complete characterization and quantification of LLW. HWMD does not have reasonable assurance that the waste containers they are certifying have been correctly characterized. Random

sampling and analysis of a fraction of shipped containers to verify the accuracy of the characterization is not performed. Quality control checks for free standing liquids and unacceptable materials are not performed.

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/CF-2

ASSESSMENT FINDING TITLE: LLNL WASTE MANAGEMENT PLAN FOR 1990

PERFORMANCE OBJECTIVE: DOE 5820.2A VI, requires development of a Waste Management Plan (WMP) that provides a vehicle to report current waste management practices and plans for the coming year. It serves as the core document in the site's waste management operations and should reference supporting documentation as appropriate. The attachment to the WMP allows sites to account for major documentation as required by the Order.

DOE 5820.2A, Section 3.b(1)(b), requires that the WMP show the relationships, in a separate section, between documents that guide and support the waste management program at the site. It also requires that the WMP identify the organization responsible for maintaining up-to-date copies of all reference documents.

DOE 5820.2A, Paragraph 3.g, requires use of the related topics section to report on related topics of significant interest to waste management planning efforts at the site, including decommissioning projects.

DOE 5820.2A, Paragraph 4 of Attachment VI-I, requires a listing of documents citing the following: schedules for decommissioning contaminated facilities; decommissioning project plans and dates of issue and a schedule for preparation of plans in the current fiscal year; lists of radiological and chemical survey reports and project final reports, and issuance dates; anticipated additions to this list for the coming year.

FINDING: The 1990 update to the LLNL Waste Management Plan (WMP) (R-17) does not conform to the requirements of DOE 5820.2A regarding the Waste Management Plan (WMP) and its attachments (I-R-104). The following deficiencies were noted in this document:

1. The LLNL WMP Section used to report on related topics of significant interest to waste management planning efforts at the site does not include a description of decommissioning projects.

2. The LLNL WMP does not include a list of documents pertaining to decommissioning of radioactively contaminated facilities.

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/CF-3

ASSESSMENT FINDING TITLE: CHARACTERIZATION OF RADIOACTIVE MATERIALS IN LOW-LEVEL WASTE

PERFORMANCE OBJECTIVE: DOE 5820.2A, III, 2.d, requires that mixed waste conform to this Order and be regulated under RCRA. Section 3.d of the Order requires that low-level waste (LLW) be characterized with sufficient accuracy to permit proper segregation, treatment, storage, and disposal. This process shall ensure that upon generation and after processing, the actual physical and chemical characteristics, and major radionuclide concentrations are known. The concentration of a radionuclide may be determined by direct methods (measurement) or indirect methods if there is reasonable assurance that the indirect methods can be correlated with actual measurements. DOE 5820.2A, 3.e(3) requires that generators and facilities receiving the waste be jointly responsible for assuring compliance with waste acceptance criteria (WAC). DOE 5820.2A, 3.e(4) requires that the WAC address allowable quantities/ concentrations of specific radioisotopes. Section 3.l requires Quality Assurance consistent with DOE 5700.6B and ANSI/ASME NQA-1. DOE 5820.2A, 3.m requires that records be kept regarding the quantity of each major radionuclide for each package.

NVO-325, Nevada Test Site Defense Waste Acceptance Criteria, Certification, And Transfer Requirements, Section 3, establishes detailed requirements for waste characterization and certification. LLW sampling and analysis shall be performed in accordance with recognized industry standards and methods. It allows for process knowledge to be used in lieu of sampling and analysis when physical form makes it difficult to sample, excessive radiation exposure would occur, and if waste is too variable to be characterized by one set of samples. The generator's waste analysis plan shall include the rationale for excluding a waste stream from sampling and analysis and the method for obtaining sufficient information to document compliance with the NTS WAC. Where sampling is not feasible, the generator shall prepare a detailed description, including concentration ranges, constituents, input streams, waste generation process, and treatment and handling that affect the wastes chemical and physical characteristics. The NTS does not require this document to take effect until April 30, 1990; however, LLNL committed to its implementation in the Hazardous Waste Management Plan (September 1989).

FINDING: The current LLNL system for characterizing LLW does not provide sufficient assurance that the waste is being accurately and completely characterized. This can result in waste that is not properly identified as mixed or radioactive, and the concentrations and types of constituents not completely or correctly determined as required by DOE Orders and the NTS WAC. If the NTS discovers that incorrect characterization has been performed on LLW sent to them, it may result in a ban on accepting further shipments from LLNL. LLNL places the onus of characterization and quantification on the generator who then submits the information to the Hazardous Waste Management Division via the Hazardous Waste Management Requisition System (R-22, R-23). There are no formal checks, performance indicators, minimum sampling and analysis requirements, or Quality

Assurance Plan to ensure that the generators are adequately performing this task (R-16).

The following specific deficiencies were noted regarding the characterization of LLW:

1. Neither the existing Hazardous Waste Management Division (HWMD) Quality Assurance Plan nor any other LLNL Quality Assurance Plan (R-18, R-20, R-50) establishes methods for review, and evaluation of the waste characterization process performed by the generator. The completed requisition forms and associated analysis, if any, are qualitatively reviewed by HWMD to identify obvious and gross characterization problems; however, this provides no quantitative indication of the accuracy and completeness of the generators characterization effort. Routine audits and surveillances of generator waste characterization activities are neither required nor performed. Quality control checks are not performed to verify the accuracy and completeness of generator characterization by opening, sampling, and analyzing a fraction of all waste containers that are received. No other types of waste characterization quality control checks are performed.

2. The indirect methods used to characterize LLW are not defined and documented by waste stream. Methods, associated documentation, and quality assurance are not adequate to demonstrate that the indirect methods can be correlated with actual measurements. The generator can obtain assistance in LLW characterization from HWMD and the building Health Physicist; however, there are no specific requirements regarding this involvement. Building health and safety technicians may also be involved in the characterization process but their role is not explicitly defined.

3. A formal program for the characterization of LLW does not exist and there are no specific documentation requirements. There is no specific guidance established that requires sampling and analysis of all LLW. There is no mechanism to identify and approve waste streams for exemption from sampling and analysis. There is no mechanism to evaluate the adequacy of indirect quantification methods for waste streams exempted from sampling and analysis.

4. Hazardous waste, mixed waste, LLW, and clean waste containers or some combination thereof, are often found in the same area in some buildings. The generator is responsible for determining in which receptacle each waste belongs and for characterizing that waste; however, there are no established formal methods and procedures to ensure that these activities are performed in a manner that meets the performance objectives. Personnel are trained in this area and waste types are often discussed in the Facility Safety Procedures (FSPs) but there are no performance indicators or quality assurance plans that verify the effectiveness of this training or the FSP.

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/CF-4

ASSESSMENT FINDING TITLE: WASTE CHARACTERIZATION

PERFORMANCE OBJECTIVE: California Hazardous Waste Management Regulations (CHWMR) Paragraphs 66305 and 66471 and 40 CFR 262.11 state that it is the responsibility of the waste generator to determine if waste is hazardous as determined by characteristics or listing as found in CHWMR Paragraphs 66305(a), 66680-66723 and defined in 40 CFR 261.3, 261.20-261.33. If wastes are hazardous pursuant to 40 CFR 261 and CCR 66305, the waste must be managed as hazardous wastes.

If the waste is not a listed waste CHWMR Paragraph 66471 and 40 CFR 262.11 allow the generator to determine whether the waste is identified as characteristically hazardous by knowledge of the process used or testing the waste according to 261.20-.24

Characteristically hazardous wastes by California and RCRA regulations include ignitability, corrosivity, reactivity, and EP Toxicity. In addition, California regulates listed wastes under CHWMR Paragraph 66680 that are different from those regulated under RCRA and the hazardous properties are not exactly the same as those in RCRA.

DOE 5400.3 states it is the policy of DOE to manage all Departmental hazardous and radioactive mixed wastes according to the requirements of RCRA Subtitle C, and DOE 5820.2A requires waste minimization of hazardous, radioactive or mixed hazardous and radioactive wastes.

FINDING: Some wastes generated onsite at LLNL are being managed with incomplete knowledge of their characteristics, and therefore, there is a potential for improper disposal. Some waste that is not hazardous by characteristics has been labeled hazardous, while other waste is labeled radioactive waste, even though it has not been demonstrated by a radioactive survey to contain radioactive contaminated waste. The LLNL Preparation Guide for Generators of Hazardous Chemicals and Radioactive Waste at LLNL does not give instruction for testing "ignitability."

Specific examples of incomplete waste characterization identified by the Environmental Subteam include the following:

- In Bldgs. 131 and 161, solder and solder sponges have been disposed of as non-hazardous trash. No characterization of the waste has occurred or has been requested. Solder when tested will probably fail the EP Toxicity test for lead (I-WM-120 and 161) and may render the waste as characteristically hazardous.

- In the Bldg. 612 area, some drums marked "flammable liquid" actually contained no flammables. The fact that the flash point had not been determined means that the waste may have been mischaracterized and may not be hazardous waste at all.

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/CF-5

ASSESSMENT FINDING TITLE: HANDLING OF HAZARDOUS WASTES

PERFORMANCE OBJECTIVE: For Waste Accumulation Areas (WAA), CHWMR Paragraph 66508 and 40 CFR 262.34 state that generators may not accumulate hazardous waste on site for longer than 90 days without a permit or interim status, and the waste must be placed in containers or tanks that meet specifications in Subparts I and J respectively of 40 CFR 265 and comply with 40 CFR 265 Subparts C, D and 265.16. These regulations also require that the date when the period of accumulation begins must be clearly marked and visible for inspection on each waste container, and each container and tank used for the accumulation of hazardous waste must be labeled or marked clearly with the words "Hazardous Waste."

For satellite accumulation areas, which are at or near the point of generation and under the control of the process operator, 40 CFR 262.34(c)(1) states that a generator may accumulate as much as 55 gallons of hazardous waste or one quart of acutely hazardous waste listed in 261.33(e) without a permit or interim status. In addition, 40 CFR 262.34(c)(2) states that a generator who accumulates more than 55 gallons of hazardous waste or more than 1 quart of acutely hazardous waste must, within 3 days, mark the container holding the excess accumulation with the date the excess amount began accumulating and move it within that 3-day period.

FINDING: Some hazardous wastes are not being stored, handled, or labeled in accordance with applicable regulations. Formal procedures for some aspects of labeling and handling do not exist, and the procedures that are in place are not being followed. Examples of improper storage, labeling, and handling observed by the Environmental Subteam include

- o <u>Accumulation longer than 90 days</u>. The Environmental Subteam observed several instances where WAA contained drums or other containers stored beyond 90 days. Examples include

  - A 55 gallon drum labeled "waste dirty oil with PCBs" in the WAA at Bldg. 875, Site 300, had a fill date of November 17, 1989 (which starts the 90-day clock under California law).

  - At Site 300 in the WAA at Bldg. 801, a 5 gallon carboy of Kodak developer, a corrosive waste, had a fill date of November 30, 1989; shipment to the Main Site had been requested.

  - At the WAA in Bldg. 827D at Site 300, a drum of used vacuum pump oil, a California listed waste, had a fill date of November 1989, although there was some uncertainty about the date(I-WM-107). In this case, delay resulted from analytical time required for waste characterization. It is site policy not to pick up any waste until the requisition form, including the analytical data, is complete.

- o <u>Incorrect or incomplete labeling</u>. The Environmental Subteam observed a variety of problems with labeling. These included

  - Problems with date information - the WAA at Bldg. 169 contained three 55-gallon drums without accumulation dates, which had been overpacked by contractors, and two with illegible dates. The WAA at Bldg. 879, Site 300 contained a 55-gallon drum of steam cleaner wastewater labeled with the fill date that was actually the start date. Several drums at Bldg. 227 had no accumulation dates and had the wrong California Waste Code Number and no hazardous properties checked. The packing and labeling of these drums was done by offsite contractors. At the satellite accumulation areas in Bldgs. 321 and 322, containers lacked workplace start dates, as did many packages in Bldg. 197 WAA. These wastes apparently resulted from the recent cleanup of the LLNL facilities, since no problems were noted at an earlier inspection of this WAA.

  - The WAA at Magazine 229 had 2 containers holding HE waste without hazardous waste labels as did 15 other boxes containing dry HE-contaminated material.

  - Miscellaneous problems were observed at the hazardous waste storage area for Bldg. 612. Some drums being shipped offsite were mislabeled, or had conflicting labels. On some drums, the lids were labeled differently than the drums, because they had been placed on the wrong drums. This latter problem was identified by site personnel and remedied before shipment (I-WM-181).

  - In the past, the Hazardous Waste Yard has received wastes without generator name or accumulation start date, with two labels on the same container or with illegible labels, with labels covered by the requisition or covered with tape, in deteriorated cardboard boxes, and without requisition or hazardous waste labels (WM- 111).

  - At Bldg. 332, six Low Specific Activity (LSA) shipping boxes (4 ft. x 4 ft. x 8 ft.) had hazardous waste labels on them checked "ignitable," which would make the waste hazardous and when radioactive, a "mixed waste." However, the waste was lumber and <u>not</u> ignitable, which as defined by regulation has a flashpoint that is less than 160°F (60°C). The radioactive category had not been checked on the label, although these boxes were to be shipped to NTS as LSA radioactive waste.

- o <u>Improper handling</u>: Several instances suggested waste may not always be handled properly:

  Drums were picked up from a WAA on a off-waste-pick-up day at an Associate Director's (AD) insistence. Hazardous Waste Management (HWM) personnel said this happens occasionally, and they do not believe they are in a position to refuse. Some of

these drums did not have labels; therefore, their pick-up was contrary to the stated procedures of the HWM Division. During interviews some of the HWM personnel expressed their impression that an AD's request obligates them to pick-up waste regardless of whether it meets HWM requirements (I-WM-193) (I-WM-183) (I-WM-184).

- Six boxes of industrial waste were found at a dumpster in a shopping center in Livermore the first day of the Tiger Team Assessment. During LLNL's investigation of the incident, a contract worker acknowledged disposal.

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/CF-6

ASSESSMENT FINDING TITLE: RADIOACTIVE WASTE REDUCTION PROGRAM

PERFORMANCE OBJECTIVE: DOE 5820.2A, III.c., requires that technical and administrative controls be directed at reducing the gross volume of waste generated and/or the amount of radioactivity requiring disposal. Waste reduction efforts are required to include consideration of process modification, process optimization, materials substitution, and decontamination. All generators are required to establish auditable programs (goals, incentives, procedures and reports) to assure that the amount of low-level waste (LLW) generated and/or shipped for disposal is minimized. Each waste generator is required to separate uncontaminated waste from LLW to facilitate cost-effective treatment and disposal. Section g, requires that the volume and number of shipments of LLW be minimized.

DOE 5400.1 requires a Waste Minimization Plan. The Implementation Guidance for this Order states that this plan should focus on the waste minimization component of waste reduction. Source reduction is first priority and recycling second priority. It further states that the treatment, storage, and disposal of LLW plays a role in the management and reduction of wastes after they are generated and that these activities are required by DOE 5820.2A and are to be addressed in the implementation plan for that Order.

The Implementation Guidance for DOE 5820.2A requires that facilities designate one individual to function as the site Waste Reduction Coordinator who reports to the DOE Field Office Waste Reduction Program Manager. The Program Manager is to prepare a summary of waste reduction activities as an appendix to the site Waste Management Plan. This appendix provides the status of waste reduction activities, program performance, and waste minimization goals and objectives. The appendix is to include program administration, program description, and program performance.

FINDING: Activities at LLNL for waste minimization and size reduction of LLW are not currently being implemented as required by DOE 5820.2A, resulting in the shipment and burial of larger volumes of LLW than necessary. The following specific inadequacies related to the implementation of the waste minimization and size reduction activities required by DOE 5820.2A, were identified:

1. The FY 90 Update LLNL Waste Management Plan (WMP) (R-17) does not contain an appendix that describes waste reduction activities.

2. The FY 90 Update WMP (R-17) does not describe the status of program implementation. It presents a list of milestones and some general planning for FY 90 and beyond.

3. LLNL does not have adequate facilities to treat LLW to achieve waste reduction of generated waste. The decontamination facility, Bldg. 419, is currently shut down and may never be operated again due to seismic qualification problems. This was the only facility at LLNL where size reduction of bulk LLW and

decontamination for recycle or clean disposal can take place. The loss of the use of this facility has likely resulted in an increase in the volume of LLW disposed of due to the inability to decontaminate and size reduce (I-R-99, I-R-100, I-R-101).

4. LLNL does not have methods, facilities, equipment, or procedures to segregate contaminated waste from clean waste after the waste has been generated. A cost benefit analysis of this activity does not appear to have been performed and was not included in the Waste Management Plan. This method of volume reduction may be necessary for LLNL to achieve waste minimization goals, especially considering LLNL's current lack of an operating decontamination facility.

5. LLNL has not formally evaluated the need to use advanced volume reduction techniques for compaction of LLW. The use of a crate compactor would likely result in increasing the amount of waste fit into each container by a factor of two or more; thus, decreasing the total number of crates shipped for burial. Super compaction services are not used or considered. These devices will compact an already compacted 55-gallon drum by a factor of 3. A cost benefit analysis of these activities does not appear to have been performed and was not included in the Waste Management Plan. These methods of volume reduction may be necessary for LLNL to achieve waste minimization goals, especially considering LLNL's problem with the decontamination facility.

6. The existing size reduction facilities are not used or are insufficient to deal with TRU-contaminated material. As a result, 30 boxes of TRU-contaminated waste are stored in Tent 6196 at the Bldg. 612 complex and cannot be shipped to NTS because they will not fit in any certified overpack containers and they cannot be size reduced onsite (I-R-139).

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/CF-7

ASSESSMENT FINDING TITLE: TRAINING OF HAZARDOUS WASTE GENERATORS AND HANDLERS

PERFORMANCE OBJECTIVE: 40 CFR 262.34 requires that hazardous waste generators using less than ninety-day storage areas be trained to enable them to perform duties in compliance with hazardous waste regulations. Article I, Section 25123.3(d)(5) of the California hazardous waste regulations requires that generators of any wastes that are transferred from satellite accumulation areas to any onsite facility be trained to enable them to fulfill California hazardous waste requirements. Both 40 CFR 265.16 and 264.16 require that interim status and permitted hazardous waste facility personnel be trained to ensure facility compliance with hazardous waste regulations. Article 18 of California hazardous waste regulations also requires that interim status and facility personnel be trained to perform their duties in compliance with the hazardous waste regulations. In addition, 29 CFR 1910.120(p) requires that employees involved in hazardous waste operations at interim status and permitted facilities be trained to enable them to perform their jobs safely. This will include an initial training of 24 hours and an annual 8-hour refresher course. Training for emergency response employees at hazardous waste facilities must be completed before they are required to respond to real emergencies.

FINDING: The LLNL hazardous waste training program lacks the following: a system to ensure that personnel requiring training are identified and trained, guidance for determining training needs, specialized training for waste accumulation area coordinators, and a current validation of Hazardous Waste Management Training needs based on a job-needs analysis.

LLNL has not established a formal system for ensuring that all waste generators have been identified, have been initially trained, and have taken required refresher courses. An informal system has been established in which training contacts have been appointed for each program. These training contacts are responsible for identifying those personnel who need to be trained and the areas in which they should be trained. This informal system has been only partially successful. Only 7 of 15 training contacts have prepared the requested lists of persons that need training (I-WM-15).

LLNL currently has nine courses available for waste generators (WM-26) and is developing several additional courses for waste generators. However, formal guidance has not been provided to program training contacts to assist them in making training decisions. LLNL is currently developing such guidance (I-WM-15).

Specialized training is not provided for WAA coordinators to allow them to conduct their duties in accordance with hazardous waste regulations. WAA coordinators do not receive any training beyond that given to all hazardous waste generators in Course Number EP006 on hazardous waste handling practices. While this course describes

regulatory requirements for WAAs, it does not provide training in sufficient detail to allow WAA coordinators to perform their jobs without "on-the-job" training (OJT). This training is not formally structured and takes place only if the WAA coordinator identifies and seeks assistance from environmental analysts and environment/technicians (I-WM-24).

Formal training programs based on a job-needs analysis for Environmental Protection Department (EPD) personnel, including Hazardous Waste Management (HWM) Operations staff, have not been completely established. LLNL is preparing a HWM Operations Training Plan (WM-24), but it has not been finalized and approved by HWM Management. Currently a job-needs analysis is being conducted for HWM Operations including OJT training requirements (WM-23) (I-WM-15).

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/CF-8

ASSESSMENT FINDING TITLE: MONITORING OF REGULATED UNDERGROUND STORAGE TANKS

PERFORMANCE OBJECTIVE: CCR 23: 2610-2714 require all owners of one or more underground storage tanks (USTs) storing hazardous substances to comply with construction standards in CCR 23: 2630-2635 and monitoring standards in CCR 23: 2640-2648. The site uses monitoring alternatives 5 and 7 as specified in CCR 23: 2641. The regulations require daily or weekly and annual monitoring. These regulations are applicable to hazardous substances and hazardous waste USTs.

40 CFR 280 regulates USTs containing petroleum and hazardous substances, while 40 CFR 264, 265 and CCR 22: 67250-67262 regulate tanks containing hazardous wastes at RCRA-permitted facilities. Hazardous waste tanks older than 15 years, or of unknown installation dates, must have secondary containment and leak detection by January 12, 1989, or be closed. Underground fuel and hazardous substances tanks of unknown age or those that were installed before 1965, must have had release detection installed by December 22, 1989. Release detection is not required by RCRA on USTs for emergency generators, but is regulated by CCR 23: 2640. In the absence of release detection, daily or weekly monitoring must be initiated.

40 CFR 265.191 requires that by January 12, 1988, the integrity of all existing tank systems that contain hazardous waste and do not have secondary containment (single-walled tanks) are to be evaluated by an independent, qualified, professional engineer who certifies that the tank system is adequately designed and compatible with the stored waste so that the system will not fail. These Integrity Assessments (IAs) are to be on file on site.

FINDING: LLNL has not instituted daily or weekly monitoring on six of the regulated Stand-by Emergency Generator (SEG) tanks at the Main Site. LLNL has received a Notice of Violation for the absence of monitoring of tanks at the Livermore Site from Alameda County February 7, 1989 and is in the process of preparing level to volume correlation tables for all the stand-by generator tanks, as required by the county, to enable them to report leakage volumes as an approved method of monitoring. These tables are to be prepared by April 1990. CCR 23: 2640 states that the failure to implement an approved monitoring system shall require closure of the UST pursuant to Article 7 CCR 23: 2670.

One hazardous waste tank (325-I1U1) has not been closed or been provided secondary containment which was required by January 12, 1989 (40 CFR 265.190-.197). Release detection was not installed by December 22, 1989 nor the tanks closed as was required for two fuel tanks. The hazardous waste tank, 325-I1U1, was taken out of service prior to January 12, 1989, and the closure plan is being prepared. The fuel tanks referred to above are 875-D1U1 and 877-D1U1.

Two other fuel tanks must have leak detection equipment by December 22, 1990, per Federal regulations. These tanks are included with 18 tanks on a Prioritization List of Tank Upgrades for an FY 1990 line item, and have been approved, but the funds have not been released by SAN.

Nine tanks have been identified at LLNL that needed IAs by January 12, 1988. Two IAs have been completed, one is in progress, and the remaining six should be done by June 1990.

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/CF-9

ASSESSMENT FINDING TITLE: HAZARDOUS WASTE INSPECTION FORMS AND RECORDS

PERFORMANCE OBJECTIVE: 40 CFR 262.34 requires that Waste Accumulation Areas (WAAs) holding containers of hazardous waste be inspected weekly and tanks containing hazardous waste at WAAs be inspected each operating day. Article 1, Section 25123.3(d)(5), of the California Code requires that onsite container waste accumulation areas 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 inspections. Article 18 of California hazardous waste regulations titled General Facility Standards for Interim Status and Permitted Facilities outlines general inspection requirements 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 264.15 and 265.15 for permitted facilities and interim status facilities, respectively.

FINDING: Consistent inspection forms are not used sitewide for inspection of waste storage areas, including waste accumulation areas. Observations revealed that three versions of inspection forms were in use at several WAAs during the Tiger Team Assessment. One form lacked a checklist item for noting potential 90-day exceedances (Bldgs. 879, 431, and 322), while another form lacked a checklist item for noting the dates and nature of corrective actions for problems (B-321). LLNL personnel informed the Environmental Subteam that the deficient forms were obsolete versions that were still being used at some WAAs. Following these observations, Environmental Protection Department personnel surveyed generators and attempted to retrieve the obsolete forms and distribute the current version. The forms used in the majority of the WAAs did have all the requisite checklist items; however, the forms were often not properly completed by the inspectors. In addition, records of inspections are missing. Specific deficiencies observed are as follows:

- Bldg. 879: WAA inspection forms for December 1989 and January 1990 did not have any notations on the checklists line for noting 90-day exceedances (All items must be checked yes or no) (WM-34).

- Bldg. 322: Operating logs or other records that would document the beginning date of the 90-day accumulation period for waste accumulation tanks were not available (WM-44).

- Bldg. 612: The dates and nature of corrective actions taken were not marked on inspection forms, even though a space was provided on the forms.

- For the week of March 14, 1990, there were no weekly inspection records available for Bldg. 612 Lab Pack area cells 1001, 1002, 1003, and 1004 in Bldg. 614W and cells A, B, C, D, and E in Bldg. 612-4 when the records were initially requested by the Environmental Subteam; they were located later and given to the team for review.

- Inspections for the weeks of November 15, 1989 and March 14, 1990 and for the period from October 30, 1988 to January 11, 1989 were missing for the WAA at Bldg. 331. The lack of weekly inspections for Bldg. 331 was also noted in the Final Report of the LLNL Independent ES&H Review Team (WM-108).

- LLNL has issued formal guidelines to generators for the management of WAAs (WM-49). The inspection checklist illustrated in the guidelines contains all the required checklist items. However, the discussion on inspections does not cover notations of 90-day exceedances or the requirement to describe needed corrective actions and dates of corrective actions. LLNL is modifying the formal guidelines to expand the discussion to cover these items.

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/CF-10

ASSESSMENT FINDING TITLE: STORAGE OF MIXED WASTES SUBJECT TO LAND DISPOSAL RESTRICTIONS

PERFORMANCE OBJECTIVE: EPA Hazardous Waste Regulation 40 CFR 268.50 prohibits storage of land disposal restricted (LDR) hazardous wastes unless storage is solely for the purpose of accumulating quantities necessary to facilitate proper recovery, treatment, or disposal. Storage for any other purpose after the land disposal restriction becomes effective is prohibited. For the first year after the restricted waste is put into storage, the regulatory agency (USEPA) bears the burden of proof in an enforcement action and must demonstrate that the storage was not for the purpose stated above. After 1 year the facility bears the burden of proof and must demonstrate to the regulator that the waste is being stored for the purpose stated above.

DOE 5400.3 requires DOE to manage mixed radioactive and hazardous wastes according to the requirements of Subtitle C of RCRA. Mixed wastes containing solvents, dioxins, and California-list wastes are subject to land disposal restrictions associated with these wastes in unauthorized states (no RCRA primacy) and authorized states that have mixed waste authority. California is not authorized for RCRA; therefore, the hazardous waste component of mixed waste is regulated at LLNL by EPA.

FINDING: LDR wastes containing radioactive constituents (mixed wastes) are being stored in the LLNL mixed waste storage area because there is currently inadequate or no treatment capacity for mixed wastes, rather than for the reasons permitted by RCRA.

Storage of mixed waste subject to LDR is a DOE-wide problem. Treatment capacity that can attain standards established by LDR for LLNL and for other DOE facilities does not currently exist. As part of a September 1989 DOE-EPA agreement concerning storage of LDR mixed waste at the Rocky Flats Plant, DOE recently submitted a report to EPA identifying mixed wastes at all its facilities. The report included information on mixed wastes currently restricted, and wastes that went into storage before the restrictions became effective (and therefore are not subject to storage limitations) that will ultimately require disposal.

As part of this DOE-wide effort, LLNL has identified its LDR mixed wastes in storage. These wastes include

- Approximately 0.40 cubic meters of radioactive corrosive wastewaters awaiting neutralization and solidification that are in storage in Bldg. 513 and the Bldg. 514 yard. Treatment has been suspended pending test results of new solidification agents (Petroset and Aquaset).

- Approximately 0.60 cubic meters of radioactive dioxin-contaminated trash is stored in Bldgs. 612 and 513. These wastes require incineration. However, there is currently no

permitted incinerator for wastes containing dioxin even if the wastes do not contain any radioactive constituents.

- Approximately 2.2 cubic meters of radioactive corrosive wastewaters (California List) requiring neutralization and Dorr-Oliver filtration treatment are generated monthly, and currently treated onsite. These wastes are temporarily stored at the Bldg. 514 portable tank storage area, and in the Bldg. 514-2 yard prior to treatment. After treatment these wastes meet land ban treatability standards and are no longer hazardous. However, if the proposed denial by EPA of the LLNL RCRA Part B permit is finalized, there will not be any onsite treatment capability for these wastes.

- Approximately 29 cubic meters of radioactive spent solvent contaminated waste are treated monthly by Dorr-Oliver filtration, which reduces the quantity of wastes by approximately 85.5 percent. The resulting mixed waste filter cakes are placed into long-term storage at the Bldg. 612 Storage Facility. Currently there is no facility available for treating these filter cakes. If the RCRA Part B Permit is denied as proposed by EPA, the entire volume of solvent contaminated wastewaters will require alternate storage and/or treatment capacity.

- Each month at LLNL, 0.42 cubic meters of radioactive liquid spent solvent wastes are generated; as of September 1989, 4.7 cubic meters of this waste was in storage. This material is ordinarily solidified, however, solidification is temporarily suspended awaiting testing of new solidification agents. If the wastes treated with the new solidification agents do not meet LDR treatment standards, then this solidified material will require long-term storage until mixed waste incineration facilities or other acceptable means of treatment become available.

The State of California also has an LDR program. It includes wastes that are not hazardous according to EPA criteria, but are hazardous according to California criteria. California law adopts Federal LDR treatment standards for any RCRA hazardous wastes and is developing its own treatment standards for non-RCRA wastes. These standards will go into effect over the next two years and will include asbestos wastes, PCB waste, non-RCRA solvents, aqueous and solid wastes with organics, and infectious waste. The question of whether "California only" mixed wastes will be regulated under California LDRs is not resolved.

Under RCRA, the inventory of mixed wastes subject to LDR will continue to grow until all hazardous wastes are restricted. All hazardous wastes will be restricted as of May 1990, although it is anticipated that mixed wastes will be granted a 2-year national capacity variance. Currently, it is not anticipated that the variance will apply to California-list wastes, solvents, and dioxins.

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/CF-11

ASSESSMENT FINDING TITLE: HAZARDOUS WASTE CHARACTERIZATION PROGRAM

PERFORMANCE OBJECTIVE: The waste analysis plan in the LLNL Part B Permit Application for the Main Site and in the Site 300 Part B Permit states that "profiled wastes are checked by random verification and characterization analysis performed by Hazardous Waste Management (HWM) annually or whenever the specific process changes." DOE 5700.6B requires that DOE facilities have quality assurance activities that include early detection and correction of deficiencies.

FINDING: The LLNL waste characterization program has deficiencies in the following areas:

- Random verification and recharacterization of profiled wastes is not conducted annually or when the process changes.
- HWM does not have a quality assurance program to verify the accuracy of generator-supplied information on hazardous waste disposal requisitions for both profiled and non-profiled wastes.

Generators with operations that produce known unchanging waste streams may avoid routine analyses by a LLNL process called profiling. In the profiling process, the generator fills out a form giving a detailed characterization of the waste stream, including the results of current analyses and historical data, and submits the form to HWM. A HWM chemist then reviews the information submitted by the generator and, if adequate, issues a numbered profile for that waste stream. The profile number is entered on the HWM requisition in place of the "Analysis Sample Number." Verification analysis of the profiled waste data has not been conducted, in accordance with the waste analysis plan contained in the Main Site Part B permit application and the Site 300 Part B permit condition.

LLNL has phased out the use of the profiled waste system, except for photoprocessing wastes which are treated to recover silver. Generators of profiled wastes will be required to provide waste characterization data on each requisition.

For wastes which are not profiled, LLNL relies on a combination of generator knowledge and analytical data to supply the information on waste composition to be included on the hazardous waste management requisition form. Currently there is no system in place to verify that generators have correctly characterized the waste streams based on their process knowledge or that generator supplied analytical data is sufficient to adequately characterize the wastes. Thus, early detection and correction of deficiencies in generator waste characterization does not take place. This may potentially result in mishandling of wastes. LLNL personnel have stated their

intention to implement a quality assurance verification system although none is currently in place.

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/CF-12

ASSESSMENT FINDING TITLE: RADIOACTIVE WASTE CERTIFICATION

PERFORMANCE OBJECTIVE: NTS is not permitted by DOE to accept shipments of LLW and/or TRU wastes from LLNL if the shipment contains any mixed wastes. WIPP-DOE-069 Revision 3 dated January 1989 defines radioactive mixed wastes as radioactive waste that also contains hazardous materials as listed in 40 CFR 261. The LLNL TRU Waste Certification Plan states in Section 1.2 that the Plan satisfies requirements in the WIPP waste acceptance criteria in WIPP-DOE-069 as updated. In addition, NTS, as an interim storage site, has established separate criteria under NVO-185 and NVO-325, which state that hazardous mixed radioactive wastes shall not be accepted for storage or disposal unless identified as an exception by the DOE/NV Manager. NVO-185 defines hazardous waste as including all wastes identified or listed in 40 CFR 261.

FINDING: The existing Waste Isolation Pilot Plant (WIPP)-approved TRU waste certification program is not adequate to certify that TRU wastes shipped to NTS do not contain any hazardous wastes.

LLNL ships TRU wastes to NTS for storage. A shipment of TRU wastes was made to NTS by LLNL during the third week in March, which had been certified in accordance with the LLNL TRU waste certification program that had been evaluated by personnel from WIPP in audits conducted in 1987 and 1988. The LLNL TRU waste certification program does not address all 40 CFR 261 hazardous materials (i.e., both listed and characteristic wastes).

This shipment to NTS was the first of 5 shipments totaling 90 containers. SAN requested that LLNL certify the absence of constituents listed in 40 CFR 261 prior to the first shipment of this waste to NTS, specifically directing that "LLNL shall ensure that these drums meet the NTS waste acceptance criteria and also certify that the drums do not contain any hazardous materials as defined." LLNL was unable to do so, because of the potential of the wastes to contain solvent-contaminated Kimwipes. Because Kimwipes are so widely used at LLNL, it cannot be determined with certainty that RCRA contaminated solvent Kimwipes are not contained in the TRU wastes. This same issue has been raised with respect to 1600 drums of TRU wastes previously shipped.

Since NVO-185 also applies to LLW, the presence of hazardous wastes in low-level wastes must also be addressed to NTS by LLNL. Until this issue is resolved, LLNL has suspended all shipments of LLW and TRU waste to NTS.

3.5.4.3. Best Management Practice Findings

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/BMP-1

ASSESSMENT FINDING TITLE: IMPLEMENTATION OF WASTE MINIMIZATION PLAN

PERFORMANCE OBJECTIVE: EPA guidance (52 FR 25056, June 12, 1989) states that effective hazardous waste minimization plans contain each of the following elements: (1) top management support; (2) characterization of wastes; (3) periodic waste minimization assessments; (4) cost allocation systems; (5) technology transfer; and (6) regular program evaluation. DOE implementation guidance (January 1990) for effective waste minimization programs for hazardous, radioactive, and mixed waste states that programs should include (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; and (6) technology transfer.

FINDING: Plans for the implementation of the LLNL waste minimization program do not include all those elements recommended for an effective waste minimization program. Missing or deficient items include: lack of plans to implement a chargeback system, an incomplete cost accounting system, inadequate plans for generator waste minimization training, and the preparation of inadequate "mini" waste minimization plans by some LLNL Directorates.

LLNL devised a hazardous waste chargeback system that would have allocated waste disposal costs to programs generating waste. Originally the plan was to be implemented at the beginning of FY 90. However, recently DOE has initiated funding of waste management operations as a direct line item, complicating plans to implement the chargeback system. As a result, LLNL has suspended plans to implement the cost allocation system. Alternative systems that would achieve the same goals (i.e., incentive to generators to reduce costs by reducing waste generation) have not been developed.

The cost accounting system developed by LLNL for the chargeback would not have been accurate. The total costs of treating, storing, and disposing of wastes were extracted from the Hazardous Waste Management database for each hazardous waste stream. This information was utilized to develop the initial cost for hazardous waste management. The cost of radioactive waste management was not included. Oversight costs including costs for compliance and permitting activities, which are part of waste management, were also not included. Thus, even if the chargeback system were to be implemented, waste management costs could not be fully allocated to generators.

The LLNL Waste Minimization Program Plan does not include adequate provisions for waste minimization training at the generator level. The Program Plan addresses training as a waste minimization

activity. However, there are no plans to include the topic of waste minimization techniques in waste generator training (I-WM-23). Various programmatic briefings on waste minimization have been conducted since 1986 and general information has been provided to LLNL personnel (WM-42). However, these briefings have been general in nature and apparently did not go into detail on waste minimization techniques and examples. The Environmental Protection Department Training Coordinators have initiated discussions on training waste generators in the area of tracking waste generation (I-WM-29).

Each Directorate prepared "Mini-Plans" for Waste Minimization based on the LLNL Waste Minimization Program Plan. The function of each mini-plan is to implement the LLNL plan at the program level. The mini-plans varied in quality. As an example, the mini-plan prepared by the Materials Fabrication Division included the principal elements of an effective waste minimization program including waste stream identification, goals, status and accomplishment. In contrast, the mini-plan developed by the Physics Directorate only expressed support for the concept of waste minimization.

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/BMP-2

ASSESSMENT FINDING TITLE: LABORATORY CLOSEOUT PROCEDURES

PERFORMANCE OBJECTIVE: Article I, Section 25123.3(d)(3) of the California Hazardous Waste Act limits the storage of hazardous wastes to 1 year. Section 268.50 of EPA hazardous waste regulations prohibit storage of land disposal-restricted wastes. Section 262.34 of EPA hazardous waste regulations requires that storage of hazardous wastes for greater 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 the wastes.

FINDING: LLNL lacks a Laboratory-wide closeout procedure to be implemented when individual experimenters leave or when laboratories and/or experiments are shutdown. The research activities at LLNL involve a large number of individual experimenters and experiments. There is continual turnover of experimenters, and experiments are continually being phased out. Often when an experimenter leaves LLNL, 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 experimenter, may remain for years.

Ultimately, facility management is responsible for ensuring that residual materials remaining after a laboratory/experiment is closed are properly disposed. However, this disposal must often be carried out by individuals who are not familiar with these materials. This is especially true where a single individual is responsible for all environmental matters in a laboratory. In some cases the disposal of residual chemicals will be delayed, resulting in less potential for reuse/recycling of unused chemicals because they remain in storage past their expiration dates. If materials are disposed of by individuals, other than the experimenter, who are unfamiliar with the material, potential opportunities for reuse/recycling may not be recognized, or the material may be inadvertently mishandled or disposed of improperly. In many cases, if closeout of a laboratory is not carried out when the experimenter leaves or the experiment/laboratory is shutdown, hazardous, radioactive and/or mixed wastes will remain in the laboratory. This may result in wastes being stored in nonconformance with EPA, California and/or DOE requirements regarding hazardous, radioactive and mixed wastes.

The self-assessment conducted by LLNL prior to the Tiger Team Assessment noted that "abandoned research projects or setups were found in many of the buildings visited, and neither the program staff nor the environmental analysts know what waste might be associated with those abandoned projects; in some instances radioactive wastes were still present" (WM-22, pg. 67).

The lack of Laboratory-wide closure procedures for individual laboratories or facilities was cited as a deficiency during the 1986 Environmental Survey at LLNL (WM-48). In the 1988 Corrective Action Plan developed to address deficiencies identified during the Survey, LLNL proposed to develop Laboratory-wide closure procedures (WM-49). However, this action was apparently not carried out.

The Environmental Protection Department (EPD) agrees that there is a need to include in a checkout review, a process to ensure that employees have properly identified their wastes and either dispose of their chemicals or arranged for transfer to another person. EPD has notified the Human Resources Department of the need to address this issue during employee checkout reviews in a March 7, 1990 letter (WM-57).

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/BMP-3

ASSESSMENT FINDING TITLE: HAZARDOUS, RADIOACTIVE, AND MIXED WASTE LABELS

PERFORMANCE OBJECTIVE: Good management practices dictate that labels for containers of hazardous, radioactive and mixed wastes be separate and distinct to clearly differentiate between hazardous, radioactive, mixed waste, and non-hazardous/non-radioactive waste containers. Such practices reduce the potential for improper waste handling and disposal.

FINDING: Current labeling practices at LLNL do not clearly differentiate between containers of hazardous, radioactive, mixed, and non-hazardous/non-radioactive waste leading to a potential for mislabeling, unintended mixing of wastes and/or mishandling of wastes. Currently, LLNL uses one label marked hazardous waste at the top with boxes to be checked to mark the waste as toxic, corrosive, ignitable, reactive, radioactive, or other. This label is used for all containers holding radioactive, hazardous or mixed wastes. The generator checks appropriate boxes to indicate whether the waste is hazardous, radioactive or mixed.

It is not readily apparent, upon examining a container, whether a particular drum labeled with the currently used hazardous waste label contains hazardous, radioactive or mixed wastes. Close inspection is required to determine which boxes are checked, and even then, the "Hazardous Waste" notation at the top can lead to confusion. For example, with such a designation on a container, one can easily make the mistaken assumption that a radioactive waste is a mixed waste.

The need for distinct labels is increased since LLNL 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 colored other than yellow and on occasion yellow drums are used for non-radioactive waste.

LLNL personnel have stated that there are plans to implement a new labeling system with distinct color coded labels for radioactive, hazardous, mixed and hazardous retention tank wastes. New labels will be available in late April 1990, and will be distributed to all generators who had received hazardous waste training. Instructions for properly completing waste labels will be shipped with the labels, and have been made part of the generator training course.

ASSESSMENT DISCIPLINE: WASTE MANAGEMENT

ASSESSMENT FINDING NUMBER: WM/BMP-4

ASSESSMENT FINDING TITLE: CONTAINMENT OF INFECTIOUS WASTE

PERFORMANCE OBJECTIVE: CCR 22, Article 13, 66835 establishes requirements for all producers of more than 100 kilograms of infectious waste per month.

CCR 22: 66840(f) requires that all infectious waste, except for sharps capable of puncturing or cutting, be contained in double disposable plastic bags which are impervious to moisture and have a strength sufficient to preclude ripping, tearing, or bursting under normal conditions of usage.

CCR 22: 66840(h) requires that all bags used for containment and disposal of infectious waste be red in color and conspicuously labeled with the words "Infectious Waste" or with the international biohazard symbol and the word "Biohazard."

In a February 10, 1989, letter to W. Reilly, EPA, Admiral J.D. Watkins stated that DOE recognizes that medical wastes generated at DOE facilities are subject to the standards in the Medical Waste Tracking Act of 1988 (MWTA) for the tracking and management of medical waste in "covered states." Although there is a provision that excludes Federal facilities, the Secretary has stressed that the DOE is committed to the operation of its facilities in full compliance with all pertinent environmental statutes.

FINDING: The Medical Facility is storing infectious waste in a single <u>clear</u> plastic bag inside a metal 5 gallon can (I-WM-155). Less than 100 kilograms of infectious waste per month are generated at the Medical Facility. Although the infectious waste generated is less than regulated quantities, it would be good management practice to store the waste in double red bags, as is stipulated by CCR 22: 66840(h).

3.5.5 Toxic and Chemical Materials

3.5.5.1 Overview

The purpose of the toxic and chemical materials portion of the Environmental Subteam Assessment of LLNL was to evaluate the status of LLNL's operations with respect to regulations promulgated under the Toxic Substances Control Act (TSCA); recommended guidance under the Federal Insecticide, Fungicide, and Rodenticide Act; applicable DOE Orders; and best management practices. These regulations and Orders establish the requirements for the use, handling, storage, and disposal of toxic and hazardous materials. The emphasis has been on the management and control of PCBs, chlorofluorocarbons, asbestos, pesticides, petroleum and petroleum products, and bulk chemicals.

LLNL has been phasing out the use of PCB fluids and equipment over the last 3 years. This action was proposed by LLNL in response to a finding of the DOE Environmental Survey that was conducted in December 1986. The remaining 8 PCB transformers and more than 5600 capacitors were removed from service during 1988 and 1989. The only PCB equipment remaining onsite consists of approximately 400 capacitors (TCM-2). However, there are many PCB-contaminated (coolant contains between 50 and 500 ppm) transformers still in service. The major PCB issues observed during this Assessment were the cleanup of Bldg. 436 that is nearing completion, and the historical PCB leaks in the electrical system in Bldg. 194. Plans are being made to resolve the latter issue.

Asbestos and asbestos-containing materials (ACMs) were used extensively in the past in construction and thermal insulation at LLNL. Some of the asbestos is in the older buildings that were constructed when the site was a military base. The Hazard Control Department, Plant Engineering, and the LLNL Counsel's Office established an Asbestos Management Committee 2 years ago to study the asbestos problem, with the goal of making recommendations to LLNL management (TCM-10). The Committee has been active in studying the problem and implementing education about asbestos health hazards onsite, prevention of exposure to fibers, and cleanup measures. A crew of State-certified asbestos building inspectors has been conducting a survey to locate asbestos and ACMs on site and to assess their condition. When friable asbestos is identified, the problem is corrected by the LLNL crew or by a contractor. The Plant Engineering crew does projects involving removals of 100 square feet or less of asbestos or asbestos-containing material, while larger cleanup projects are conducted by a contractor. The information obtained by the building inspectors to date indicates that the majority of asbestos at the site is encapsulated and in good condition. No asbestos-related deficiencies were observed during the assessment.

A large number of pesticides are used at LLNL. The pesticide inventory at the Main Site includes 60 products (TCM-6). Pesticide products are appropriately stored in Bldg. 520 with adequate secondary containment. A smaller number of pesticides are in use at Site 300 and are stored in Bldg. 841. This building meets all of the recommended requirements for storage of these products except for the lack of secondary containment (TCM/BMP-5).

Diesel fuel is stored in many aboveground storage tanks (ASTs) throughout LLNL. The Draft SPCC Plan (TCM-11) contains lists of these tanks and

information on their size, location, age, and material of construction. The Tiger Team inspection of most of these ASTs revealed several that did not have adequate secondary containment and some that required improved maintenance such as areas of corrosion of the tank.

Many chemicals used in bulk quantities are stored in ASTs or drums (55 or 30 gallon) at or near the location of use. The major deficiencies noted include storage of incompatible chemicals adjacent to each other and lack of secondary containment at many locations (TCM/BMP-1 and TCM/BMP-2). Many of the product storage areas appeared to be in good condition and had received recent attention by LLNL staff during the standdown days in preparation for the Tiger Team Assessment.

LLNL was previously aware of about half of the findings identified within the Toxic and Chemical Materials portion of the Assessment. Corrective actions were started on most of the findings during the course of this Assessment.

3.5.5.2 Compliance Findings

ASSESSMENT DISCIPLINE: TOXIC AND CHEMICAL MATERIALS

ASSESSMENT FINDING NUMBER: TCM/CF-1

ASSESSMENT FINDING TITLE: PCB SPILL CLEANUP

PERFORMANCE OBJECTIVE: Spills of PCBs with concentrations greater than 50 ppm must be cleaned up within 48 hours (40 CFR 761.125(b)(iii)) of finding the spilled fluid. Also, releases on indoor nonimpervious surfaces must be cleaned to attain a concentration of 10 ug/100 cm^2 as determined by standard wipe tests.

FINDING: Oil stains around the base of the six modulators and two high-voltage power supply units in Bldg. 194, Room 1211 were not cleaned up within the statutory time limit (48 hours). The oil stains appear to be old and were observed during this Assessment on both March 1 and March 26, 1990. The exact sources of the spills have not been identified.

The electrical power units in this area consist of transformers and capacitors that contain PCB at various concentrations. One possible source of the leaks of PCB fluid may have been the "pulse" transformers that have probes through the side wall. This type of design is prone to leaks. The PCB concentrations of 5 of the 6 "pulse" transformers range from 130 to 200 ppm. The other transformers that make up this electrical system also contain significant quantities of PCBs. Thus, it must be assumed that the oil stain on the floor contains PCBs at a concentration greater than 50 ppm and therefore required cleanup within 48 hours of discovery. The analysis of wipe samples obtained recently from the floor were inconclusive. Additional sampling and analysis are planned.

ASSESSMENT DISCIPLINE: TOXIC AND CHEMICAL MATERIALS

ASSESSMENT FINDING NUMBER: TCM/CF-2

ASSESSMENT FINDING TITLE: PCB CONTAMINATION

PERFORMANCE OBJECTIVE: In the event of a PCB spill, the Toxic Substances Control Act (TSCA) (40 CFR 761.125) requires that all indoor surfaces must be cleaned to 10 ug/100 cm^2 as determined by standard commercial wipe tests. In addition, spills of PCBs with concentrations greater than 50 ppm must be cleaned up within 48 hours (40 CFR 761.125(b)(iii)) of finding the spilled fluid.

FINDING: PCB contamination in Bldg. 436 exceeds the statutory requirement of 10 ug/100 cm^2 on the floor, doors, piping, and walls.

G. E. capacitor leaks were found by LLNL personnel on the first floor of Bldg. 436 on June 13 and 14, 1989 (TCM-18, 19, and 20). The spills were not cleaned to the statutory requirement within the required 48-hour period, nor was the EPA Regional Office contacted to negotiate an alternate schedule. Spill cleanup was started after "grounding" the affected capacitors. As a result of the leaking, an inspection of the capacitors in Bldg. 436 was made by LLNL. Due to the age and condition of the capacitors, the 5600 capacitors were removed over the period September 25 to October 13, 1989. The removal of the associated shelving was completed on February 1, 1990. Analysis of wipe samples of the floor and walls of Bldg. 436 were reported in a memo dated August 24, 1989. The concentrations varied from >5 ug/100 cm^2 to 70 ug/100 cm^2 with several areas greater than 10 ug/100 cm^2. Decontamination of this building was started on March 26, 1990, by an offsite contractor.

ASSESSMENT DISCIPLINE: TOXIC AND CHEMICAL MATERIALS

ASSESSMENT FINDING NUMBER: TCM/CF-3

ASSESSMENT FINDING TITLE: ABOVEGROUND STORAGE TANKS

PERFORMANCE OBJECTIVE: The Clean Water Act (40 CFR 112.7) requires that aboveground storage tanks (ASTs) that contain petroleum or petroleum products should have adequate secondary containment or diversionary structures or equipment to prevent the release of these materials to surface water. Proper maintenance also can prevent releases to the environment.

FINDING: Many of the ASTs at LLNL containing diesel fuel or other petroleum products do not have secondary containment and need improved maintenance. Some examples of ASTs and deficiencies noted include, but are not limited to, the following:

- A 500-gallon tank containing diesel fuel is located in Bldg. 452 and does not have secondary containment. Also, many leaves and paper were noted in the space between the concrete support and the tank. Combustible materials in proximity to petroleum tanks are a potential fire hazard.

- Two diesel fuel tanks with a capacity of approximately 280 gallons each are located on the south side of Bldg. 412. These tanks do not have secondary containment, have some rust spots, and the paint is peeling. Lack of proper maintenance could lead to leaks.

- A mobile tank containing approximately 500 gallons of diesel fuel was located near Bldg. 162 at the time of this Assessment and did not have secondary containment.

- A 5000-gallon mobile tanker, containing diesel fuel and identified as D-2, was located in the Tank 2 Area of Site 300. This tanker did not have secondary containment around it, although the valve did have a wash basin placed on the ground under it. This is being used as a source of emergency generator fuel and Site 300 has made plans to replace the system. An LLNL Environmental Analyst informed the Tiger Team on March 29, 1990, that Site 300 has started to empty this tank.

- An approximately half-full 500-gallon tank of road oil is supported on a pedestal at Site 300. This tank, located in an area cleared of vegetation near Route 2, does not have secondary containment.

3.5.5.3 Best Management Practice Findings

ASSESSMENT DISCIPLINE: TOXIC AND CHEMICAL MATERIALS

ASSESSMENT FINDING NUMBER: TCM/BMP-1

ASSESSMENT FINDING TITLE: STORAGE OF HAZARDOUS AND TOXIC MATERIALS

PERFORMANCE OBJECTIVE: Drums that contain hazardous materials should be stored in a manner to prevent or minimize the potential for release of these substances to the environment.

FINDING: Some drums containing toxic/hazardous substances are being stored in a manner inconsistent with best management practices.

Many of the drums noted were in outside storage at or near the point of use. Deficiencies in the management and control of these drums could result in the contamination of air, surface water, groundwater, and soil. Deficiencies observed by the Environmental Subteam include, but are not limited to, the following:

- Four 55-gallon drums of 1,2-polybutadiene in n-heptane were placed on wooden pallets near the northwest corner of Bldg. 226 without secondary containment. These drums were moved to acceptable storage in Bldg. 227 on March 26, 1990.

- Three 55-gallon drums of a biocide were placed on wooden pallets in the Bldg. 291 yard without secondary containment. Other drums in the same area were on pallets with secondary containment. A second visit to this area on March 26, 1990, revealed that the biocide containing drums had been moved to proper storage.

- At least 20 30-gallon drums of Freon were located in a locked area (North of Bldg. 512) without secondary containment. The drums in this storage area had partial protection from the elements.

- Three 55-gallon drums of Exxon Univolt N61 (transformer oil) were placed on wooden pallets at the northeast corner of Bldg. 439 without secondary containment. An open drain was nearby. An LLNL EA reported to the Tiger Team that these drums were removed on March 28, 1990, following this observation.

- Seven 55-gallon drums of trichlorotrifluorethane were placed on wooden pallets near T-3204 without secondary containment.

- Two 55-gallon drums containing Mobil DTE 25 were placed on wooden pallets outside of Bldg. 836B (Site 300) without secondary containment. These had arrived approximately 3 days earlier. An LLNL Environmental Analyst reported to the

Tiger Team on March 29, 1990, that these drums have since been moved inside and provided with secondary containment.

- Two 55-gallon drums containing Chevron transformer oil were on wooden pallets in the electrician's corporation yard near Bldg. 883 (Site 300) without secondary containment. An LLNL Environmental Analyst reported to the Tiger Team on March 29, 1990, that these drums have since been provided with secondary containment.

- Two 55-gallon drums containing Freon were on wooden pallets in Bldg. 801 (Site 300) without secondary containment. The drain for this area goes to a retention tank, but this tank is out of commission at present due to a leak. Site personnel agreed to place drums on a pallet with secondary containment.

- Twenty-four 5-gallon cans of a molding compound (polycarbonate resin) were stored on a shelf in the Sunshine Warehouse without secondary containment.

- A milling machine and a portable hydraulic pump stored in the Sunshine Warehouse were leaking hydraulic fluid.

ASSESSMENT DISCIPLINE: TOXIC AND CHEMICAL MATERIALS

ASSESSMENT FINDING NUMBER: TCM/BMP-2

ASSESSMENT FINDING TITLE: STORAGE OF INCOMPATIBLE CHEMICALS

PERFORMANCE OBJECTIVE: Chemicals that react violently when in contact with each other should not be stored in aboveground storage tanks (ASTs) near one another nor in tanks that share the same drain to sewer or retention tank. The simultaneous release (spill, leak, etc.) of incompatible chemicals may result in a violent reaction that could result in injuries to workers as well as a release to the environment.

FINDING: Highly reactive chemicals are stored in adjacent ASTs.

A 1200-gallon AST containing 37 percent hydrochloric acid is supported about 12 feet above the floor and is adjacent to a 1200-gallon AST containing 50 percent sodium hydroxide in Bldg. 325. These tanks feed smaller day-tanks that are also situated side-by-side at floor level. This system of four tanks does not have secondary containment and share a single drain that flows to a retention tank. An identical system is located in Bldg. 291. The operator stated that leaks have occurred in the past due to gasket failures.

Hydrochloric acid and sodium hydroxide react violently when in contact and should not be stored near each other nor share a common drain. A catastrophic failure of these tanks could result in significant damage and injuries to workers as well as a release to the environment. Since LLNL is located in a seismically active area, the potential for a catastrophic failure is increased.

At the time of the Tiger Team Assessment, both tanks still contained the identified chemicals in storage. However, LLNL was in the process of converting from the present system to an all-vendor-supplied deionizer for both locations and the tanks are valved off. This change was authorized by Job Order 145754 dated January 23, 1990.

ASSESSMENT DISCIPLINE: TOXIC AND CHEMICAL MATERIALS

ASSESSMENT FINDING NUMBER: TCM/BMP-3

ASSESSMENT FINDING TITLE: PCB LABELING

PERFORMANCE OBJECTIVE: The Toxic Substances Control Act (TSCA), 40 CFR Part 761, requires PCB labels only for transformers containing coolant with 500 ppm or greater of PCBs. Marking of PCB equipment is to alert personnel (maintenance, fire fighting, spill cleanup, etc.) that the coolant contains PCBs in greater than 500 ppm and requires special handling and disposal according to regulations. PCB labels on transformers that contain less than 500 ppm of PCBs may confuse fire and spill response personnel and lead to improper handling.

FINDING: Several PCB-containing transformers were incorrectly and inconsistently labeled as follows:

- A high-voltage transformer in Bldg. 431 with a PCB coolant concentration of 10.8 ppm was marked with a PCB label. Neither Federal nor State regulations require marking of equipment with a PCB concentration of less than 500 ppm. The PCB label has been removed and a PCB-contaminated label has been placed on the transformer by LLNL.

- A transformer in Bldg. 435 with a coolant concentration of 95 ppm PCBs had both a PCB label and a PCB-contaminated label. The PCB label was removed by LLNL after this was called to their attention.

- A transformer near Bldg. 431 with a PCB coolant concentration of 430 ppm had a blue non-PCB label placed on top of a PCB-contaminated marker. The blue tag had been placed there in error and was removed by LLNL personnel when it was brought to their attention.

ASSESSMENT DISCIPLINE: TOXIC AND CHEMICAL MATERIALS

ASSESSMENT FINDING NUMBER: TCM/BMP-4

ASSESSMENT FINDING TITLE: ANNUAL PCB STATUS REPORT

PERFORMANCE OBJECTIVE: The Toxic Substances Control Act (40 CFR 761.180) requires that an annual PCB status report be prepared by July 1 covering PCB and PCB-item use during the previous calendar year.

FINDING: The annual PCB status documents (TCM-2, 3, 4, and 5) for 1985, 1986, 1987, and 1988 are deficient because they lack the date of their preparation.

These annual reports are not required to be submitted to the regulatory agency, but should be maintained on file and available for inspection. Without a date of preparation, it is difficult to demonstrate compliance with the July 1 deadline for preparing such reports in the event of a regulatory inspection.

ASSESSMENT DISCIPLINE: TOXIC AND CHEMICAL MATERIALS

ASSESSMENT FINDING NUMBER: TCM/BMP-5

ASSESSMENT FINDING TITLE: SECONDARY CONTAINMENT

PERFORMANCE OBJECTIVE: The Federal Insecticide, Fungicide, and Rodenticide Act, as amended by the Federal Environmental Pesticide Control Act of 1972, recommends that pesticides classed as highly toxic or moderately toxic be stored in facilities with protective enclosures to prevent uncontrolled release into the environment (40 CFR 165.10)

FINDING: The pesticide storage facility in Bldg. 841 at Site 300 does not have secondary containment.

This storage area contains many pesticides and some are in significant quantities. At least one of these, Amitrol, is a restricted liquid herbicide due to its oncogenic potential. The presence of restricted pesticides and the variety and quantity of pesticide stored in this building warrant that drainage from the site should be contained by natural or artificial barriers or dikes. This facility does meet the other recommendations for a pesticide storage facility (40 CFR 165.10). The lack of secondary containment around the stored pesticides can result in the release of these hazardous materials to the environment in the event of a leak or spill.

3.5.6 Quality Assurance

3.5.6.1 Overview

Quality assurance, as applied to LLNL environmental protection programs, was assessed to determine compliance with documents listed in the Tiger Team Guidance Manual, applicable Federal and State regulations and DOE Orders. Quality assurance activities were also reviewed against draft DOE 5400.xy and against commonly accepted best industry practices and standards of performance. The assessment included interviews with LLNL employees and contracted personnel; inspections of selected LLNL facilities and locations; and review of documents, procedures, and records associated with quality assurance.

The assessment of LLNL quality assurance practices was coordinated with other Environmental Subteam specialists to ensure that all potential quality assurance problems, related to environmental programs, were identified and reviewed in sufficient detail. It was the consensus of the Environmental Subteam that, in general, the sitewide application of quality assurance was inadequate to demonstrate that LLNL environmental protection programs are being implemented in accordance with applicable environmental requirements and DOE Orders.

LLNL does not have a Laboratory-wide integrated mechanism for implementing environmental protection program quality assurance at all organizational levels. There is an LLNL Quality Assurance Manual (LLNL Quality Assurance Manual, M-078, Rev. 1, September 1985), and an LLNL Assurance Department under the LLNL Associate Director for Administration and Operations. Although the Manual defines LLNL quality assurance, the requirements of this Manual do not satisfy DOE 5700.6B. In addition, there is no effective mechanism in place to ensure that the existing requirements of this manual are implemented on a Laboratory-wide basis.

As a result, the adequacy of environmental program implementation quality assurance varies dramatically between different groups, divisions, and departments of LLNL. The implementation of quality assurance amongst these different levels of organizations ranges from marginal to non-existent. Where they exist, Quality Assurance Plans for environmental programs are most prevalent at the Group level and occasionally on the Division level. All of these existing plans, at least in part, do not satisfy the requirements of DOE 5700.6B. There is no single Quality Assurance Plans or quality assurance organization responsible for ensuring implementation of environmental programs at LLNL.

Neither the Environmental Protection Department (EPD) nor the Hazards Control Department (HCD) have a department-wide quality assurance staff and Quality Assurance Plan. The EPD has recognized this deficiency and has undertaken significant action to rectify the problem; however, they are still a long way from satisfying the requirements of DOE 5700.6B.

Where they exist, personnel responsible for quality assurance report directly to a line manager. For example, the LLNL Assurance Manager reports to the Associate Director that has line responsibility for EPD and HCD. Another example is that the EPD Quality Assurance Manager reports directly to the EPD

Manager. This type of quality assurance organization fails to meet the requirement of DOE 5700.6B for independence of the quality assurance function.

The lack of an integrated and comprehensive Quality Assurance Plan for implementation of environmental protection programs resulted in the following specific quality assurance deficiencies identified by the Environmental Subteam:

- There is no formal requirement for software quality assurance, even when such software is used to demonstrate compliance with regulatory requirements and DOE Orders.
- Quality assurance, quality control, and calibration practices in LLNL laboratories that analyze environmental program samples generally require improvement and do not conform with the requirements of DOE Orders and commonly accepted best industry practices.
- Inadequate methods are used to ensure that the quality assurance programs of contractor laboratories used to analyze environmental samples meet the requirements of DOE Orders.
- There is inadequate use of quality control checks such as activity surveillances, and independent random sampling and analysis to verify implementation of environmental programs.
- There is insufficient quality control for preparation of the LLNL Environmental Report for 1988.
- Lack of effective quality assurance and quality control denies upper management access to key performance indicators by which they can gauge the adequacy and effectiveness of environmental program implementation on a sitewide basis.

3.5.6.2 Compliance Findings

ASSESSMENT DISCIPLINE: QUALITY ASSURANCE

ASSESSMENT FINDING NUMBER: QA/CF-1

ASSESSMENT FINDING TITLE: ENVIRONMENTAL QUALITY ASSURANCE PROGRAMS AT LLNL

PERFORMANCE OBJECTIVE: DOE 5700.6B, Section 6h, defines a Quality Assurance Plan as a document that contains or references the quality assurance elements established for an activity, group of activities, a scientific investigation or a project and describes how conformance with such requirements is to be assured for structures, systems, computer software, components, and their operation commensurate with (1) the scope, complexity, duration, and importance to satisfactory performance, (2) the potential impact on environment, safety and health, and (3) requirements for reliability and continuity of operation.

Section 7 requires that plans and actions to assure quality achievement shall be established, implemented, and maintained. Also, quality assurance activities shall be required, developed, and managed as integral activities in Departmental Programs.

Section 8 states that the objectives of Quality Assurance Plans are (1) to assure that management attention and support are provided at all levels within DOE and contractor organizations, and (2) to establish an independent, institutional coordination and overview function to develop and coordinate quality assurance policies and overall guidelines.

Section 9 requires that effective quality assurance programs shall include as a minimum: assignment of organizational responsibility and authority for activities that affect quality and activities that assure quality achievement; definition of QA objectives and requirements in terms of measurable characteristics; procedures and work instructions; independent verification of quality attainment and QA Program effectiveness; definition of a QA plan for each program, project, and activity; and performance of internal quality assurance audits as a primary activity by any organization that implements quality assurance criteria or requirements.

FINDING: Environmental Quality Assurance as implemented at LLNL does not satisfy the requirements of DOE 5700.6B, especially those elements requiring that quality assurance be institutionalized and that it be an integral activity at all levels within DOE and contractor organizations. As a result, some environmental protection activities performed at LLNL do not have sufficient quality assurance to provide reasonable assurance that they are being conducted in a manner consistent with applicable requirements. Neither the Hazards Control Department (HCD) nor Environmental Protection Department (EPD) have Quality Assurance Plans and most of the Divisions within these Departments do not have Quality Assurance Plans. Some of the groups within these divisions have Quality Assurance Plans, which in part do not meet the requirements of DOE 5700.6B.

The Quality Assurance Manual for LLNL (Quality Assurance Manual, M-078, Rev. 1, September 1985), issued by the Associate Director for Administration and Operation, and implemented by the LLNL Quality Assurance Manager, has not been revised since DOE 5700.6B was issued on September 23, 1986, and is not sufficient to implement the requirements of the Order throughout LLNL. It delegates Quality Assurance Plan responsibilities to the Associate Directors and their line organizations but does not implement a mechanism for ensuring compliance. This is evidenced by the lack of Quality Assurance Plans for the HCD and EPD. It does not require the minimum elements listed in the Order and does not identify how the line quality assurance functions are to maintain their independent nature. The QA manual provides some specific guidance and establishes QA requirements but these are not implemented in practice and in any case are not sufficient to implement all of the requirements of DOE 5700.6B.

The existence and role of the LLNL Assurance Manager is not understood by all LLNL personnel with quality assurance responsibilities. Some individuals responsible for quality assurance within groups and divisions at LLNL are unfamiliar with the Quality Assurance Manual and are unaware of its requirements and its relationship to their division or group. In addition, they could not describe any interactions they have with the LLNL Assurance Manager's organization nor were they aware of any audits performed by this organizational element in their division or department.

Quality Assurance Plans have not yet been established for the HCD and EPD. In the absence of such documents, the implementation of Quality Assurance at the Division and the Group levels is inconsistent and even non-existent in many cases, and generally does not satisfy DOE 5700.6B. Those Groups and Divisions that do have Quality Assurance Programs appear to do so because of external requirements rather than because of any LLNL Quality Assurance Requirements. For example, the Hazardous Waste Management Division has QA Plans to meet the requirements of WIPP and NTS waste acceptance criteria but no other EPD division has a QA Plan.

The EPD has recognized this deficiency and has promulgated a Quality Assurance Program Action Plan, March 5, 1990, aimed at establishing a unified cohesive Quality Assurance Program throughout the Department. Although this document represents a good first step and significant activities are underway to implement it; the Department is still a long way from having a comprehensive quality assurance program. The Hazards Control Department has not yet initiated a formal departmental effort to establish a Department Quality Assurance Plan.

ASSESSMENT DISCIPLINE: QUALITY ASSURANCE

ASSESSMENT FINDING NUMBER: QA/CF-2

ASSESSMENT FINDING TITLE: IMPLEMENTATION OF ENVIRONMENTAL GUIDANCE DOCUMENTS

PERFORMANCE OBJECTIVE: DOE 5700.6B, Section 7, requires quality assurance activities as integral activities in programs and that quality assurance requirements be defined and the activities established and implemented in consonance with DOE Orders. Section 8 states that the objective of QA is to assure that management attention and support are provided at all levels within DOE contractor organizations. Another objective of QA is to establish an independent, institutional coordination and overview function to develop and coordinate quality assurance programs and overall guidelines. Section 9 requires that internal quality assurance audits be performed as a primary activity by any organization that implements quality assurance criteria.

DOE 5400.1, IV., 10., requires a quality assurance program consistent with DOE 5700.6B and covers each element of environmental monitoring and surveillance programs.

DOE 5820.2A, III., 3.1., requires quality assurance consistent with DOE 5700.6B for low-level waste operational and disposal practices. It also requires that these practices be conducted in accordance with applicable requirements of ANSI/ASME NQA-1 and other appropriate national consensus standards.

FINDING: LLNL has no formal mechanism to measure or ensure compliance with guidance documents that were established by LLNL for the purpose of protecting the environment and the public. Performance objectives, performance indicators, or any other formal quality controls have not been established as an independent mechanism to track the programmatic implementation of the guidance in these documents, nor is there a Quality Assurance Plan to facilitate implementation of these compliance methods. As a result, there is a potential for activities to be conducted at LLNL that are not in compliance with the requirements of these guidance documents and without LLNL environmental protection personnel being aware of the conditions.

LLNL uses manuals and handbooks to provide guidance on the implementation of environmental protection programs on a Laboratory-wide basis. Many of LLNL's environmental protection compliance methods are described in the following documents:

- Health and Safety Manual - Sections 1.01, 1.04, 1.13, 2.0, 3.0, 4.0, 6.06, 7.0, 9.0, 12.0, and 33.0;
- Health and Safety Manual Supplements - Supplements 1.13, 4.08, 6.06, 9.12, 12.01, 12.05, and 33.011;
- Hazards Control Manual - Sections 1.0, 2.0, 3.0, 4.0, 6.06, 7.0, 9.0, 12.0, and 33.0; and

- Environmental Protection Handbook - Guidelines for Discharges to the Sanitary Sewer System, Guidelines for Waste Accumulation Areas, and Preparation Guide for Generators of Hazardous Chemicals and Radioactive Waste at LLNL.

There are no formal mechanisms in place to measure and ensure the implementation of these documents on a Laboratory-wide basis. The LLNL Safety Teams develop Team Action Plans and Discipline Action Plans that define the responsibilities assigned to each member of the LLNL Safety Team. These Action Plans are activity oriented, do not directly relate to the requirements of the documents delineated above, and are not defined in a manner to verify programmatic compliance with the requirements of these documents. Neither is there a Quality Assurance Plan related to implementation of the requirements in the Discipline Action Plans; however, there are supervisory controls associated with implementation of these requirements.

The members responsible for each of the various disciplines of the LLNL Safety Team also perform annual facility inspections and each LLNL Safety Team publishes an annual report. These inspections are essentially a review of physical conditions or activities within the facilities and do not include any type of review to assess programmatic compliance with the requirements of the guidance documents. In addition, many of the environmental protection requirements in these documents are the responsibility of members of the LLNL Safety Team. The annual report cannot be considered as an element of quality assurance because it does not constitute an independent evaluation, as required by DOE 5700.6B.

ASSESSMENT DISCIPLINE: QUALITY ASSURANCE

ASSESSMENT FINDING NUMBER: QA/CF-3

ASSESSMENT FINDING TITLE: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

PERFORMANCE OBJECTIVE: DOE 5400.1, requires implementation of Quality Assurance Plans that meet the requirement of DOE 5700.6B for all elements of environmental monitoring and surveillance programs. DOE 5400.5, I., states that it is the intent of DOE that the monitoring and surveillance programs for DOE activities, facilities, and locations be of high quality. Draft DOE 5400.xy, establishes detailed requirements for performance standards of effluent monitoring programs, meteorological monitoring programs, environmental surveillance, laboratory procedures, data analysis and statistical treatment, dose calculations, and quality assurance.

FINDING: The Environmental Monitoring Program is not conducted in a manner consistent with DOE Orders and commonly accepted best industry practices (I-R-49, I-R-50, I-R-51). This program is implemented by the Environmental Monitoring Group of the Regulatory Affairs Division of the Environmental Protection Department (R-25, R-26). Improvement is required in the following specific areas in order for program performance to meet the stated performance objectives:

1. The analytical requirements for each type of sample and media are not specified nor is the minimum lower limit of detection for each analysis. These requirements are well defined in practice and are described in the Annual Monitoring Reports; however, they are not documented as part of the overall program definition.

2. Action levels are not specified and documented for all analytical results. There is no formal program detailing requirements for anomalous measurement investigation, resolution and documentation. There is no formal program that defines the requirements for investigations of QC samples that fall outside of established acceptance criteria. The existing procedure, EMP-QA-D, contains some action levels and is being revised to be more comprehensive.

3. There are no formal QC acceptance criteria and established methods for documenting QC results, transmitting results to the laboratory, and resolution of the identified problem. Documentation requirements are not established for the entire process of tracking and resolving problems identified as causing QC samples to fall outside the acceptance criteria.

4. Formal documented audits and surveillance are not performed by the Environmental Monitoring Group (EMG) of other LLNL groups that provide analytical services for the EMG.

5. An annual audit is performed of outside contractor laboratories; however, a pre-award audit is not performed to ensure that the Quality Assurance Plan of a contractor laboratory meets the

requirements of DOE Orders before it is allowed to analyze environmental monitoring samples. LLNL states that they only use State-certified laboratories to analyze environmental samples; however, State certification does not mean that the LLNL Quality Assurance Plan meets the requirements of DOE Orders.

6. There is no requirement to perform a routine land use census to identify nearest residence, gardens, cow/goat milk, population, etc. This type of data is essential to ensure that all pathways to humans and the maximum receptor locations are identified and effectively monitored. This data also provides a basis for siting environmental monitoring locations. This type of information is also needed for the development of the Environmental Monitoring Plan.

7. Some procedures are being used past their expiration date. Issued procedures have a 1-year life before expiring. It is required that these procedures be reviewed, updated if necessary, and reissued before the expiration date. The following examples of this situation were noted:

Procedure	Effective Date	Expiration Date
EMP-AP-L	8/30/88	8/30/89
EMP-AT-L	9/2/88	9/2/89
EMP-AP-S	6/15/88	6/15/89
EMP-AT-S	6/14/88	6/14/89
EMP-GW-S	9/1/88	9/1/89

8. The direct radiation (environmental TLD monitoring) program does not include the processing of blind QC spikes along with the field data (I-R-112, I-R-114, I-R-115, and I-R-116). The procedures used by the Environmental Monitoring Group for this program are not formalized and, in one case, incorrectly describe the use of "golden" TLDs to calibrate the system. The TLD location descriptions are on a typed list but not otherwise specified in a formal document. The Environmental Monitoring Group is in the process of developing formal procedures for this program.

ASSESSMENT DISCIPLINE: QUALITY ASSURANCE

ASSESSMENT FINDING NUMBER: QA/CF-4

ASSESSMENT FINDING TITLE: RADIOLOGICAL QUALITY ASSURANCE PRACTICES: ENVIRONMENTAL ANALYTICAL SCIENCES LABORATORY

PERFORMANCE OBJECTIVE: DOE 5400.1, IV., 10., requires that a quality assurance program consistent with DOE 5700.6B be established covering each aspect of environmental monitoring and surveillance programs. It requires that quality assurance programs include but not be limited to the following: organizational responsibility, program design, procedures, field quality control, laboratory quality control, human factors, recordkeeping, chain-of-custody procedures, audits, performance reporting, and independent data verification.

FINDING: Radiological quality assurance, quality control, and instrument control practices in the Environmental Analytical Sciences Laboratory (EASL) are not sufficient to ensure proper operation of the Laboratory and its analytical equipment and do not satisfy the requirements of DOE 5400.1 and DOE 5700.6B. The EASL is responsible for logging, screening, and tracking effluent and waste samples provided to them from the Environmental Protection Department. The EASL then forwards samples that require radiological analysis to the Hazards Control Department for processing.

The following deficiencies in the operation of the EASL were identified:

1. The EASL does not have a Radiological Quality Assurance Plan that delineates the QA/QC requirements and responsibilities for its operation. These deficiencies are recognized and plans are being made to develop and implement a QA Plan for the EASL.

2. Quality Control activities are being performed to some degree; however, Quality Assurance audit and surveillance functions are not performed.

3. The relationship of the EASL QA Plan to the plans of appropriate division, and department QA Plans has not yet been established. The EASL is a program and it appears that it will be operated under the cognizance of the Condensed Matter and Analytical Sciences Division of the Chemistry and Material Sciences Department who will be responsible to the Environmental Protection Department for its operation.

4. The EASL has documented methods covering the receipt, screening, tracking, dilution and processing of samples for radiological analysis. These methods are delineated in a memorandum, dated March 2, 1990, but they have not yet been incorporated into formal procedures. Also the methods used for the calibration, functional check, source check, and efficiency check of counting

instruments used to screen incoming samples are not contained in formal laboratory procedures.

ASSESSMENT DISCIPLINE: QUALITY ASSURANCE

ASSESSMENT FINDING NUMBER: QA/CF-5

ASSESSMENT FINDING TITLE: GENERAL QUALITY ASSURANCE PRACTICES IN LLNL ENVIRONMENTAL LABORATORIES

PERFORMANCE OBJECTIVE: Quality assurance/quality control procedures and practices resulting in scientifically valid and defensible environmental monitoring data should be implemented consistent with regulations and DOE Orders. All major environmental regulations (e.g., 40 CFR 112 and 40 CFR 136) as well as DOE 5400.1 and DOE 5700.6B contain requirements and guidance for environmental monitoring including QA/QC.

FINDING: The QA/QC practices in some of the LLNL environmental laboratories are not sufficient to document the validity of the analytical data.

Deficiencies in the QA/QC practices observed in at least one of the LLNL environmental laboratories include, but are not limited to, the following:

- The laboratories do not all have quality assurance procedures or plans.
- Calculations are not consistently checked by a second person in the Low Level Counting Laboratory of the Environmental Sciences Division.
- The transcription of data to the computer data base is not verified by a second person in the Nuclear Chemistry Laboratory.
- Standards for pH are in use beyond the expiration date on the bottles in EASL and the laboratory in the Sanitary Sewage Monitoring Station. These pH standards were replaced when the laboratory personnel were made aware of this finding.
- The analytical log sheets in the Nuclear Chemistry Laboratory and the Low Level Counting Laboratory in the Environmental Sciences Division are not always signed by the analyst and are not controlled in a manner that allows clear traceability of modifications or deletions.
- Calibration logs are not signed by the person performing the calibration in the Nuclear Chemistry Laboratory and the Low Level Counting Laboratory in the Environmental Sciences Division.
- The calibration of the analytical balance exceeded a 1-year period in the Low Level Counting Laboratory in the Environmental Sciences Division.
- Incoming samples are placed on a bench top and left in an unsupervised area in the Low Level Counting Laboratory in the

Environmental Sciences Division. Samples should be kept in a secured area with access by only authorized personnel.

- There is no formal procedure for validation of all analytical data generated in the Low Level Counting Laboratory in the Environmental Sciences Division.

- The quality assurance coordinators report directly to the LLNL director or supervisor in EASL, the Industrial Hygiene Services Laboratory, and the Radiation Counting Laboratory. Therefore, they do not have the organizational freedom to report data quality problems to upper management and may not have the independence to conduct corrective actions. This system presents the potential for conflicts of interest between the quality assurance requirements and LLNL's production needs.

  Some of the environmental laboratories are in the process of reorganization and at least two of them are planning changes in reporting lines for their quality assurance coordinators.

ASSESSMENT DISCIPLINE: QUALITY ASSURANCE

ASSESSMENT FINDING NUMBER: QA/CF-6

ASSESSMENT FINDING TITLE: RADIOLOGICAL QUALITY ASSURANCE PRACTICES IN THE SAFETY SERVICES DIVISION LABORATORIES

PERFORMANCE OBJECTIVE: DOE 5400.1, IV., 10., requires that a quality assurance program consistent with DOE 5700.6B be established covering each element of environmental monitoring and surveillance programs. It requires that quality assurance programs include but not be limited to the following: organizational responsibility, program design, procedures, field quality control, laboratory quality control, human factors, recordkeeping, chain-of-custody procedures, audits, performance reporting, and independent data verification.

FINDING: Quality assurance practices at the Hazards Control Department, Safety Services Division Laboratories, for the radiological analysis of environmental, effluent, and waste samples are not sufficient to support the validity of the data. The Industrial Hygiene Laboratory performs sample preparation for these samples, while the Counting Laboratory of the Dosimetry Group performs the radiological analysis. The following deficiencies were identified:

Industrial Hygiene Laboratory

- Spiked and blank samples are used as QC samples but the results are not tracked or trended and there are no formally defined acceptance criteria.

- Requirements and methods for tracking, trending, defining acceptance criteria, reporting of QC data, and investigating and resolving problems are not described in procedures or other formal documents.

- The Quality Assurance Plan appears to address only the QC function. Quality Assurance audits and surveillances of laboratory operations are not performed.

Counting Laboratory

- Spiked, blank, and duplicate samples are used as QC checks, but the results are not tracked or trended and there are no formally defined acceptance criteria.

- Requirements and methods for tracking, trending, acceptance criteria, reporting of QC data, and requirements for investigating and resolving problems are not described in procedures or other formal documents.

- There is no documented commitment to a minimum 10 percent QC sample load by sample and analysis type, nor a formal definition of what QC samples are required by sample and analysis type.

- QC samples are not used for gamma spectroscopy.

- The activities of the Quality Assurance Coordinators appear to consist of only QC functions. Quality Assurance audits and surveillances of LLNL operations are not performed.

- Maintenance logs were either not established for each item of equipment or were not adequately maintained.

- Requirements for alpha-beta counter periodic calibration, functional checks, operational testing, and efficiency checks are not contained in formal procedures nor are minimum intervals documented in procedures. Requirements for tracking, trending, and setting acceptance criteria for periodic checks are not formally documented. Alpha and beta efficiency and background acceptance criteria are specified in a memorandum rather than a formal procedure. Formal methods for dealing with and resolving checks that exceed the acceptance criteria are not established.

- Requirements for scintillation counter functional checks, operational testing, and efficiency checks are not contained in formal procedures, nor are minimum intervals documented in procedures. Requirements for tracking, trending, and setting acceptance criteria for periodic checks are not formal, although some acceptance criteria are specified. Formal methods for dealing with and resolving checks that exceed the acceptance criteria are not documented in procedures.

- There are no procedures or documented requirements for the operation of the gamma spectroscopy equipment.

- Quality Control samples are not processed as blind samples.

- Formal training requirements for analysts have not been established.

- The LLNL Supervisor performs a documented data review for all analyses except gamma spectroscopy. However, the requirements and mechanisms for data review are not formally defined.

- Methods for investigation, resolution, and documentation of anomalous measurements and QC sample results that exceed acceptance criteria are not formally documented.

ASSESSMENT DISCIPLINE: QUALITY ASSURANCE

ASSESSMENT FINDING NUMBER: QA/CF-7

ASSESSMENT FINDING TITLE: QUALITY ASSURANCE PLAN AND OPERATIONS PROCEDURES IN THE WASTEWATER AND TANK SYSTEMS GROUP

PERFORMANCE OBJECTIVE: DOE 5700.6B requires Quality Assurance policies, plans, and programs. Effective Quality Assurance programs shall include as a minimum: implementation of procedures and work instructions; plan and actions defined for each program/project/activity, as appropriate; implementation using written procedures and instructions; confirmation of quality attainment by means such as program reviews, and surveillance of activities. Internal Quality Assurance audits shall be performed. DOE 5400.1, IV., 5.a., requires that effluent monitoring be conducted to provide representative measurements of the quantities and concentrations of pollutants, so that the type and frequency of sampling are adequate to characterize effluent streams. Section 10 of this DOE Order requires a Quality Assurance program including the following: organizational responsibility, program design, procedures, field quality control, laboratory quality control, human factors, recordkeeping, chain-of-custody procedures, audits, performance reporting, and independent data verification.

FINDING: Quality assurance, recordkeeping, and procedures for the Wastewater and Tank Systems Group (WTSG) do not comply with the DOE Orders described in the performance objective. The WTSG is part of the Environmental Guidance Division of the Environmental Protection Department. Specific areas that require improvement are

1. The procedures governing operations of the group are informal and not issued as controlled copies. Not even informal procedures are in place to cover some aspects of the groups operation, including the quarterly update of the required analysis for each retention tank, and exemption of releases from the Retention System Disposition Record (RSDR) System. Formal documentation requirements for reports, data, and analytical requirements are not established.

2. A Quality Assurance plan covering operations of the group and the services of analytical laboratories is not established.

3. Formal guidance exists requiring the Environmental Analyst for each building to determine what analysis is required for each tank in the Retention Tank System. However, detailed formal guidance for implementing this requirement has not been established. The Guidelines for Discharges to the Sanitary Sewer System provide limited aid by stating that "The Environmental Analyst bases the list of required analysis on information supplied by the responsible employees about the material used in the process that discharges a wastestream into the tank." There are no quality assurance or quality control checks applied to this process, except that duplicate samples are processed and analyzed for each tank before the contents are released.

4. The WTSG maintains a list of required analysis by tank and updates it quarterly by sending a memo to each Environmental Analyst requesting them to update the analysis list for the tanks in their facility. Procedures have not been prepared that describe and require the process of generating and updating the quarterly report. There are no formal recordkeeping requirements for maintaining the information in the old quarterly reports, which represent the historical basis of the WTSG analytical program.

5. Many of the filed RSDRs were not properly completed. This appears to have been caused by a poor form design, which has since been corrected. Nevertheless, an improperly completed form should not be filed. Improperly completed forms should be identified during the RSDR review and approval process and the forms corrected before they are filed.

6. Improperly completed RSDR forms are indicative of inadequate procedures, training, and quality assurance.

7. Minimum retention tank recirculation times or volumes prior to sampling are not specified in the Guidelines for Discharge to the Sanitary Sewer System or required on a sitewide basis. The guidelines simply require that tanks be mixed and a representative sample obtained. Some Environmental Analysts have formally defined minimum recirculation times; however, there is no requirement for them to do so. This is not sufficient to ensure that a representative sample is obtained, since a minimum of two to three tank volumes must be recirculated in order to obtain a representative sample.

8. Certain types of liquid radioactive releases occur outside of the RSDRS, such as the release of tritium contaminated mop water from the Tritium Facility (Bldg. 331). In these situations the responsible Environmental Analyst requests approval from the WTSG. The WTSG reviews the request and gives approval. This is a one time approval for a continuing practice. There is no formal program for permitting releases outside of the RSDRS, including requirements, procedures, and centralized recordkeeping. In addition, there is no requirement for periodic reevaluation of these approvals and no method to review them against new and changed regulatory criteria to determine continued compliance. Lack of centralized recordkeeping and formal periodic review may lead to regulatory non-compliance.

ASSESSMENT DISCIPLINE: QUALITY ASSURANCE

ASSESSMENT FINDING NUMBER: QA/CF-8

ASSESSMENT FINDING TITLE: SOFTWARE CONTROL

PERFORMANCE OBJECTIVE: DOE 5400.6B, Section 5.g, defines a Quality Assurance Plan as a document that contains or references quality assurance elements and describes how conformance with such requirements is to be assured for computer software. Section 7 of this DOE Order requires quality assurance activities as integral activities in programs and that quality assurance requirements be defined and the activities established and implemented in consonance with DOE Orders. Section 7 of this DOE Order states that the objective of QA is to assure that management attention and support are provided at all levels within DOE contractor organizations. It also states that the objective of QA is to establish an independent, institutional coordination and overview function to develop and coordinate quality assurance programs and overall guidelines. Section 9 of this DOE Order requires that internal quality assurance audits shall be performed as a primary activity by any organization that implements quality assurance criteria.

DOE 5400.1, IV., 10., requires a quality assurance program consistent with DOE 5700.6B and covering each element of environmental monitoring and surveillance programs commensurate with its nature and complexity.

DOE 5820.2A, III., 3.1., requires quality assurance consistent with DOE 5700.6B for low-level waste operational and disposal practices. It also requires that these practices be conducted in accordance with applicable requirements of ANSI/ASME NQA-1 and other appropriate national consensus standards.

FINDING: There are no LLNL Quality Assurance standards established for control of software that is used in the process of demonstrating compliance with environmental requirements and regulations. There are no formal requirements, procedures, methods, and documentation for verification and validation, configuration management, and software life-cycle management for computer applications developed by LLNL, purchased from commercial vendors, or obtained from another party. Many of these applications are used to either demonstrate or ensure compliance with regulatory requirements and DOE Orders. The lack of formal software controls creates the possibility of non-compliance resulting from use of inadequate, damaged, sabotaged, or otherwise malfunctioning software.

The Applications Systems Division of the Applications Development Department of the Computation Directorate provides personnel on a matrix basis to the Environmental Protection Department and other organizations at LLNL to develop or assist in the development of computer applications. Personnel within the Environmental Protection and Hazards Control Departments also develop their own computer applications. There is no formal mechanism which defines the responsible party for software quality assurance in each of these situations.

The Environmental Subteam identified the following instances related to software verification and validation:

1. The Hazardous Waste Management Division (HWMD) of the Environmental Protection Department uses detailed database applications to implement the Hazardous Waste Requisition System and TRU tracking system. These applications are a critical component of HWMD's system to demonstrate and ensure regulatory compliance. However, software verification and validation, configuration management, and life cycle controls are not specified or required in the HWMD quality assurance plan. Informal software controls appear to have been implemented but are not part of a formal program.

2. Software used to perform offsite dose calculations for the maximum exposed individual and the population are not controlled under a quality assurance program. The same is true for software used to log and process meteorological data and analyze and process environmental TLDs. There is no verification and validation or configuration management associated with this software.

3. Verification and validation, configuration management, and documentation of software used in EASL are not performed. There are no requirements or methods established to implement these processes.

4. Requirements for verification and validation, configuration management, and documentation of software used in the Counting Laboratory of the Dosimetry Group of the Safety Services Division of the Hazards Control Department are not documented or formal. Informal verification and validation of software appears to have been performed.

ASSESSMENT DISCIPLINE: QUALITY ASSURANCE

ASSESSMENT FINDING NUMBER: QA/CF-9

ASSESSMENT FINDING TITLE: RADIOLOGICAL QUALITY ASSURANCE PRACTICES: NUCLEAR CHEMISTRY DIVISION

PERFORMANCE OBJECTIVE: DOE 5400.1, IV., 10., requires that a quality assurance program consistent with DOE 5700.6B be established covering each aspect of environmental monitoring and surveillance programs. It requires that quality assurance programs include but not be limited to the following: organizational responsibility, program design, procedures, field quality control, laboratory quality control, human factors, recordkeeping, chain-of-custody procedures, audits, performance reporting, and independent data verification.

FINDING: Quality assurance, quality control, and instrument control practices in the Nuclear Chemistry Division are not sufficient to demonstrate the validity of the data generated by the laboratory and do not satisfy the requirements of DOE 5400.1 and DOE 5700.6B. The Nuclear Chemistry Division performs radiological analysis of environmental monitoring samples for the Environmental Monitoring Group of the Environmental Protection Department. In addition, they are preparing to assume responsibility for the radiological analysis of effluent and waste samples provided to them from EASL.

The following deficiencies in the operation of the Nuclear Chemistry Division were identified:

1. The Nuclear Chemistry Division is currently operating under the Environmental Quality Verification Group Quality Assurance Plan, UCAR 10203, September 18, 1987 and Environmental Quality Verification Group Procedures Manual, UCAR 10254, October 1988. These documents do not adequately define laboratory operations and quality assurance in accordance with the stated performance objectives.

2. The Nuclear Chemistry Division also operates under the document Radiochemical Methods of the Site Environmental Monitoring Program, M-122, Rev. 1, January 1985. This document is not controlled under any Quality Assurance Plan nor is it regularly reviewed and updated.

3. The Nuclear Chemistry Division does not calibrate, check and maintain its radio-analytical equipment in accordance with the quality assurance requirements stated in the performance objectives. The following deficiencies were identified:

   - Requirements for trending, tracking, defining acceptance criteria, reporting of quality control (QC) data, investigating and resolving QC problems are not described in procedures or other formal documents.

- A 10 percent minimum QC sample load is not specified for each sample type and each analysis type. Also, the requirements for each type of QC sample (blank, duplicate, spike, etc.) are not formally specified.

- Maintenance and operation logs were not maintained for each piece of counting equipment.

- Requirements for periodic counter calibration, background measurements functional checks, as well as source checks and efficiency checks are not formalized and minimum intervals are not established.

- Requirements for trending, tracking, and setting acceptance criteria for periodic checks are not established. Formal methods for resolving and documenting checks that exceed the acceptance criteria and analytical data associated with such checks are not established.

- Quality Control samples are not processed as blind samples.

- A documented review of analytical data is not performed. Requirements and methods of data review are not specified.

- Methods for investigation, resolution, and documentation of anomalous measurements and QC sample data that exceeds acceptance criteria are not formally documented.

- Calibration of counting equipment is not traceable to National Institute of Standards and Technology (NIST).

3.5.6.3 Best Management Practice Findings

ASSESSMENT DISCIPLINE: QUALITY ASSURANCE

ASSESSMENT FINDING NUMBER: QA/BMP-1

ASSESSMENT FINDING TITLE: PROCUREMENT OF ANALYTICAL SERVICES

PERFORMANCE OBJECTIVE: A LLNL-wide procedure outlining the quality assurance/quality control requirements for the procurement of environmental monitoring services from offsite contractors would be valuable as guidance for the various LLNL organizational elements requiring these services. An appropriate procedure would help to assure consistency and the development of scientifically valid and defensible data throughout the various environmental programs. The requirements should be developed in coordination with those applied to LLNL laboratories.

FINDING: There is no LLNL-wide formal guidance or written procedure governing the establishment of quality assurance requirements to be applied to the procurement of environmental analytical and sampling services. Although LLNL personnel have stated that the LLNL practice is to use State-certified laboratories for environmental samples, LLNL does not have a formal procurement policy that requires this. In addition, LLNL does not have a documented program to establish independent QA requirements for contractor laboratories, or an independent system to ensure that the analytical data received from contractor laboratories are of consistent quality and are scientifically valid and defensible. An effective guidance procedure should outline the QA/QC practices and documentation required of the contractors and specify the extent to which laboratory and sampling audits are to be conducted by LLNL.

Requirements imposed by LLNL on the sampling and analytical contractors are inconsistent between the various LLNL users. Audits by LLNL are not generally conducted.

3.5.7 Radiation

3.5.7.1 Overview

Environmental radiation protection programs at LLNL were assessed to determine compliance with documents listed in the Tiger Team Manual, applicable Federal and State regulations and DOE Orders. The programs were also reviewed against draft DOE 5400.xy and DOE 5500.3A, and against commonly accepted best industry practices and standards of performance. The assessment included interviews with LLNL employees and contractor personnel; inspections of selected LLNL facilities and locations; and review of documents, procedures and records associated with environmental radiation protection programs. The Tiger Team found no activity which poses an immediate and unacceptable radiation safety risk to the environment or public.

As a part of the environmental radiation protection assessment, reviews were coordinated with other Environmental Subteam specialists to ensure that all potential radiation protection problem areas were reviewed in sufficient detail. Coordination with other specialists included: Air and Water specialists, to evaluate monitoring programs and effluent controls; Inactive Waste Sites and Groundwater specialists, to evaluate the potential hazard from inactive sites containing radioactive materials; Quality Assurance specialist, to assess programmatic monitoring and control; and Waste Management specialist, to assess the adequacy of waste management of radioactively contaminated waste. Several environmental radiation protection findings are addressed in the Waste Management and Quality Assurance sections of this report.

Environmental radiation protection programs were categorized into the following six areas for the purpose of this assessment: environmental monitoring, effluent monitoring, radioactive waste management, radiological analyses, decontamination and decommissioning, and safety analysis reports.

The radiological environmental monitoring program consists of perimeter and offsite monitoring locations at the Main Site and Site 300. The routine program is operated under a set of formal procedures and a Quality Assurance Plan. This program and associated documents require improvement in several key areas including ambient air monitoring, data review and evaluation, and control of services provided by other groups and contractors. In addition to the routine program, LLNL has a program to track, evaluate, monitor and determine the dose impact from accidental releases. This program needs better defined, more direct communication pathways and requires significant upgrades to meet the procedural, documentation, and training requirements of DOE Orders.

Environmental monitoring results were summarized in the 1988 annual environmental monitoring report and include individual and population dose assessments. Data presentation, calculational methods, and statistical analysis were ill-defined, unevenly applied, and inaccurate in some cases. The dose assessment was generally adequate except for one minor and one significant deficiency. Dose impact from elevated soil plutonium concentration at the Livermore Water Reclamation Plant were not discussed in the report. More significantly, although elevated airborne plutonium concentrations at one monitoring location existed for the entire year, no

investigation was performed to determine their source, correct the problem, and assess the offsite dose impact.

DOE 5400.1 requires an Environmental Protection Implementation Plan (EPIP) that describes the process by which the site will develop and implement the Environmental Monitoring Program (EMP) required by this DOE Order. The EPIP prepared by LLNL did not contain sufficiently detailed information regarding EMP development and implementation, especially in the areas of schedule, budget and necessary resources.

Radiological effluent monitoring and control programs were reviewed for both airborne and liquid effluents. Although LLNL does an adequate job of airborne effluent monitoring at its high-risk facilities, LLNL lacks a sitewide formal program that defines and implements airborne effluent monitoring. LLNL recognizes this deficiency and has taken preliminary steps to correct the problem. Failure to develop and implement an adequate sitewide program will severely hamper LLNL's ability to comply with the recently revised 40 CFR 61 and draft DOE 5400.xy. Implementation of the liquid effluents control program is generally adequate but the program needs formal procedures, document control, and a Quality Assurance Plan.

Radioactive waste generati characterization, treatment, storage and disposal activities were evaluated on a sitewide basis. LLNL places the onus of waste characterization on the generator. Although there are sufficient resources made available to the generators to perform this function, there are no specific formal requirements on use of these resources regarding sampling, analysis, waste stream characterization, and approval of indirect methods of radionuclide quantification. In addition, there is no Quality Assurance Plan to ensure that the generator adequately performs this responsibility.

Operation of the Hazardous Waste Management Division (HWMD) is governed by formal procedures and a Quality Assurance Plan. These documents are fairly comprehensive but fail to adequately address several key areas. The following areas are deficient: quality control checks on generator characterization are inadequate; quality control checks and surveillances on labeling and shipping operations are unsatisfactory; insufficient use is made of performance objectives and performance indicators; and tracking of performance problems and their resolution is inadequate.

Radioactive waste volume reduction activities required by DOE 5820.2A have not been formally implemented and there were insufficient facilities necessary to accomplish this objective. Also, volume reduction activities were not adequately addressed in the 1990 Waste Management update.

LLNL analyses of radiological environmental and effluent monitoring samples are not sufficiently controlled to ensure data validity. Analyses of these samples are performed by at least three different LLNL laboratories and several contractor laboratories. Each of the four divisions in the Environmental Protection Department has at least some responsibility in this area but there is a lack of coordinated departmental control. Quality assurance and quality control at LLNL laboratories need improvement in several areas in order to meet the requirements of DOE Orders. Audits of contractor laboratories appear to be done annually; however, pre-contract award audits are not performed to ensure that the contractor's Quality Assurance Plan meets

the requirements of DOE Orders. As a result, a contractor laboratory could perform analysis of environmental samples for up to a year before an LLNL audit identified that the contractor's Quality Assurance Plan did not comply with DOE Orders.

Evaluation of LLNL decontamination and decommissioning (D&D) activities identified the complete lack of a formal sitewide D&D program to implement the requirements of DOE 5820.2A. Four facilities have been identified by LLNL as requiring D&D; however, these activities are not being conducted in accordance with DOE 5820.2A. In addition, the 1990 update to the Waste Management Plan did not contain the required information regarding LLNL D&D activities.

Compliance of LLNL activities with the analyses and limitations delineated in facility Safety Analysis Report (SARs) was reviewed and evaluated, specifically regarding offsite radiological consequences. The Tiger Team concluded that the current method of evaluating, controlling, and approving facility physical and administrative changes is inadequate to demonstrate compliance with facility SARs.

3.5.7.2 Compliance Findings

ASSESSMENT DISCIPLINE: RADIATION

ASSESSMENT FINDING NUMBER: RAD/CF-1

ASSESSMENT FINDING TITLE: SAFETY ANALYSIS AND THE EVALUATION OF OFFSITE IMPACTS

PERFORMANCE OBJECTIVE: DOE 5484.1B, I., requires that construction, operation, and significant modifications, including decommissioning, be authorized based on an objective assessment of the safety analysis. Chapter II of this DOE Order requires a safety analysis for those operations that involve hazards not routinely encountered and accepted in the course of everyday living by the vast majority of the general public. Based on this definition, all operations involving greater than environmental levels of radioactivity require a safety analysis. The safety analysis is required to include an analysis of maximum credible accidents.

A physical or administrative change constitutes a significant modification if it increases the risk beyond that previously analyzed and reviewed, including the following: changes in operating characteristics; increases in the quantity of hazardous material; changes in design features or administrative controls; reductions in the reliability of any item identified as a hazard control; introduction of a new hazard; application of new regulations; or receipt of new information indicating that the hazard associated with existing operations are greater than believed.

DOE 5700.6B, requires Quality Assurance policies, plans, and programs. Effective Quality Assurance programs are required to include, as a minimum the following elements: implementation of procedures and work instructions; plans and actions for each program/project/activity; implementation of quality assurance using written procedures and instructions; and confirmation of quality attainment by such means as program reviews, and surveillance of activities. Internal Quality Assurance audits are required be performed.

FINDING: Facility Safety Procedures (FSPs), Operational Safety Procedures (OSPs) and changes to these documents are not implemented in a manner sufficient to ensure compliance with the associated Safety Analysis Report (SAR) and the requirements of DOE Orders (R-14, R-15, and R-59). Periodic reviews of these documents are also not performed in a manner to ensure compliance with the associated SAR. The LLNL Safety Team and Safety Team Leader are responsible for reviewing these documents. This review process is documented and appears to include review by appropriately qualified individuals; however, there is no requirement or mechanism to ensure that they are reviewed against the requirements and limitations of the SAR (I-R-126, I-R-127, and I-R-129). Specific deficiencies include the following:

1. There is no documented LLNL requirement that FSPs and OSPs be evaluated against the SAR to ensure that they do not result in a significant modification.

2. There is no documented "finding of no significance" associated with each FSP and OSP that does not require modification of the SAR.

3. There is no documented mechanism to ensure that OSPs and FSPs resulting in significant modifications are either cancelled or suspended pending an SAR revision.

4. There is no formal Quality Assurance Plan associated with the preparation, maintenance, review, and modification of FSPs, OSPs, and SARs.

5. The standardized guidance for OSP/FSP promulgation, review, and approval does not define the minimum required review elements regarding compliance with SAR's or the methods for documenting such reviews.

6. The FSP for the Bldg. 514 complex (R-6) contains an activity limit for depleted uranium; however, the SAR for this facility (R-42) does not include the analysis of a maximum credible accident involving this material. Currently there are 160 drums containing approximately 7.8 Curies of depleted uranium stored in oil. A uranium fire in any one of these drums would likely result in a conflagration involving all 160 drums. This accident and the resulting offsite consequences are not analyzed in the SAR or referenced in the FSP.

7. The FSP for the Bldg. 612 complex (R-7) contains activity limits for TRU, fissile materials, mixed fusion products and tritium. The SAR does not contain an analysis of the maximum credible accident involving these limits, nor does the FSP reference any such analysis.

ASSESSMENT DISCIPLINE: RADIATION

ASSESSMENT FINDING NUMBER: RAD/CF-2

ASSESSMENT FINDING TITLE: RADIOLOGICAL STACK EFFLUENT MONITORING PROGRAM

PERFORMANCE OBJECTIVE: DOE 5400.1, IV., 5., requires that effluent monitoring be conducted at all DOE sites to satisfy the following program objectives: evaluate the effectiveness of effluent treatment and control; identify potential environmental problems and evaluate the need for remedial actions or mitigation measures; and detect, characterize, and report unplanned releases. The Order also requires that effluent monitoring be conducted to provide representative measurements of the quantities and concentrations of pollutants in airborne discharges.

DOE 5484.1, III., requires that effluents be monitored and that monitoring be conducted in a manner that provides accurate measurements of the quantity and concentration of airborne pollutants in effluents. It also provides a basis for evaluating the adequacy and effectiveness of containment and waste treatment control as well as efforts toward achieving levels of radioactivity which are as low as reasonably achievable. It requires that measurements of volume, rate of discharge, content, etc., be made at the point of discharge, where practicable, and that proportional sampling may be necessary when effluent flow rates fluctuate.

40 CFR Part 61, Subpart H, requires the following: effluent flow rates and measurements shall be made using approved methods; for variable flow rates continuous or frequent flow-rate measurements shall be made; radionuclides shall be directly monitored or extracted using approved methods; the effluent stream shall be monitored continuously or withdrawn continuously; a quality assurance program shall be conducted in accordance Appendix B, Method 114. It requires that radionuclide emission measurements be made at all release points which have a potential to discharge radionuclides into the air in quantities which would cause effective dose equivalents in excess of 1 percent of the standard. It is necessary to evaluate the potential for radionuclide emission at each release point to determine if it is subject to release monitoring. Release rates shall be based on the discharge that would result if all pollution control equipment did not exist. Periodic confirmatory measurements shall be made to verify the low emissions from those release points that are not monitored.

40 CFR Part 61, Appendix B, Method 114, states that each facility required to measure their radionuclide emissions shall conduct a quality assurance program. The program shall consist of a system of policies, organizational responsibilities, written procedures, data quality specifications, audits, corrective actions and reports. The program shall include the elements described in Method 114.

FINDING: LLNL does not have a formal radiological stack effluent monitoring program that establishes overall sitewide guidance and control (I-R-47, I-R-48, I-R-49, I-R-108, and I-R-109). Existing stack monitors for the LLNL high risk facilities appear to be adequate; however, the informal program that is in place is not sufficient to

ensure compliance with the DOE Orders and 40 CFR Part 61 for other stack monitors and airborne effluent release points. This problem has been identified by laboratory personnel and was addressed in Finding E10 of the Mini-Tiger Team Audit (R-61). In addition, two baseline studies were performed: one to assess the adequacy of existing monitoring equipment and another to assess the offsite dose from unmonitored release points (R-1, R-37). The Environmental Monitoring Group has overall responsibility for the effluent monitoring program (R-31). Specific improvements are required in the following areas:

1. Formal mechanisms do not exist to ensure that the Environmental Monitoring Group is included in the review, evaluation, and signature approval of the use of radioactive materials, other than sealed sources, in all buildings. This review is essential so a determination of monitoring requirements can be made and this usage can be identified and entered into a data base. In this manner the required periodic reviews can readily performed. Reviews need to be initiated in the process as soon as possible so that effective design input can be provided.

2. Formal methods do not exist for evaluating usage of radioactive materials to determine if applicable monitoring requirements must be developed. These methods and the results of the evaluations must be formally documented. The requirements and methods for periodic reevaluation must be formalized and documented.

3. There are no sitewide uniform or formal standards defining the minimum requirements for stack monitoring equipment.

4. There are no sitewide uniform or formal standards defining the minimum requirements for ventilation systems design.

5. There are no sitewide uniform or formal standards defining the minimum sampler maintenance.

6. There are no sitewide uniform or formal requirements for HEPA change criteria, pressure drop gauge reading, gauge calibration, or gauge reading acceptance criteria.

7. There are no sitewide uniform, formal methods to quantify releases that may occur during periods when samplers are not operational or to quantify releases from release points that are not continuously monitored.

8. A formal quality assurance plan for this program has not been prepared.

ASSESSMENT DISCIPLINE: RADIATION

ASSESSMENT FINDING NUMBER: RAD/CF-3

ASSESSMENT FINDING TITLE: ASSESSMENT OF AIRBORNE EFFLUENTS

PERFORMANCE OBJECTIVE: DOE 5484.1, III., requires that an environmental radioactivity monitoring program be maintained to determine whether containment and control of releases of radioactivity from site operations are functioning as planned. An environmental monitoring report shall be prepared annually to summarize and interpret the levels of radioactivity in the environment attributable to site operations. It also specifies than an assessment of potential dose to the public be performed in accordance with the following requirements: the assessment shall be as accurate and realistic as is practicable; and evaluate all significant potential pathways of exposure. Section 5, requires that effluent monitoring be conducted in a manner that provides accurate measurements of the quantity and concentration of airborne pollutants in effluents. It also requires that the annual report contain a complete summary to the extent that all significant releases are reported.

DOE 5400.1, I., 5.a., requires that effluent monitoring be conducted at all sites to evaluate the effectiveness of effluent treatment and control; identify potential environmental problems and evaluate the need for remedial actions or mitigation measures; and to detect, characterize, and report unplanned releases. It also requires that environmental surveillance be conducted to monitor the effects of DOE activities on the offsite environment.

FINDING: LLNL has not addressed all potential radiological exposure pathways in its dose assessments nor did it investigate and evaluate the cause of measurable offsite airborne plutonium contamination. The detected concentrations are much less than any regulatory limits and present no imminent threat to the public or the environment. The LLNL Environmental Report for 1988 (R-28) presented data for measurements of plutonium in air at the site perimeter which clearly indicated detection of plutonium from site sources. However, this situation was not even discussed in this report. In addition, the site has not conducted an investigation to determine the cause of the elevated measurements (I-R-118 and I-R-119).

The measured airborne plutonium concentrations at a perimeter monitor located near the predominant downwind direction ranged from 4 to 16 times greater than the monthly average and was 7 times the annual average for the offsite control locations. The concentrations at adjacent monitors were also generally higher than the offsite control locations.

Although the detected concentrations are much less than any regulatory limits and present no imminent threat to the public or the environment, they do indicate one or more airborne effluent plutonium sources on site. The site did not detect plutonium in any stack monitors for airborne effluents over the same time period, which indicates that the source of the offsite plutonium is unmonitored and unquantified. It may also indicate that site airborne effluent monitoring is inadequate or that the airborne

plutonium is due to soil contamination at the southwest portion of LLNL caused by historical activities.

Airborne plutonium concentrations were not considered in the calculation of offsite doses. The failure to investigate the source of the elevated measurements or to address the plutonium in the offsite dose assessments is not consistent with DOE requirements that all potential sources of radioactive materials and pathways for exposure of individuals be evaluated.

ASSESSMENT DISCIPLINE: RADIATION

ASSESSMENT FINDING NUMBER: RAD/CF-4

ASSESSMENT FINDING TITLE: ASSESSMENT OF IMPACT TO THE PUBLIC AND THE ENVIRONMENT IN EMERGENCY SITUATIONS

PERFORMANCE OBJECTIVE: Draft DOE 5500.3A, Emergency Planning, I., 2.d(2), requires development and maintenance of plans, procedures, and documents integral to the emergency planning programs described in Chapter III. Chapter I, 2.e, specifies "Consequence Assessment" as one of the 14 elements of planning and preparedness. DOE 5500.3A, III., f., requires that provisions be made for offsite field monitoring of hazardous materials including personnel, monitoring and sampling equipment, communications equipment and transportation of the monitoring teams. It also requires provisions to incorporate field monitoring information into the offsite consequence assessment.

Chapter III, Section k. of this DOE Order, requires provisions for analysis of environmental samples and that the results are provided to personnel responsible for emergency response decisions and actions. It also requires that adequate equipment and supplies be available and that they be properly stored, labeled, and operable. The type, quantity, and location of equipment shall be identified, including whether or not it is dedicated to emergency response. Provisions shall be in place to inspect, inventory, calibrate, and perform operational checks of this equipment and supplies, and that provisions be made for repair and replenishment as needed. Section l of this DOE Order requires specialized formal training of all members of the emergency response organization including classroom and practical training. A formal program shall specify initial training and annual retraining and the method to accomplish this. Training must be provided for personnel responsible for hazards assessment, protective actions, hazards monitoring and analysis, health physics and meteorological projections.

Chapter IV, Section 1b. of this DOE Order states that the Emergency Operations Center (EOC) shall provide for the effective and efficient accomplishment of the following: dispatch and direct mobile emergency monitoring teams; receive, evaluate, and manage data from the emergency monitoring teams; and assess the consequences on the environment. It also requires that communications at the EOC provide for the following: effective exchange of information between personnel on site and offsite; reliable communication links, backup or alternate methods for communicating with monitoring teams. The order states that staffing of the EOC shall include the following: personnel responsible for assessment and evaluation of the impact of emergency events on the environment; personnel for coordinating mobile emergency monitoring teams; and personnel responsible for the recommendation of protective actions for the public.

Section 2 of this DOE Order requires that necessary equipment and supplies be identified and listed in implementing procedures and charges that the inventory shall be kept current and documented.

FINDING: The LLNL Emergency Organization, Emergency Plan, and Implementing Procedures do not comply with the requirements of draft DOE 5500.3A for monitoring, tracking, and assessing the impact to the public and the environment from offsite radioactive releases in emergency situations (I-R-111, I-R-113, I-R-120, I-R-121, I-R-122, and I-R-123). The following deficiencies were noted:

1. The personnel responsible for monitoring and evaluation of offsite radiological impact are located at three different locations, none of which is located in the EOC. This does not meet the communication and staffing requirements for the EOC as required by the performance objective. The meteorological and management portion of offsite dose assessment is located in the Satellite Communications Center, the communications and control of the offsite teams is handled from Trailer 1680, and the Environmental Monitoring Group Leader is located at the incident scene.

2. The organization and operation of the offsite radiological dose assessment function is not described in detail in the Emergency Plan or its Implementing Procedures.

3. There are no procedures which describe the activation of an offsite radiological monitoring team or the method by which the Environmental Technicians are dispatched and linked with the Health and Safety Technicians. There are no procedures which delineate the equipment to be taken, how it is to be utilized, and how information gathered is to be relayed back from the field.

4. There are no procedures that describe the offsite monitoring equipment, or its location; nor is there an inventory of this equipment. Furthermore, there are no procedures that identify the requirements for maintenance, calibration, and inventory of emergency equipment and supplies. Requirements for adequate equipment and supplies properly stored, labeled, and operable are not established. There are no procedural requirements to inspect, inventory, calibrate, and operationally check the equipment and supplies, nor are there requirements to repair and replenish them as needed.

5. There are no procedures that describe emergency planning zones, predefined environmental and public protective action recommendations, source term estimation, and back calculation.

6. There is no formal training program for members of the emergency response organization responsible for performing offsite dose assessment, including classroom and practical training, except for emergency plan exercises. There is no formal program for initial training and annual retraining. There is no specific training for personnel with emergency plan responsibilities in the areas of hazards assessment, protective actions, hazards monitoring and analysis, health physics and meteorological projections. None of the LLNL personnel interviewed during the

Tiger Team Assessment had received specific formal Emergency Plan Training and at least one person was unable to adequately demonstrate adequate knowledge of his emergency job function.

7. There are no procedures that describe the provisions for the radiological analysis of environmental samples or the transmission of results to personnel responsible for emergency response decisions and actions.

ASSESSMENT DISCIPLINE: RADIATION

ASSESSMENT FINDING NUMBER: RAD/CF-5

ASSESSMENT FINDING TITLE: LLNL ENVIRONMENTAL REPORT

PERFORMANCE OBJECTIVE: DOE 5400.1, II., 4., requires an annual site environmental report that presents summary environmental data so as to characterize site environmental management performance, confirm compliance with environmental standards and requirements, and highlight significant programs and efforts. Attachment II-1 to the Order establishes the suggested format and content of the report, which includes the following: a discussion of abnormal occurrences that resulted from program activity; tables, graphs, or text which clearly and accurately present the overall monitoring results; and an assessment of potential radiation dose to the public.

DOE 5484.1, III., 4., Scope and Content of Environmental Monitoring Program, Reports, and Summaries, requires that programs for monitoring the environment be conducted. It also requires that the report shall include for each station the number of samples taken with an indication of the central tendency and the spread of the data, including mean concentration plus two standard deviations, and concentration maximum and minimum. The minimum detection levels should be indicated and data below this level should be expressed as being less than (<) the minimum detection level. The preferred method of computing averages is outlined in ERDA-77-24; however, it is acceptable that sample results below the detection level be assigned the detection level value, and the average expressed as less than (<) the computed value. In either case, the methods used to calculate these numbers should be outlined in the report. Section 5, Effluent Monitoring, requires a summary of the effluent monitoring program. Chapter IV, Section 4.c, Effluent and Environmental Monitoring Reports, describes the format and content of effluent and environmental monitoring reports.

FINDING: The LLNL Environmental Report for 1988 (R-28) does not satisfy DOE requirements for preparation, reporting methods, statistical techniques, calculational methods, and quality assurance (I-R-118 and I-R-119). Deficiencies were noted in the following specific areas:

1. The description of statistical methods used to evaluate data in Appendix B of the report is ambiguous and does not contain a sufficiently detailed description of how these methods were applied. The following specific problems were noted:

   - The use of Lower Limit of Detection (LLD) values in calculating averages and standard deviations is not clearly explained as required by DOE 5484.1.

   - The description and apparent implementation of data significance, when compared to the LLD, is incorrect. It states that all measured values with a two sigma error greater than 100 percent were assumed to be at or below the detection limit. Examination of the data in the Report indicates that measured values with this magnitude of error are being

reported as less than the LLD. This is an inappropriate method of handling data values with large errors.

2. The achieved LLD is not reported for all analyses and measurements that do not result in a positive detection and in some cases is incorrectly reported. In some cases the achieved LLD is shown, while for others a footnote is provided that states activity was not detected. DOE 5484.1 specifies that the LLD shall be reported in all cases and that measurements below this value shall be reported as less than the LLD where LLD is the actual lower limit of detection. The data is required to be reported in this manner so that the reader may readily discern if the lack of detection was due to high analytical detection limit.

3. DOE 5484.1 requires that mean concentrations be reported; however, in many cases throughout the Report, the median and median absolute deviation are reported instead of the mean and the standard deviation of the mean. The methods and equations used to calculate the mean, standard deviation of the mean, median, and median absolute deviation are not defined in the Report. The following additional problems were noted:

   - The decision to use median or mode statistics is defined in the report but is not consistent from table to table. The basis of the choice of statistics is not justified. In one case, median statistics are used on data sets with less than eight items of data. Appendix B states that median statistics are to be used on sample sets containing one-third or more less than LLD values of the total number of measurements. In other cases, neither of these criteria are applied and median statistics are not used even when they would be applicable by these criteria.

   - Mean statistics and median statistics are often mixed for different columns in the same data table and the data are not clearly marked to indicate which statistics were used on each data column.

   - The method used to calculate the median differs from table to table and sometimes within the same table.

   - Instances were noted where the mean, median, and median absolute standard deviation were incorrectly calculated.

4. The equation displayed in Appendix F for calculation of the annual population dose is incorrect and inconsistent with the actual method utilized. It appears that the equation actually used to calculate the population dose is the correct one.

5. The compass sectors being used by LLNL in determining the distance to the fence line and to the nearest resident do not match the wind direction sectors used in the AIRDOS model. The first 22.5 degree compass sector should be centered on north, and not 22.5 degrees east of north as is currently done by LLNL. As a consequence, the distances used in the dose assessment may be incorrect.

ASSESSMENT DISCIPLINE: RADIATION

ASSESSMENT FINDING NUMBER: RAD/CF-6

ASSESSMENT FINDING TITLE: DECONTAMINATION AND DECOMMISSIONING ACTIVITIES AT LLNL

PERFORMANCE OBJECTIVE: DOE 5820.2A V, Decommissioning Of Radioactively Contaminated Facilities. This Order establishes specific requirements for developing and documenting programs to provide for the surveillance, maintenance, and decommissioning of contaminated facilities. These requirements include maintaining a complete list of contaminated facilities both operational and excess; and maintaining operational records (e.g., facility design drawings and modifications, characterization data on contamination levels, prior decontamination activities, and incident reporting required by the DOE) for all contaminated facilities.

The Order also requires LLNL to initiate decommissioning planning during the design phase for new facilities and prior to termination of operation for existing facilities; to plan using a 2-year budget cycle and to assure cost sharing for multiple user facilities. Decommissioning project activities require facility characterization to obtain baseline data; use of an environmental review process to ensure compliance with CERCLA and RCRA; technical engineering planning; decommissioning operations; and post decommissioning activities.

DOE 5820.2A VI and Attachment VI-1, Waste Management Plan Outline and Waste Management Documentation Requirements, respectively, establish requirements for reporting of Decommissioning and Decontamination (D&D) activities at LLNL in the annual update of the Waste Management Plan.

DOE 5820.2A, V., 3.e., requires quality assurance consistent with DOE 5700.6B for D&D activities.

FINDING: LLNL does not have a program to manage D&D of abandoned, new, and currently in use facilities. Hence, D&D activities at LLNL are not being performed in accordance with the requirements of DOE 5820.2A.

The following specific deficiencies were noted regarding D&D activities at LLNL:

1. A sitewide D&D program has not been established to ensure that the requirements of this Order are met for abandoned, new, and currently in use facilities. There appears to be no single individual or organization responsible for D&D at LLNL.

2. A Quality Assurance Plan consistent with DOE 5700.6B has not been established or implemented for all LLNL D&D activities as required by DOE 5820.2A.

3. The Environmental Restoration Division of the Environmental Protection Department is responsible for the four planned LLNL D&D activities (I-R-137). Efforts are underway to D&D four major facilities at LLNL (Bldgs. 212 W, 281, 292, and 412 E). A formal

program has not been established to ensure that the requirements of DOE 5820.2A are met for the decommission efforts associated with these facilities. In addition, there is no Quality Assurance Plan covering these D&D activities.

4. New facilities being planned or under construction do not comply with the performance objectives for D&D, since no mechanism is in place to perform decommissioning planning. As a result, decommissioning planning does not appear to be implemented during the design phase, as required.

5. There is no mechanism in place to initiate decommissioning for facilities currently in use.

6. The FY 90 Update LLNL Waste Management Plan (R-17 and R-19) is required to summarize documentation for D&D activities in 1989. The plan summarized these activities as follows: "There are no plans to terminate operations at LLNL and hence, no plans for facility decommissioning." This completely fails to meet the stated performance objective for waste management documentation requirements.

3.5.7.3 Best Management Practice Findings

ASSESSMENT DISCIPLINE: RADIATION

ASSESSMENT FINDING NUMBER: RAD/BMP-1

ASSESSMENT FINDING TITLE: ENVIRONMENTAL PROTECTION IMPLEMENTATION PLAN

PERFORMANCE OBJECTIVE: Environmental Protection Implementation Plan Guidance for DOE 5400.1, August 3, 1989, provides guidance for preparation of the Environmental Protection Plan. DOE 5400.1, III., 2., requires preparation of an Environmental Protection Implementation Plan (EPIP) by November 9, 1989. The EPIP is required to provide environmental protection goals and objectives, and identify strategies and timetables for attaining them. Organization, staffing, and budget requirements needed to carry out environmental protection initiatives are to be described.

FINDING: The LLNL EPIP (R-30) does not contain sufficiently detailed information regarding the implementation of DOE 5400.1 requirements (I-R-49). The following deficiencies were identified:

1. Section 1 does not include an overview of ongoing activities designed to ensure compliance with DOE 5400.5 and draft DOE 5400.xy.

2. Section 5 does not provide a sufficiently detailed discussion of preparation of the Environmental Monitoring Plan nor a schedule or timetable for its development. Instead, it simply specifies that it will be completed by the regulatory mandated completion date. The organization, staffing, and budget for this effort are not described; rather it is simply stated that personnel resources within currently budgeted limits will be used.

3. Section 5 does not adequately describe how the airborne effluent monitoring activities will be implemented, especially in light of the fact that there is no formal sitewide airborne effluent monitoring program.

ASSESSMENT DISCIPLINE: RADIATION

ASSESSMENT FINDING NUMBER: RAD/BMP-2

ASSESSMENT FINDING TITLE: PLUTONIUM IN SOIL AT THE LIVERMORE WATER RECLAMATION PLANT

PERFORMANCE OBJECTIVE: Commonly accepted best industry practices are to identify and remove soil containing radioactive material in concentrations significantly greater than background when the elevated concentrations are caused by unplanned releases. DOE 5400.5, II., 3.d., Discharges of Liquid Waste to Sanitary Sewage, requires that concentrations shall be controlled so that long-term buildup of radionuclides in solids will not present a handling and disposal problem at sewage disposal plants. The Order also requires that discharges to public sewers be coordinated with the operators of the waste water treatment works.

FINDING: The LLNL Environmental Report for 1988 did not adequately discuss the plutonium detected in soil immediately adjacent to the fenced area at the Livermore Water Reclamation Plant (LWRP). In addition, LLNL has no plans to remove this contamination. This activity is the result of plutonium released in historical sanitary sewage discharges during 1967. The concentration level is far below any proposed standards and does not represent a hazard to the public or the environment (I-R-141).

The elevated plutonium concentration found in soil was briefly discussed in the LLNL Environmental Report for 1988, which stated that elevated plutonium concentrations were also found at this location in 1987. However, the report does not discuss the dose impact associated with the plutonium nor does it describe ongoing or historical activities regarding this contamination.

LLNL has been aware of the plutonium soil contamination at LWRP since the early 1970s. The situation has been thoroughly investigated to determine the extent, magnitude, and consequences associated with this contamination. The investigations have shown that the maximum soil concentration at this location is almost 100 times the average of plutonium concentrations in all other offsite and onsite soil samples. The average soil concentrations at the LWRP has remained relatively constant since the early 1970s and is similar to the concentration detected in the LWRP sludge in 1988.

Even though historical site activities have resulted in measurable soil plutonium concentrations in the environment and its extent is very small, LLNL has not made any commitment to remove it. The original decision made in the 1970s to leave the activity in place was prudent based on the lack of environmental hazard. However, given the current high level of public concern over any level of radioactivity detected in the environment, especially plutonium, continuing to leave it in place is not consistent with commonly accepted best industry practices.

3.5.8 Inactive Waste Sites and Releases

3.5.8.1 Overview

The Inactive Waste Site portion of the Environmental Subteam Assessment at LLNL evaluated the compliance status of the Main Site and Site 300 with regard to those documents listed in the Environmental Audit Manual and the Tiger Team Guidance Manual - Environment, Safety and Health and Management and Organization Assessment, including the statutory provisions of CERCLA and SARA, the proposed National Contingency Plan, State regulations, and applicable DOE Orders. The scope of the review included interviews with SAN, LLNL, and consultant and regulatory personnel; visits to identified inactive waste sites; extensive review of documents, plans, sampling results, and internal standard operating procedures; and evaluation of the adequacy and implementation of spill reporting procedures. The inactive waste sites investigation also included an evaluation of Emergency Planning and Community Right-to-Know activities under SARA Title III and California laws.

Environmental investigation activities at the Main Site and at Site 300 are being driven by two different regulatory actions. The Main Site was included on the National Priorities List (NPL) on July 21, 1987, because of groundwater contamination. Preliminary assessments were submitted for the six areas of groundwater contamination known at that time. Prior to the listing, the site had been working under a series of State-issued administrative orders. The first was an Order for Compliance issued by the California Department of Health Services (DHS) that required submission of a groundwater investigation plan. Secondly, the San Francisco Bay Regional Water Quality Control Board (RWQCB) issued several orders that directed investigation and cleanup efforts. A variety of investigation activities were conducted under these orders.

Once LLNL was placed on the NPL, DOE made efforts to enter into a multi-agency agreement at the same time the RWQCB-ordered agenda was progressing. Negotiations between all concerned agencies (DOE, EPA, RWQCB, and DHS) resulted in the signing of a Federal Facility Agreement (FFA) in November 1988 and the adoption of a revised site cleanup order by the RWQCB that incorporated a single CERCLA investigation and a single schedule (IWS-7). The FFA accepted all previous work completed under the RWQCB and DHS Orders, and the required activities began with the remedial investigation effort.

The status of Site 300 is quite different. A preliminary assessment for all of Site 300 was submitted to the EPA in late 1987. Prior to this submittal, LLNL was already involved in studies of contamination at Site 300. LLNL is conducting a series of environmental investigations under the auspices of the RWQCB (Central Valley Region). A revised work plan (IWS-2) submitted in October 1989 outlined tasks planned for the investigation and subsequent remediation of areas of soil and groundwater contamination. All activities conducted to date have occurred with the approval and oversight of the RWQCB.

In February 1989, EPA issued a unilateral Administrative Order for Site 300 under Section 3008(h) of RCRA (IWS-3). However, this Order has not taken effect because negotiations are still underway to coordinate the RCRA investigation activities with those required by the RWQCB Draft Cleanup and Abatement Order issued in April 1989 (IWS-56). Shortly thereafter (July 1989), Site 300 was proposed for the NPL. The NPL issue is not expected to be

finalized in the near future because LLNL has contested the score that was assigned by EPA based on potential impacts of trichloroethene (TCE) on water supply wells. LLNL data indicate that the deep regional water supply aquifer has not been affected by the contaminant of concern, TCE, although TCE contamination is found in shallow and in perched aquifers. At this time no agreements have been reached, and investigations and remediations are proceeding solely under State jurisdiction. Although a number of reports on the nature and extent of contamination at Site 300 have been completed, the existing work plan will not satisfy all RFI work plan requirements and the reports do not include information on receptors and potential risks (which are, however, nonexistent for many source areas). These issues would be subject to negotiation similar to that which occurred for the FFA.

A variety of inactive waste sites have been identified at the Main Site and Site 300. At the Main Site, environmental restoration activity has focused on widespread volatile organic contamination of groundwater, a result of a large number of Navy and LLNL activities, both past and present. Source areas at the Main Site include old landfills, storm sewer discharges, salvage yards, dry wells, spill areas, fire training pits, and a large gasoline spill. Extensive record review and groundwater investigation has resulted in the identification of 14 general geographic areas to be investigated, in addition to a gasoline spill.

The remedial investigation conducted at the Main Site focused on the issue of groundwater contamination. Both State agencies and the EPA have given top priority to the definition and the remediation of the offsite solvent plume, followed by the onsite groundwater contamination. Many of the original source areas such as the East Traffic Circle Landfill (IWS-21) and the evaporation pits in the East Taxi Strip area (IWS-53) have been excavated, thereby removing residual sources of groundwater contamination. Low priority is given to areas that may be minor potential residual sources of groundwater contamination such as those contaminated by less mobile constituents that pose little risk to groundwater (IWS/BMP-1).

At Site 300, production and disposal activities occurred in isolated portions of the area. Inactive waste sites at Site 300 include inactive disposal pits for firing table debris (two of which are scheduled for RCRA closure), closed HE process water lagoons, dry wells, and several plumes of tritium and trichloroethene groundwater contamination. Work at Site 300 is progressing under a State-approved work plan that focuses first on the areas of identified offsite groundwater contamination in the GSA area and the sewer pond area, followed by delineation and remediation of onsite groundwater contamination such as at the Bldg. 834 complex. As at the Main Site, however, there is little attention given to areas containing less mobile contaminants (e.g., PCBs).

One of the original DOE Environmental Survey findings focused on the fact that there was no system in place to avoid excavation in known areas of contamination. Since then, a formal system has been implemented that involves the Environmental Analysts, Environmental Restoration personnel, and the Site Planning Department. All plant engineering projects are presented to the Environmental Analysts and LLNL Safety Teams. In addition, the Environmental Restoration Department has supplied Site Planning with maps delineating known areas of contamination, and Site Planning sends monthly maps of all planned

projects to the Environmental Restoration Division. This system ensures that accidental excavation and disposal of contaminated soil is avoided.

Site activities with respect to SARA Title III consist of release reporting under CERCLA Section 304 and community right-to-know reporting under CERCLA Sections 311 and 312. The site is not required to prepare Annual Release Reports under Section 313 (Form Rs) because LLNL is not a manufacturing facility as identified in SIC codes 20 to 39.

There is an established system in place for spill reporting. Spill reporting procedures are verbally transmitted to chemical handlers in the generator training course offered on site. Detailed written procedures to reinforce the information offered in the training are currently in preparation. Interviews conducted and records reviewed during the assessment, revealed that the release reporting system is well organized and implemented. Reportable-quantity releases are filed by the Division Leader of the Environmental Guidance Division (I-IWS-17 through 21).

LLNL filed its initial SARA Section 311 report in 1987. The report included a list of chemicals that was provided by the Purchasing Department. The list included all items identified by LLNL as being "chemicals," but does not include consumer products or very small amounts of research-type chemicals used in various laboratories. However, because the minimum reporting requirement in SARA is 1 pound, this does not present a problem. This overall inventory has not changed, and therefore, this submittal meets the reporting requirements.

The 1988 calendar year submittal of Tier II reports under SARA Section 312 was based on a detailed inventory of chemicals present on site in quantities greater than 1 pound (IWS-54), although only chemicals present in quantities greater than 500 pounds are required by SARA to be recorded in Tier II reports. This "over-reporting" is one of the problems associated with not having an operating chemical tracking system (IWS/BMP-2). 1988 was the first year that nonprofit organizations such as the University of California were required to report. The Tier II information was generated using in-house computer software. The submittal for 1989 was presented as a Hazardous Materials Business Plan under California law AB2185 that has slightly different reporting requirements and schedules. AB2185 applies only to profit-making businesses. A subsequent law, AB2189, states that submissions meeting the requirements for AB2185 satisfies SARA Title III requirements, and also incorporates non-profit agencies such as the University of California. LLNL submitted its plans to Alameda County in February 1990 and to San Joaquin County in December 1989. The LLNL Fire Department has also received copies of all reports. LLNL reports all chemicals in the inventory that are present in quantities greater than 500 pounds, regardless of whether the chemical is on one of the relevant California lists of hazardous chemicals.

3.5.8.2 Compliance Findings

ASSESSMENT DISCIPLINE: INACTIVE WASTE SITES

ASSESSMENT FINDING NUMBER: IWS/CF-1

ASSESSMENT FINDING TITLE: ADMINISTRATIVE RECORD FOR REMEDIAL INVESTIGATION ACTIVITIES AT THE Main Site

PERFORMANCE OBJECTIVE: In 1986, the Superfund Amendments and Reauthorization Act (SARA) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) established the requirement for an administrative record in order to allow public participation in the selection of remedial alternatives. The Main Site has been on the National Priorities List (NPL) since July 1987. In 1988, both the proposed revisions to the National Contingency Plan (December 21, 1988) and the EPA Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (October 1988) suggested that the Administrative Record be compiled early in the process. Specifically, 40 CFR 300.815(a) states that "The administrative record file for the selection of a remedial action shall be made available for public inspection at the commencement of the remedial investigation phase." Section XXIII of the Federal Facility Agreement (IWS-7) also requires the establishment of an administrative record.

FINDING: LLNL has not established the administrative record for the remedial investigation at the Main Site.

LLNL personnel have been operating under the assumption that the administrative record need only be completed when the proposed remedial action plan is published (scheduled for November 1990) in order to meet the CERCLA public participation requirements. The schedule was discussed during the FFA negotiations, but did not become a formal part of the FFA.

The Environmental Restoration Division prepared a plan for the establishment and maintenance of the administrative record (IWS-58). Letters were sent to the other FFA signatory agencies (the EPA, the California Department of Health Services, and the California Regional Water Quality Control Board) in February 1989 requesting that they furnish their own documents that are relevant to the administrative record (IWS-59). LLNL has received no response to these requests to date. Many, if not all, of the DOE-produced technical documents completed at the time of this assessment are available to the public in the information repositories established as part of the community relations activities. However, there are many other documents that should be included in an administrative record in addition to the technical documents (e.g., correspon-dence). At the time of the Tiger Team Assessment, LLNL had several dozen binders containing potentially relevant documents that must be sorted and compiled. Additional information is continually generated, a fact that makes the establishment of the administrative record more difficult as time goes on.

3.5.8.3 Best Management Practice Findings

ASSESSMENT DISCIPLINE: INACTIVE WASTE SITES

ASSESSMENT FINDING NUMBER: IWS/BMP-1

ASSESSMENT FINDING TITLE: RESIDUAL SOIL CONTAMINATION WITH IMMOBILE CONSTITUENTS

PERFORMANCE OBJECTIVE: As stated in Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (IWS-55), "...the intent of soil sampling is to characterize and estimate the limits of existing soil contamination... (S)oil contamination should be documented in both vertical and horizontal directions."

FINDING: The remedial investigation at the Main Site focused on the extent of volatile organic chemical contamination in groundwater and soil, while areas with identified historical releases of immobile constituents (e.g., metals and/or PCBs) were not fully investigated. These areas may, in fact, present little risk to site receptors; however, this cannot be determined because no sampling has been conducted in many of these areas. Several apparent discrepancies exist between historical release information presented in Section 4.1 and the extent of contamination discussed in Section 4.2 of the draft Remedial Investigation (RI) Report (IWS-1).

During the RI, extensive record reviews, interviews, and aerial photo interpretations were conducted to identify potential source areas; the RI mentions specific files for each source area described in the report. The final resolution of these identified problem areas (i.e., whether further work is required) is not addressed in the draft RI report. The status of many of these areas could have been evaluated with limited surface or shallow subsurface analyses conducted for the parameters of concern.

Additional soil sampling is planned for several areas at the Main Site (e.g., hexavalent chromium identified in drainage ditches in the West Traffic Circle Area), but no formal plan exists for the coordination of these activities. Although LLNL has prepared a tentative listing of areas planned for further investigation in 1990 (IWS-60), there is no documentation of planned analyses or where these investigations fit into the overall program. Environmental Restoration Division personnel (I-IWS-25 and 26) indicated that these activities will be part of the FFA-required RCRA investigation that follows the RI.

A similar situation exists in the Pit 6 remedial investigation currently underway at Site 300. More than 2000 PCB capacitors are known to have been disposed in the pit, yet no adjacent or underlying soils have been analyzed for PCBs although groundwater was analyzed for PCBs (I-IWS-11 and 12). Therefore, no conclusions can be drawn as to whether or not PCBs have been released to the soil.

Regulators involved in these investigations are focusing attention on the issue of volatile organic compounds in groundwater and not on the issue of immobile chemicals in the various source areas. All work plans and investigation documents have been submitted to and approved by the regulators. However, because of the intense public scrutiny these types of activities receive and the guidance issued by the EPA, it is a good practice to close contamination issues, where possible, by using chemical analytical results and contaminant fate and transport information.

ASSESSMENT DISCIPLINE: INACTIVE WASTE SITES

ASSESSMENT FINDING NUMBER: IWS/BMP-2

ASSESSMENT FINDING TITLE: CHEMICAL TRACKING SYSTEM

PERFORMANCE OBJECTIVE: To minimize manual data entry and inventory checking, a computerized chemical tracking system that incorporates toxic chemical inventories and SARA Title III reporting is useful when large numbers of chemicals are involved.

FINDING: The lack of a computerized chemical tracking system complicates SARA Title III reporting.

The baseline inventory completed for calendar year 1988 SARA reporting is manually updated by inputting data from Purchasing Department monthly printouts. Annual summaries from the data base are sent to each person responsible for chemicals in LLNL. These people are asked to verify the summary, but not all are returned to the Environmental Guidance Division. Because many of the facilities onsite are chemistry laboratories where the basic chemical stock does not vary considerably, the reporting is based on the baseline inventory, which is checked against purchasing records. This manual checking and entry, as well as the unverified reporting, could allow for error in reporting. In addition, without detailed training, LLNL may also be reporting chemicals unnecessarily by reporting chemicals present in quantities greater then 1 pound, when the threshold for reporting is 500 pounds.

A Task Force for Chemical Tracking has been created to develop a new system based on bar coding of chemicals. The task force includes representatives from Hazards Control, Environmental Protection, Health Services, Business Operations, and Administrative Information Systems. This system would provide a tracking system for chemicals from the time they arrive on site until they are disposed of. A comprehensive system could incorporate a variety of software for multiple reporting requirements, including SARA 311/312 and, if ever necessary, SARA 313.

The task force hopes to have a system designed by July 1990, with implementation by the end of the year. However, no budget has been allocated for such a system (I-IWS-23).

ASSESSMENT DISCIPLINE: INACTIVE WASTE SITES

ASSESSMENT FINDING NUMBER: IWS/BMP-3

ASSESSMENT FINDING TITLE: SPILL REPORTING PROCEDURES

PERFORMANCE OBJECTIVE: Written standard operating procedures for spill reporting should be available to every chemical handler onsite to ensure that every spill is properly remediated and reported.

FINDING: LLNL has no written SOPs for spill reporting, although they are currently in preparation. The procedures for reporting spills to supervisory and Environmental Protection Department personnel are currently disseminated via the Hazardous Waste Handling Practices training course (EPD-006).

Line personnel interviewed during the assessment (I-IWS-17 through 21) were aware of the procedures to be followed in the event of a spill, and the spill reports on file indicated that both large and small volumes (as small as 1 pint) were reported. Personnel appear to err on the conservative side by calling the Fire Department first, unless they know the chemical is non-toxic. In the case of large spills (generally defined as requiring 2 or more people more than 1 hour to clean up), the Fire Department is the primary responder. The Environmental Analysts are secondary responders, and are notified by either the Fire Department or the Safety Team Leader. The Environmental Monitoring Group may be requested to collect environmental samples, and Hazardous Waste Management personnel are responsible for the physical cleanup. In the case of small spills, the Environmental Analysts may be notified directly by the program personnel or the Safety Team Leader.

The Environmental Analysts prepare forms that contain all pertinent information on the spill. If there is any possibility that the spill is a reportable quantity (RQ), the analyst reports immediately to the Leader of the Environmental Guidance Division, who makes the final determination on RQs, and personally handles all reporting.

As the system stands now, it appears to be working well. However, there is no way to know whether all small spills are reported through the system. This was originally a finding in the DOE Environmental Survey, and since then, measures have been taken to train personnel in spill reporting. However, without written procedures available at individual work stations, there is always a possibility that appropriate managerial personnel may not properly report spills.

3.5.9 National Environmental Policy Act

3.5.9.1 Overview

The purpose of the National Environmental Policy Act (NEPA) portion of the LLNL Tiger Team Environmental Assessment was to (1) evaluate NEPA management structure and NEPA review processes at LLNL, and as related to LLNL, at SAN; (2) identify inappropriate procedures or inadequate NEPA documentation; and (3) evaluate compliance with the NEPA, Council on Environmental Quality (CEQ) regulations, and DOE NEPA Guidelines, Orders, and Memoranda.

The scope of the LLNL NEPA assessment included interviews with SAN and LLNL staff members responsible for NEPA compliance, a site tour, evaluation of NEPA documentation and NEPA review and tracking procedures, and a search for LLNL projects or facilities which may have been overlooked with regards to NEPA review. The 1982 LLNL environmental impact statement and six LLNL environmental assessments were reviewed for their adequacy as reference documents from which to tier future NEPA documents. The use of categorical exclusions, memoranda-to-file (MTFs), and action description memoranda (ADMs) were evaluated for consistency with DOE NEPA requirements.

The LLNL NEPA assessment is unique in two ways: it is the first Tiger Team NEPA assessment of a DOE National Laboratory and it is the first assessment completed since issuance of Secretary of Energy Notice (SEN) 15-90 (February 5, 1990). Among other changes, SEN 15-90 withdraws the prior Defense Program delegation of authority to SAN for approval of MTFs. SAN retains only authority to make NEPA decisions for actions specifically listed in 52 FR 47662, Section D.

In general, both the SAN and LLNL NEPA review, guidance, documentation and coordination are deficient but correctable. SAN has not provided formal NEPA guidance to LLNL. LLNL, as a DOE contractor, has made unauthorized NEPA determinations. Both SAN and DOE Headquarters oversight of LLNL NEPA review has been inadequate.

None of the LLNL NEPA assessment findings were a surprise to SAN or LLNL. Each had recently completed self assessments and had undertaken personnel and procedural changes that will improve their operations.

SAN has recognized that past NEPA documentation for LLNL is incomplete and has initiated corrective measures for several identified deficiencies including requests for more NEPA training, specific guidance, and additional personnel. SAN has specifically asked for both guidance and funding to prepare a new sitewide NEPA document.

LLNL's "Program Compliance Log" (N-131) states that

- Certain projects, notably in Laser Programs, have been implemented without required SAN NEPA review and documentation.

- In some instances, LLNL prepared an inappropriate level of documentation for SAN NEPA review (e.g., MTFs done when ADMs or EAs were more appropriate).

- NEPA documentation for LLNL is incomplete and scattered. There are several instances where documents (ADMs, Environmental Evaluations (EEs), MTFs, etc.) were prepared for SAN NEPA review but no transmittal letters or other records to show that they were ever sent to SAN.

- LLNL does not have a written, approved set of SAN NEPA compliance procedures.

- LLNL does not have a formal NEPA training program.

- The sitewide EIS is outdated and inadequate by today's standards but fortunately, has not been used to tier from.

- The NEPA process and California's "little NEPA" (California Environmental Quality Act) processes are not well integrated.

- NEPA reviews are not tracked in an integrated system.

In response to findings from their self-assessment, LLNL has hired additional NEPA staff, is trying to design an optimal NEPA-tracking system, and has provided NEPA training and guidance to LLNL programs, projects, and contractors.

In summary, the LLNL Tiger Team NEPA assessment resulted in five compliance findings and one best management practice finding. The findings are

- Compliance findings:

  - Inconsistent NEPA guidance,

  - Inadequate NEPA review,

  - Outdated sitewide EIS,

  - Deficiencies in environmental assessments, and

  - Inappropriate NEPA determinations.

- Best Management Practice finding was inadequate NEPA records.

3.5.9.2 Compliance Findings

ASSESSMENT DISCIPLINE: NEPA

ASSESSMENT FINDING NUMBER: NEPA/CF-1

ASSESSMENT FINDING TITLE: INCONSISTENT NEPA GUIDANCE

PERFORMANCE OBJECTIVE: Secretary of Energy Notice (SEN) 15-90 (February 5, 1990), DOE 5440.1C (National Environmental Policy Act; NEPA), and the DOE NEPA Guidelines (52 FR 47662) establish departmental compliance with regard to the NEPA and the Council on Environmental Quality Regulations (40 CFR 1500-1508). Further guidance is found in the DOE NEPA Compliance Guide (Draft), October 1988, and the phased compliance strategy found in DOE Order 4700.1 (Project Management System).

FINDING: Neither SAN nor LLNL guidance for implementation of NEPA at LLNL is consistent with DOE NEPA Orders or Guidelines.

SAN has not provided formal NEPA guidance to LLNL (I-N-003). SAN verbal guidance to LLNL regarding projects that require NEPA documents and the types of documents required is inconsistent (I-N-010).

The LLNL Guidelines for Complying with the National Environmental Policy Act at Lawrence Livermore National Laboratory, issued in February 1990 (N-80), does not clearly describe the DOE NEPA review process or who has the authority to make NEPA determinations. Specific deficiencies in the LLNL Guidelines include the following items:

- Page 8 of the LLNL Guidelines is incorrect. Only DOE Headquarters, not SAN, has the authority to decide whether an EA or an EIS is required for actions that are not listed in 52 FR 47662, Section D.

- Despite the statement on page 13 of the LLNL Guidelines, ADMs are not NEPA documents. ADMs are not required for every line item. However, ADMs are required for all requests for NEPA determination from the Assistant Secretary for Environment, Safety and Health.

- The LLNL Guidelines contain no information on integrating the NEPA and California Environmental Quality Act requirements, although such guidance is provided in a separate LLNL document.

ASSESSMENT DISCIPLINE: NEPA

ASSESSMENT FINDING NUMBER: NEPA/CF-2

ASSESSMENT FINDING TITLE: INADEQUATE NEPA REVIEW

PERFORMANCE OBJECTIVE: Secretary of Energy Notice (SEN) 15-90 (February 5, 1990), DOE 5440.1C, and the NEPA Guidelines (52 FR 47662) implement Council on Environmental Quality regulations (40 CFR 1508 et seq.) requiring an adequate NEPA review of all proposed DOE actions and their reasonable alternatives prior to implementation, in order to consider their potential to significantly affect the environment.

FINDING: Both SAN and LLNL NEPA review procedures for proposed/planned actions at LLNL are inadequate and are not consistently initiated early in the planning process (e.g., in the conceptual design stage for line items or in the short list stage for general plant projects). The absence of a NEPA review results in retroactive, incomplete, or no NEPA documentation.

- o Since the SAN and LLNL database for tracking NEPA review and status of ongoing and proposed projects is still under development (N-7, 17; see NEPA/BMP-1), there is a great deal of concern at SAN and LLNL that some program projects, work for others, and operating-funded projects may not be receiving adequate NEPA review (N-7, 10, and 16). If some projects escape review or project cumulative or collocation impacts are not assessed, a violation of CEQ regulations (40 CFR 1502.4, 1508.25, and 1508.27) designed to prevent "segmentation" or "piecemealing" of related significant actions into multiple insignificant actions could occur.

  - In a memorandum of September 15, 1989, from D.W. Pearman, Jr. to the Secretary of Energy, SAN identified 115 LLNL projects or facilities initiated since January 1, 1985, which did not receive a NEPA review in a memorandum-to-file, environmental assessment, or environmental impact statement. All but 21 of the items on this list would probably have been suitable for a categorical exclusion under 52 FR 47662, Section D.

  - Although there is considerable confusion concerning SAN and LLNL NEPA documentation (see NEPA/BMP-1), there appears to be 81 general plant projects initiated since 1985 (N-132 and 133) and 39 buildings built and 96 temporary trailers utilized since the 1982 EIS (N-135) for which neither a LLNL environmental review nor a SAN NEPA review could be found. This list is in addition to the 115 projects/facilities reported to the Secretary of Energy. It appears that most of these projects and facilities would have been suitable for review in a categorical exclusion or a memorandum-to-file.

- NEPA is not triggered at the appropriate time (I-N-3, 4, and 7).
  - The High Explosives Applications Facility was completed before a second required environmental assessment (N-113) was approved.
  - The Engineering Demonstration System was installed and operational before NEPA review was completed.
- The ISMP Demonstration Facility (Bldg. 490), housing the Laser Optics Research Facility, relied on the 1982 sitewide EIS (N-101) for its original construction and operation even though this facility was not completely evaluated in the EIS.
- NEPA documentation has not been prepared for environmental cleanup/corrective actions undertaken to date such as the LLNL East Traffic Circle landfill excavation, excavations of the Taxi Strip evaporation ponds, closure of nine decommissioned HE rinse water lagoons at Site 300, removal and disposal of firing table gravels from six firing tables at Site 300, pilot ground water and soil vacuum extraction projects at Bldg. 834 at Site 300, and the sealing and abandonment of six inactive water supply wells. However, NEPA documentation for at least seven other cleanup or corrective actions being undertaken at the Main Site and Site 300 is currently underway.
- LLNL "Whiz Tag" (small activities usually described as work order items at other DOE sites) actions may not all have been evaluated for potential environmental effects due to their short turn around times (I-N-7 and 9). However, most of these maintenance actions should have received at least generic discussion in the NEPA review of the affected facility.

ASSESSMENT DISCIPLINE: NEPA

ASSESSMENT FINDING NUMBER: NEPA/CF-3

ASSESSMENT FINDING TITLE: OUTDATED SITEWIDE ENVIRONMENTAL IMPACT STATEMENT

PERFORMANCE OBJECTIVE: Council on Environmental Quality (CEQ) regulations (40 CFR 1502.9(c)) require preparation of a supplemental environmental impact statement (EIS) if there are either: (1) substantial changes in a proposed action, or (2) significant new circumstances or information relevant to environmental concerns. CEQ guidance (46 FR 18036) indicates that 40 CFR 1502.9 has special significance if an EIS concerns an ongoing program and/or is more than 5 years old.

CEQ regulations (40 CFR 1502.20 and 1508.28) encourage the use of tiering as a means to eliminate repetitive discussions so that subsequent environmental analyses on the same site can concentrate on issues specific to a proposed action. However, to use a sitewide EIS for tiering, it must reflect current site conditions.

FINDING: The 1982 sitewide EIS for LLNL operations (N-101) is no longer an adequate document from which to tier future NEPA documents.

The sitewide EIS was approved by DOE and remains valid for any ongoing LLNL operation which has remained unchanged since 1982. However, the EIS is more descriptive than analytic and lacks analyses in several impact categories required in NEPA guidance issued since 1982:

- The EIS is no longer representative of site conditions because LLNL property boundaries and land use/population patterns in the vicinity of LLNL have changed significantly.
- The EIS lacks specific statements and conclusions regarding environmental baseline conditions and impacts:
  - Cumulative effects and the significance of direct and indirect impacts are not evaluated as required by CEQ regulations [40 CFR 1508.27(b)(7) and 40 CFR 1508.8].
  - Decontamination and decommissioning (D&D) of ongoing and future actions are not considered.
  - Analysis of construction activities and major relocation projects lack quantitative and collocation assessments.
- The EIS does not follow current risk assessment methodology:
  - Only accidents are discussed; there is no examination of operational risk.
  - Radiological impacts to flora and fauna are not addressed.

- Accident scenarios generally ignore worker impacts and focus on site boundary and other public exposure doses.

- Industrial and radiation worker safety are not adequately discussed.

o The EIS does not reflect current regulatory requirements:

- Although waste management practices and effluent monitoring are discussed, the EIS does not describe projects underway nor specifically state intent to comply with currently applicable environmental regulations such as the Clean Air Act (40 CFR 61), the Safe Drinking Water Act, the Resource Conservation and Recovery Act (RCRA), and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

- Current State permitting requirements and local waste management requirements, as they apply to LLNL, are not addressed.

o Coordination and consultation with State and local agencies is poorly documented in the EIS:

- Although letters provided to the NEPA assessment team by SAN document correspondence with the State Historic Preservation Officer (SHPO), these letters are not presented in the EIS.

- During EIS preparation, a proposed endangered plant species (Amsinckia grandiflora; subsequently listed as endangered) was identified at Site 300. The EIS contains no documentation in the EIS of formal consultation with the U.S. Fish and Wildlife Service (FWS), as required by Section 7 of the Endangered Species Act of 1973, concerning possible impacts on Amsinckia grandiflora. An interview with LLNL NEPA personnel (N-019) indicates that neither SAN or LLNL has correspondence documenting formal consultation with the FWS.

Both SAN and LLNL recognize that the 1982 EIS is no longer adequate for tiering and have requested both funds and guidance to prepare a new sitewide document (I-N-9 and 10). Several recent projects have been considered in environmental assessments rather than tiering from the EIS.

ASSESSMENT DISCIPLINE: NEPA

ASSESSMENT FINDING NUMBER: NEPA/CF-4

ASSESSMENT FINDING TITLE: DEFICIENCIES IN ENVIRONMENTAL ASSESSMENTS

PERFORMANCE OBJECTIVE: CEQ regulations (40 CFR 1500 et seq.) and DOE guidelines implementing NEPA (52 FR 47662) require that environmental assessments (EA) specifically document consideration of a number of laws, regulations, and technical areas.

FINDING: Review of six LLNL EAs (N-103, 105, 108, 113, 114, and 122) indicates the EAs do not consistently address all required elements.

Although all six EAs reviewed were approved by DOE and will remain valid as long as the described projects remain unchanged, document review and onsite verification revealed several procedural errors (i.e., failure to document required environmental protection rather than failure to carry out needed surveys, communications, studies, etc.).

Even though there has been a general improvement in the quality of the EAs over time, the six EAs reviewed exhibited the following deficiencies in one or more areas:

- Consideration of impacts to workers;
- Consideration of transportation impacts;
- Consideration of noise impacts;
- Consideration of the presence of wetlands and potential impacts;
- Consideration of cumulative, collocation, long-term, and indirect impacts;
- Documentation of coordination/consultation with the State Historic Preservation Officer;
- Documentation of public and agency involvement;
- Protection of sensitive species;
- Mitigation of potential impacts; and
- Reference to any documentation of actual impacts and the effectiveness of past mitigation.

ASSESSMENT DISCIPLINE: NEPA

ASSESSMENT FINDING NUMBER: NEPA/CF-5

ASSESSMENT FINDING TITLE: INAPPROPRIATE NEPA DETERMINATIONS

PERFORMANCE OBJECTIVE: NEPA Guidelines (52 FR 47662) and DOE 5440.1C (National Environmental Policy Act), require that a Responsible Supervisory Official (RSO) make appropriate NEPA determinations for all DOE activities.

Prior to Secretary of Energy Notice 15-90 (February 5, 1990), a SAN RSO could determine whether a LLNL proposed action either (1) fell within the typical classes of actions requiring one of the three levels of NEPA review provided for in 52 FR 47662, Section D [i.e., a categorical exclusion, environmental assessment (EA), or environmental impact statement (EIS)], or (2) although not categorically excluded, had effects which were immediately viewed as "clearly insignificant." If all potential impacts were clearly insignificant, a Memorandum-to-File (MTF) could be written. However, if a proposed action required analysis of questions related to DOE control and jurisdiction or any environmental data gathering or analysis to reach a conclusion, then the proposed action failed the test of clearly insignificant and an Action Description Memorandum (ADM) would be prepared and submitted through channels to DOE Headquarters for a determination of the appropriate NEPA documentation (i.e., EA, EIS, or supplemental EIS). All NEPA determinations are mutually exclusive, i.e., only one type of determination is appropriate for any proposed action.

SEN-15-90 eliminates the use of the MTF by October 1, 1990 and requires Secretarial Officer approval, rather than SAN RSO, of any MTF issued between February 5 and October 1, 1990.

FINDING: Review of 21 SAN MTFs and associated documents (N-001 through N-069) for LLNL projects issued since 1985 indicates that all of these NEPA determinations were inappropriate. Each of the 21 determinations may be placed in 1 or more of 4 categories:

<u>Category 1</u>: <u>The action was not "clearly insignificant" (4 of 21 MTFs)</u>.

- Chemical Waste Storage Building (N-004) - An Environment, Safety and Quality Assurance (ESQA) Division System Review form attached to the MTF had the following comments: "This area lacks adequate water for fire protection. Water mains will need to be [increased]...Discussion of potential environmental impacts inadequate (e.g., hazardous fumes fire, major spills, etc). This may need an EA due to sensitivity of such a facility." These concerns indicate the action is not "clearly insignificant." [Although not properly documented, SAN stated on March 13, 1990, that this project replaced open storage of chemical waste.]

- Bldg. 483 and Bldg. 490 Expansion (N-007) - Although this MTF states that SAN-ESQA recommended that an EA be prepared for the subject project, this MTF was issued anyway. The MTF states:

"Although ESQA concurs that this project will be 'environmentally insignificant' relative to existing conditions, the recommendation [for an EA] stems from staff opinion that the existing EA for Building 490 is outdated, particularly in regard to freon emissions." The rationale provided in the MTF for determining that the proposed action will have insignificant impact on the environment is flawed and the MTF is improperly worded.

- Hardened Engineering Test Building (N-008) - This MTF is inappropriate because while the impacts of the construction may be environmentally insignificant, the potential impacts of operations are <u>not</u> clearly insignificant [i.e., conducting intrinsic radiation measurements and engineering tests on Special Nuclear Material, nuclear explosive-like assemblies. Although not stated in the document, SAN stated on March 13, 1990, that these operations were ongoing and considered in the 1982 EIS; therefore, incremental change was only construction.].

- Microfabrication Building (Bldg. 153) (N-011) - The MTF states: "Toxic, corrosive, and flammable compressed gases are used in the fabrication of microelectronics. Relocation of these operations from the second floor of Building 131 to a building housing only 12 to 40 employees will reduce the risk to personnel from accidental releases of these gases." Simply moving an operation with potential risk to an area where fewer personnel may be impacted does not make the operation "clearly insignificant."

<u>Category 2</u>: <u>The SAN RSO exceeded delegated authority for NEPA determinations (12 of 21 MTFs)</u>.

- In 12 MTFs (N-003 through N-005 and N-008 through N-016), the proposed action was described by words such as "...clearly not a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act..." However, if a proposed action is not deemed "clearly insignificant" or is not listed in 52 FR 47662, Section D, the SAN RSO does <u>not</u> have the authority to make a NEPA determination. Therefore, by phrasing the NEPA determination as above, the RSO exceeded his authority.

<u>Category 3</u>: <u>The individual making the NEPA determination did not have RSO authority (5 of 21 MTFs)</u>.

- Five MTFs relied on a specific categorical exclusion listed in 52 FR 47662, Section D (N-034 through N-038). However, the MTF was not signed by an authorized SAN RSO.

Category 4: Miscellaneous.

- One MTF (N-013) specifically related that it was prepared after part of a proposed project was nearly complete: "Except for landscaping, the Lot A-8 expansion project has been completed." The MTF should have been prepared before the project was initiated.

- Eight MTFs (N-001 through N-007 and N-011), relied, at least in part, on tiering to a previous NEPA document. In each case, the documents did not cite the relevant EA or EIS clearly enough to allow independent evaluation of the determination.

- Several MTFs should have provided more detail to document the basis for the NEPA determination (N-003, N-014, N-015, and N-017). For example, one MTF (N-015) simply stated: "...trailers would be used by approximately 15 employees working on the Strategic Defense Initiative..." What are they doing? Another MTF (N-017) dealing with the replacement of 26 transformers did not address the final disposition of the transformers to be removed nor if PCBs are a factor.

- Although DOE 5440.1C requires that SAN send copies of all MTFs to DOE Headquarters, there was no evidence to indicate that this was done for 10 of the 21 MTFS (N-001 through N-005 and N-017 through N-021) prior to the Secretary of Energy's specific request of August 7, 1989. All MTFs issued after July 1989 have been sent to DOE Headquarters.

3.5.9.3 Best Management Practice Findings

ASSESSMENT DISCIPLINE: NEPA

ASSESSMENT FINDING NUMBER: NEPA/BMP-1

ASSESSMENT FINDING TITLE: INADEQUATE NEPA RECORDS

PERFORMANCE OBJECTIVE: SAN and LLNL should maintain separate but compatible NEPA compliance records for all LLNL facilities and projects to track and assure compliance with the requirements of DOE 4700.1 (Project Management System) and DOE 5440.1C (National Environmental Policy Act).

FINDING: There is no overall integrated NEPA database at either SAN or LLNL which tracks the status of NEPA compliance for past, present, and proposed projects.

This finding is based on interviews (I-N-1, 4, 14 through 22) with SAN and LLNL personnel, a review of the new tracking systems instituted at both SAN and LLNL in 1989, a review of LLNL Schedule 44s and a review of SAN and LLNL lists of NEPA documents in an attempt to prepare a list of site projects and their NEPA reviews. (See NEPA/CF-2.) The following specific problems have been identified:

- Although both SAN and LLNL are developing tracking systems (I-N-3, 7, and 20), these systems are neither fully implemented nor integrated. SAN and LLNL tracking of NEPA documents in the approval cycle are inconsistent (N-073).

- Schedule 44s for the FY 91 budget request (N-91) have not been updated to reflect the current status of project NEPA compliance:

  - Although the Nuclear Directed Energy Research Facility EA (N-114) was completed in June 1989, and a finding of no significant impact was issued August 18, 1989 (N-115), the FY 91 Budget Request still lists only the submittal of the EA to DOE-HQ in November 1988;

  - Although Site 300 Facilities Revitalization action description memoranda are currently under preparation or planned, the FY 91 Budget Request only indicates that in June 1984 an environmental evaluation was submitted to DOE-HQ; and

  - Although an AVLIS Production Plant Design EAs are being prepared for the Demonstration Phase and an EIS will be prepared for the Deployment Decision, the FY 91 Budget Request incorrectly shows that compliance with NEPA will not be observed until Title I and II design.

3.6 NOTEWORTHY PRACTICES

There were no Noteworthy Practices identified by the Environmental Subteam.

3.7 TEAM COMPOSITION AND AREAS OF RESPONSIBILITY TIGER TEAM ASSESSMENT - ENVIRONMENTAL SUBTEAM

Areas of Responsibility	Name/Organization
Subteam Leader	Donna Bergman Office of Environmental Audit Department of Energy
Assistant Team Leader	David Shafer Office of Environmental Audit Department of Energy
Special Assistant	Marilyn Stone Office of Environmental Guidance and Compliance, Department of Energy
Technical Coordinator	David Yesso NUS Corporation
Waste Management	Ralph Basinski NUS Corporation
Surface Water	Joseph Boros NUS Corporation
Air	Tom Eckle NUS Corporation
Groundwater/Soil	Mary Robison NUS Corporation
Waste Management	Philip Winsborough NUS Corporation
Toxic and Chemical Materials/Quality Assurance	Charles Caruso NUS Corporation
Radiation/Quality Assurance/Waste Management	Steven Masciulli Vertechs, Inc.
Inactive Waste Sites	Amy Hubbard NUS Corporation
Administrative Support	Lisa Drinkhall NUS Corporation
National Environmental Policy Act	James Gilliam Office of NEPA Project Assistance, Department of Energy
National Environmental Policy Act	Richard Barringer Oak Ridge National Laboratory

National Environmental Policy Act	Thomas Anderson Pacific Northwest Laboratory
National Environmental Policy Act	Lorene Sigal Oak Ridge National Laboratory
National Environmental Policy Act	Cynthia G. Heckman Oak Ridge National Laboratory

4.0 SAFETY AND HEALTH ASSESSMENT

4.1 PURPOSE

The purpose of the Safety and Health (S&H) Subteam's appraisal was to assess the effectiveness of representative safety and health programs at the Lawrence Livermore National Laboratory (LLNL) through the evaluation of activities at facilities and in selected safety disciplines.

4.2 SCOPE

The S&H portion of the Tiger Team Assessment was provided by two Technical Safety Appraisal (TSA) teams using the TSA process to perform the appraisal function. The S&H Subteam appraisal was performed concurrently with assessments conducted by an Environmental Subteam and a Management Subteam.

Within the S&H programs of the prime contractor, performance was appraised in the following disciplines: Organization and Administration, Quality Verification, Operations, Maintenance, Training and Certification, Auxiliary Systems, Emergency Preparedness, Technical Support, Packaging and Transportation, Nuclear Criticality Safety, Safety/Security Interface, Experimental Activities, Site/Facility Safety Review, Radiological Protection, Industrial Hygiene, Occupational Safety, Fire Protection, and Medical Services.

4.3 APPROACH

The S&H Subteam evaluation was conducted during February 26-March 30, 1990. The S&H evaluation was conducted by a team of experts assembled by the Office of the Deputy Assistant Secretary for Safety, Health and Quality Assurance (DAS, SHQA), Office of Safety Appraisals (OSA). Team members consisted of DOE Headquarters staff, employees of DOE contractors, and outside consultants. The S&H Subteam was comprised of two TSA teams which were led by two Team Leaders from OSA. Guidance and direction was provided by a member of the DAS, SHQA senior management. A list of the team members and their areas of responsibility is provided in Section 4.9; a biographical sketch is provided in Appendix A-3 for each team member. Because findings and concerns developed in the Site 300 appraisal were very similar to those being developed in the main site appraisal effort, or were traceable to main site support, the efforts of the two TSA teams were combined and their appraisal results incorporated into a single section (Section 4.5).

The S&H evaluation was operationally focused. The LLNL site and selected facilities were appraised relative to operations and the condition of equipment and facilities to determine the status of safety, health, and quality verification programs. This approach assumes that the facility and its equipment have been appropriately designed, constructed, and tested, and that safety reviews or Safety Analysis Reports (SARs) adequately evaluate the risks presented by the operation of the facility. Thus the evaluation considered whether current operations are being conducted within the operational safety procedures established for specific facilities and activities.

The S&H Subteam's activities were guided by the performance objectives and supporting criteria contained in the February 1990, "Performance Objectives and Criteria for Technical Safety Appraisals at Department of Energy Facilities and Sites." The findings 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. 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; or (2) threatened to compromise safe operation; or (3) even though currently acceptable, could be improved to substantially enhance the excellence of the operation. Because of this last category, more concerns are reported than would result from a strictly compliance-oriented appraisal.

As a result of the individual findings, 142 concerns were identified and are discussed in this section of the report. The findings that support each concern are listed immediately preceding the concern. All of the concerns were seen as Category III, except for MA.2-1, PT.6-1, PT.6-2, OS.4-1, and FP.7-5, which were judged to be Category II. The category rating, potential hazard, and level of noncompliance for each concern were determined according to the criteria in Section 4.7.

Drawing upon the extensive experience of its members, the S&H Subteam has attempted to identify some of the causal factors behind each statement of concern. However, the S&H Subteam recognizes that this effort is imperfect due to its relative unfamiliarity with the details of the contractor's overall operations. Therefore, the S&H Subteam believes that the contractor should consider the concerns, and even the findings, as possibly symptomatic of some set of deeper root causes and should search out and correct those root causes to provide reasonable assurance that improvements in the safety of the operation will be sustained.

4.4 SAFETY AND HEALTH ASSESSMENT SUMMARY

LLNL uses matrix management to provide flexible and prompt marshalling of resources in response to changing priorities or missions and to address new or unusual problems. This mechanism, like LLNL's health and safety program, has its strengths and weaknesses. While effective in promoting the basic research mission of LLNL, for a facility as large and complex as LLNL has become, the matrix system has inherent shortcomings that have resulted in the diffusion of safety responsibility and authority and blurring of its lines of communication. This diffusion is a key contributor toward the shortcomings identified in the health and safety performance of the LLNL.

Multiple lines of responsibility exist, along programmatic, administrative, or support lines, and combinations of these. While individuals indicate some comfort in working in a matrix system, the line of safety responsibility upward from individual workers is inconsistent or ambiguous, being perceived to follow all three lines. Overlaps in authority and responsibility exist, as well as duplication of resources, and even some level of interference and absence of cross communication, as exemplified by the three divisions sharing responsibility for hazardous materials packaging and transportation

activities, duplicating some resources and, historically, not communicating with each other.

While ultimate responsibility for safety rests with the LLNL Director at the top, and knowledgeable, well-motivated and safety-conscious individual workers at the bottom, implementation of LLNL's safety program in the interposition is accomplished through both multitiered and multipathed, unique combinations of senior management positions, safety review committees, safety teams, site/facility and program managers and supervisors, and division-level safety function organizations. Most key safety positions are identified, but not all are without some ambiguity, and some are without sufficient resources.

Senior management promotes safety, but is not following through to ensure implementation and is not perceived as being sufficiently present at work sites -- the lack of, or infrequent presence of upper management at Site 300 has distanced the site's staff in their perception of support and opportunity from the main site organizations.

Many aspects of the safety program are fragmented, unfocused, inconsistent, not in compliance, and proper priorities are not being established. Safety reviews are often conducted in a support role, rather than as oversight, by safety teams and committees which depend on the programs for funding. LLNL does not have a program to conduct independent self-assessments. Safety reviews are encouraged at many levels through committees, but these groups are generally involved only in issues and subjects brought to them for review by proponents of research programs. Thus, the performance of safety reviews and oversight at LLNL has an inherent aspect of conflict of interest.

Several examples of failure to fully comply with DOE Orders and Federal regulations with respect to public and occupational safety were identified, including packaging and transportation activities, fire alarm and life safety code violations, OSHA noncompliances in construction and operations, and electrical code violations. There is no program to identify equipment important to safety, and events significant to safety have existed without being reported, documented, or evaluated, and without benefit of lessons learned. Critical components of fire protection systems are nonfunctional during the cold months of the year, some valves are inaccessible, and the condition of water mains because of corrosion, neglect, and lack of monitoring have rendered substantial portions of the Site 300 fire protection system unreliable. Greater attention should be given to maintenance of safety-related systems.

Safety documentation quality is spotty, not generally complete, current, accurate or accessible. Most facilities do not have approved or in-place Safety Analysis Reports or Operational Safety Requirements. Safety-related procedures vary in quality and approach and adequacy, depending on the program and level of generation. There is no function at LLNL that tracks status and needs for safety documents on a sitewide basis.

The safety function organizations are staffed by competent safety professionals, but LLNL has not devoted sufficient resources to non-research-related health and safety activities. Although the level of technical competence is very high at LLNL, no policy or procedures manual nor corporate standard exist for training. Considerable variability exists in training

activities and administration. Training evaluation techniques and methods vary widely and in many cases do not exist. The quality of training documentation is also variable, good in some facilities such as the Plutonium Facility and Hazards Control; poor in others, such as the Security Protection Force. Hazards communications need to be more consistent and effective.

The Whiz Tag System, intended to provide rapid response to high-priority maintenance needs, is one of several mechanisms available which allow modifications and installation of new equipment without benefit of mandatory review or documentation by fire protection, Hazards Control, or security. Quality verification is inconsistent and ineffective; there is no sitewide instrument/gauge/tool calibration program.

Strengths exist in technical competence, criticality safety, medical services, laser safety, training programs provided by the Hazards Control Department, and emergency response capability (although planning in this area is deficient, and training is in the early stages of development and not yet implemented).

Five root causes may be identified for the deficiencies in LLNL safety performance: (1) DOE SAN and LLNL management have not established controls that are effective in verifying compliance with safety procedures and requirements; (2) weaknesses in training and a lack of formality in safety-related operations have resulted in widespread noncompliance; (3) senior management involvement and independent verification of adequate safety is lacking, in that there is a need for proactive searches for safety-related deficiencies and improvements, and there are no consistent searches for potential safety degradation, feedback from quality assurance activities, lessons learned from onsite and offsite operating experience, or meaningful consideration of advances in safety technology; (4) DOE SAN has not exercised close safety oversight of LLNL, although there is evidence of occasional involvement by DOE SAN in safety issues at LLNL and a small presence on site, but frequent inspections, assessments, and followups required to ensure that an appropriate level of safety performance is achieved are absent; and (5) there is an expectation and assumption of safety rather than an inquisitiveness to challenge a suspect assessment or demonstrate its safety.

The dedicated and highly competent staff at LLNL is capable of substantially improving overall safety performance. This improvement can be realized through proactive management control of safety analyses, procedures, training, maintenance, and operations, and can be demonstrated through better workplace practices and documentation.

4.5 SAFETY AND HEALTH FINDINGS AND CONCERNS

4.5.1 Organization and Administration

4.5.1.1 Overview

This Appraisal addressed all eight Performance Objectives in the Organization and Administration area. The Organization and Administration review of LLNL was accomplished by interviewing selected LLNL management personnel, including the Director and Associate Directors, the Resident Manager, Department/ Division Managers at the main site, representatives at Site 300 who have been designated to serve as members of the Resident Manager's staff, and selected technicians; by reviewing documents; by visiting facilities at both the LLNL main site and at Site 300; by viewing actual operations in the Dissolving Wing of Bldg. 151; and by attending presentations by LLNL and DOE SAN management staff.

LLNL is a large organization with a broad spectrum of activities. Responsibility for safety is delegated downward from the LLNL Director through program support and administrative paths. Matrix assignments of individuals at lower management, supervision, and work force levels result in a lack of clarity in accountability for safety. To ensure accountability, management functions must be defined and integrated sitewide, and ground rules must be documented for conducting day-to-day business in a consistent way throughout LLNL.

As a consequence of the matrix management system used by LLNL, some organization charts show the administrative line of responsibility; others the programmatic line of responsibility; and still others the Site 300 reporting line, which is neither administrative nor programmatic. Thus, most management personnel and staff have two reporting lines, while many of those at Site 300 have three.

Some management personnel and staff interviewed thought that safety responsibility followed the administrative line, while others thought it followed the programmatic line. At Site 300, because the safety responsibility is assigned to the Resident Manager, the line safety responsibility is not a single unbroken line but a dual line that comes together at varying levels of LLNL management.

Even though the matrix organization is difficult to understand, most of those interviewed felt comfortable working in this type of organization. However, a few employees indicated that multiple lines of safety responsibility can lead, and have led, to situations in which they have felt pressured to relax safety requirements in the interests of program objectives. Potential conflicts between program and safety interests can occur because safety team members provide both safety overview and technical assistance to programs. In addition, program managers must decide on the funding level for safety in competition with program funds. A means of ensuring that funding reflects safety priority has not been established. These potential conflicts are not addressed by sitewide management procedures. The matrix system inherently complicates the establishment and maintenance of safety accountability at LLNL.

The Resident Manager has been assigned responsibility for establishment and operation of the safety program at Site 300. However, he has not been delegated sufficient direct authority or resources to fulfill this responsibility. Furthermore, the Site 300 Safety and Operational Manual states that operational safety lies with the department/division operating the facility involved; the safety responsibility for technical support lies with the department/division performing the work; and the Resident Manager has the staff safety support responsibility.

The LLNL is an informal organization. Mission and function statements, which define the assigned purpose of each organizational unit and how this purpose is to be accomplished, do not exist for all organizational units. The mission and function statements that do exist are located in various types of documents. There are no written and promulgated sitewide safety goals that can be tracked to determine success or failure, nor do all departments/divisions have written safety goals. Specific position/job descriptions that delineate safety responsibilities do not exist for all management personnel.

LLNL Management's assessment of facility activities is compromised by the lack of a sitewide program for ensuring performance quality through frequent, formal audits; neglecting to make full use of the unusual occurrence reporting system; and lack of a sitewide data analysis and trending requirement. In addition, information being provided to employees in the form of manuals and safety procedures lacks clarity, completeness and accuracy, making good worker performance difficult to achieve and measure.

The LLNL Health and Safety Manual and the Site 300 Safety and Operational Manual are not controlled. Safety analysis documentation is not satisfactory in format or content. LLNL is quite familiar with the extensive deficiencies in Safety Analysis documentation at LLNL.

The Site 300 personnel form a close-knit group. They are proud of their accomplishments and firmly believe that the Site 300 level of safety far exceeds that at the LLNL main site. The management personnel and staff interviewed were knowledgeable of their own assignments, as well as the overall operation of Site 300. There appeared to be greater loyalty to Site 300 than to LLNL. Many Site 300 management personnel and staff feel somewhat isolated at Site 300 and, because of the infrequent visits to Site 300 by upper-level LLNL management personnel, they do not believe they can compete on an equal basis with LLNL main site organizations for staffing and other resources.

Personnel management is performed in accordance with a sitewide guide, implemented at the Associate Directorate level. The absence of administrative requirements leads to considerable variability in practices. Performance appraisal is used not only to measure the employee's performance, but also to establish his or her scope of work. Performance appraisal objectives tend to be general and often inadequate in their consideration of safety performance.

The LLNL fitness-for-duty program does not include subcontractors and visitors, nor is there sufficient preassignment testing of employees in sensitive positions for substance abuse or preemployment and random testing.

There are more than 40 concerns in the report which have been categorized as deficiencies in which LLNL is not in compliance with DOE Orders. LLNL has no systematic means of ensuring that DOE Orders are being followed in the relevant activities.

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:

- An overall management plan which would define the LLNL mission, the scopes of work for the numerous Associate Directors, priorities, objectives, responsibilities, and interfaces which would also include safety considerations has not been developed and put in place at LLNL.

- Some of the above matters are discussed and resolved through reviews by a complex array of upper-level management committees; however, clear accountability for responsibilities and functions is difficult to verify through this review process. A document was provided which lists the committees, their general scopes of activity, membership, and reporting line. The document does not address how this arrangement of committees would be integrated to perform the management plan functions enumerated above.

- The Director of LLNL has initiated an effort through an exchange of letters between the Director and the Associate Directors to establish agreed-upon roles for upper management; however, this effort, originally undertaken in mid-1989, is incomplete.

- The above letters indicate that there are a number of deficiencies related to the definition of organizational functions and responsibilities at LLNL, such as problems with an Associate Director modifying top-level directives, clarity of delegation of authority, lack of a strategic plan, and lack of initiatives for the Associate Directors to work together.

- A sitewide administrative plan to establish a consistent set of requirements has not been implemented, resulting in excessive inconsistency in the conduct of operations related to safety overview, auditing, training, operation, procedures, document control, and personnel management.

- See Sections MA.2, PT.1, AX.3, TC.1, and OP.1; and Concerns RP.1-2, SS.3-1, and MA.1-5.

CONCERN: (OA.1-1) (H3/C2) Accountability for safety responsibility is not clearly defined because of the lack of upper-level management control documentation.

FINDINGS:

- Safety is clearly stated at LLNL to be a line responsibility; however, the matrix management tends to obscure the understanding of individuals at the matrix intersections as to which line, administrative or functional, is correct for them.

- o Working-level staff can experience undue pressures in situations where program objectives are in conflict with safety requirements; perceived threats of retaliation by, for example, withdrawal of program support for a matrixed individual who strictly enforces safety requirements can discourage reporting of potential safety problems.

- o Hazards Control Safety Team personnel are subject to a conflict of interest because their fiscal support comes from the program organization for whose activities they are providing safety overview.

- o It is understood from management-level interviews that the question of clear lines of safety responsibility is a matter of concern at LLNL recently and has been addressed but not fully communicated to the working level.

- o See Section PT.1.

CONCERN: (OA.1-2) (H2/C2) LLNL has failed to maintain clear lines of safety responsibility and independence of safety overview.

FINDINGS:

- o All working-level staff interviewed stated that their line safety responsibility was to their immediate supervisor, regardless of whether that was the administrative line or program line of responsibility.

- o Some first- and second-level supervisors interviewed at Site 300 thought their line safety responsibility was through their administrative chain, while others thought it was through the programmatic chain. All agreed, however, that they have a dual-line safety responsibility, the second being through the Resident Manager.

- o See Sections OP.1, MA.1, and PT.1.

CONCERN: (OA.1-3) (H2/C2)

- o All management personnel and staff interviewed at Site 300 do not have the same understanding of the line of their safety responsibilities.

FINDINGS:

- o Mission and function statements, where they exist, are not consistent across LLNL.

- o A few of the departments have some mission/function statements in departmental documents. However, these do not generally go below the division level, and in many cases do not mention safety as part of the mission.

- o Many management personnel interviewed were not aware of any mission/function statements for their department.

CONCERN: (OA.1-4) (H3/C2) Mission/function statements that define the assigned organizational purpose and how this purpose is to be accomplished do not exist for all organizational units.

FINDINGS:

- The Site 300 Safety and Operational Manual states that "The responsibility for the establishment and operation of the Laboratory's Safety Program at Site 300 has been delegated to the Associate Director for Nuclear Design and he has, in turn, delegated this responsibility to the Site 300 Resident Manager."
- Department/division representatives at Site 300 serve in a dual role in which they represent their parent organizations in all respects, while participating in the management of Site 300.
- The responsibility for operational safety at Site 300 lies with the LLNL department/division operating the facility involved. However, this operating staff does not report to the Resident Manager.
- The safety responsibility for technical support to these facilities lies with the department/division performing the work. Like the operating staff, this technical support staff does not report to the Resident Manager.
- Staff safety support is provided by the Resident Manager in conjunction with the technical services staff.
- The Resident Manager has been matrixed into this position from Mechanical Engineering.
- The Resident Manager has no personnel reporting directly to him either administratively or programmatically, and cannot directly and officially reprimand or reward a Site 300 employee.
- The Resident Manager has limited control over the quality or level of training of employees at Site 300.
- The Resident Manager has a very small budget, which is not adequate to correct safety deficiencies or initiate safety upgrades.
- The Resident Manager does not receive sufficient upper- level management support to compensate for the lack of delegated authority, and upper-level management personnel seldom come to Site 300 to obtain a first-hand assessment of the safety needs.
- See Section OP.1.

CONCERN: (OA.1-5) (H1/C2) The Resident Manager does not have sufficient direct authority or resources to fulfill his safety responsibilities.

FINDINGS:

- The LLNL Health and Safety Manual states: "The Laboratory Director is responsible for safety at LLNL. He assigns to all levels of management the responsibility for implementing the LLNL Safety Policy and for maintaining a safe work environment...Although an Associate Director may assign safety responsibilities to others, he remains responsible for ensuring correction of all oversights and errors within his organization that result in injury, illness, property loss, or environmental damage."

- The Associate Director for Nuclear Design has delegated the responsibility for the establishment and operation of LLNL's Safety Program at Site 300 to the Resident Manager.

- Operational safety and technical support safety have been assigned to those operating the facility and those performing the work, respectively.

- The LLNL Health and Safety Manual, Supplement 1.02, states: "Most first-line supervisors have responsibility for employees and for areas where employees and others work. Because of the LLNL matrix system, supervisors may have line responsibility for employees who work in another supervisor's area and may have other supervisor's employees in their area. There are also project leaders who have no line responsibility but in effect function as area or employee supervisors." (See Concern PT.1-1.)

- The LLNL Health and Safety Manual states that "Employees are responsible for their own safety and for...bringing to the supervisor's attention any behavior or condition that may cause injury or illness to others or unacceptable damage to property" and for promptly reporting an occupational injury, illness, or significant exposure to toxic material to their supervisor and to Health Services.

- LLNL issues various organization charts, some show lines of administrative responsibility, some lines of programmatic responsibility, and others (for Site 300) show lines of responsibility to the Resident Manager, which may be neither administrative nor programmatic. Most charts do not indicate the nature of the line of responsibility being depicted.

- See Section PT.1.

CONCERN: (OA.1-6) (H2/C1)

For Site 300, it is frequently not possible, as required by DOE 5480.1B and DOE 5482.1B, to trace a single line of safety responsibility from the LLNL Director to the staff performing the task.

FINDINGS:

- Detailed safety policies and requirements are embodied in DOE Orders.
- It is the LLNL Director's stated policy to accept nothing less than full compliance with DOE ES&H Policies and Regulations.
- The DOE/UC contract requires compliance with "all applicable safety and health regulations and requirements (including reporting requirements) of the DOE communicated to the University."
- The Appraisal Team found more than 40 concerns which indicated lack of compliance with various DOE Orders.

CONCERN: (OA.1-7) (H1/C1)

There is no LLNL system in place to ensure that DOE policies and requirements are addressed by the cognizant personnel and that compliance with the requirements is currently maintained. As a result, LLNL operations are being conducted in significant noncompliance with DOE Orders.

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:

- Hazards Control Safety Team members are charged with providing both technical safety advice to, and safety overview of, the same program or facility activities. Their objectivity is thereby potentially compromised.

- Program managers purchase safety assistance and overview from the Hazards Control Department. Their line safety responsibility is in potential conflict with programmatic objectives. A means to ensure that safety funding is commensurate with its priority has not been established at LLNL.

- Safety Team members' safety overview objectivity can be compromised by direct participation in programmatic operations. Such participation was observed to have occurred despite Hazards Control Department's instructions to the contrary.

- See Sections PT.3 and OS.1.

CONCERN: (OA.2-1) (H2/C2) Conflicts of interest between responsibilities for program and safety exist at LLNL.

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:

- Although many safety and program documents state the expectation that activities will be performed safely, there is no sitewide documented requirement that organizational units develop and implement specific safety goals, make individual assignments of disaggregated goals, and measure performance against such goals.
- Safety goals are not consistent across LLNL.
- LLNL does not set annual safety goals to achieve specific limits or to improve the overall level of safety (e.g., lost work-day case reduction from the previous year).
- Of the departments interviewed, only Plant Engineering has written safety goals that are measurable.
- Some departments have general safety goals in various departmental documents, but in most cases the safety goals are not tracked or charted, nor are they written in such a way that success or failure can be determined.
- See Section PT.1 and Concern OP.1-3.

CONCERN: (OA.3-1) (H2/C2) LLNL does not require and does not have written and promulgated sitewide safety goals, nor do all departmental elements have specific, measurable safety goals which can be tracked.

OA.4 CORPORATE SUPPORT

PERFORMANCE OBJECTIVE: Corporate interest and support for safe operation should be evident.

FINDINGS:

- The University of California (UC) does not have a safety policy for LLNL operations. The DOE/UC contract contains a safety clause which commits UC to maintain a safe workplace and to comply with DOE safety requirements.

- There is no formal delegation of safety responsibility from the UC Regents to the LLNL Director.

- UC does not address the priority of safety over program objectives. While a number of LLNL policy statements, including the Director's statement, do fully address this safety principle, it is noted that a number of policy statements bearing the title LLNL Safety Policy developed at lower organizational levels do not address safety priority (e.g., Management Plan for Plutonium Facility Operations, Section 5.1).

- Feedback on the status of compliance with safety standards and requirements is not provided by UC to LLNL management. Reviews conducted by UC's Health, Safety, and Environment Advisory Committee do not specifically address this subject, nor is there a requirement to do so in the Committee charter.

- Actions to correct deficiencies in resources to implement needed safety actions are not addressed by UC, but are delegated to the LLNL Director.

- See Section PT.1.

CONCERN: (OA.4-1) (H3/C2) The University of California demonstrates little corporate commitment to safe operations at LLNL.

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:

- Although timely and effective action to track and correct identified deficiencies appears to be the responsibility of the Associate Directors and their management personnel, a sitewide, formally structured set of requirements for this purpose does not exist.

- The Quality Assurance Office (QAO) has published a Quality Problem Corrective Action Guide (M-078-QG-1), but there are no requirements for its use.

- Many of the QA plans were found to have no provisions for nonconformance reporting (NCR) or corrective action reporting (CAR). This is contrary to the requirements of DOE 5700.6B, which invokes ANSI/ASME NQA-1.

- QAO is not apprised of DOE audit findings unless they relate directly to the institutional aspect of QAO.

- Only Laser Programs has a substantial documented history of effective use of NCR/CAR processes.

- The Internal Appraisal of the Plutonium Facility, Bldg. 332 (1987), found a lack of auditing and QA plan implementation. Closure was premised on a commitment to hire a QA engineer for the facility and completion of the audit plan and performance of the audits. To date, these commitments have not been completely met. (See Section QV.1.)

- A recent failure detected by inspection prior to use of high-efficiency particulate air (HEPA) filters caused by latent defects in the filter media resulted in prompt notification of the vendor and inspection of the stock on hand; however, no formal reporting to upper management (NCR/CAR) has been documented. An Unusual Occurrence Report (UOR) has been issued, but this action was very late according to UOR reporting requirements.

- A number of deficiency and corrective action tracking systems have been found at the department level (e.g., the HIRAC database in Hazards Control); however, these systems do not have documented upper management level reporting and analysis requirements. A number of deficiencies were entered into HIRAC in 1985 and still have not been resolved.

- Failures of facility safety systems usually require facility shutdowns until the failure is restored, but there is no requirement that failure root cause be determined. The focus is on facility restart.

- Work controls for corrective action in the Tritium Facility (Bldg. 331) lack implementing procedures.

- Upper-level management personnel seldom come to Site 300 to obtain a first-hand assessment of safety needs.

- See Concerns OA.5-5, FR.6-1, and QV.1-1; and Sections FR.6 and PT.3.

CONCERN: (OA.5-1) (H2/C1) The performance of corrective actions and the prevention of recurrence through addressing basic causes and related generic problems does not meet the Corrective Action requirements of DOE 5700.6B.

FINDINGS:

- A SAN appraisal of the UOR system, available in draft form, conducted February 5-6, 1990, found that there is no LLNL policy statement available on reporting unusual occurrences. This finding is still valid.

- There is no sitewide documented process in place at LLNL to collect, review, and analyze UORs to assess root and common causes of, and lessons learned from unusual occurrences, and to distribute such information to LLNL management and supervisors, who might be expected to benefit from such information.

- The UOR program has not been the subject of an internal audit or appraisal for several years. This finding was also reported in the SAN appraisal referenced above.

CONCERN: (OA.5-2) (H2/C1) The UOR program at LLNL does not conform to the policy and objectives of the Unusual Occurrence Reporting System, DOE 5000.3, Sections 7.a.(5) and 7.b.(2) and (3).

FINDINGS:

- Some Facility Safety Procedures (FSPs) and Operational Safety Procedures (OSPs) by which LLNL provides information necessary for safe operation directly to employees are incomplete and erroneous (for example, FSP 191 and the FSPs governing high explosives operations involved in three recent incidents).

- The Health and Safety Manual, which provides a basis for FSPs and OSPs and lower-tier safety manuals, contains permissive wording which subverts the intent of requirements. (For example, Health and Safety Manual Supplement 32.05, Pressure Vessel and System Design, states that "All pressure designers and experimenters <u>should</u> fully understand this material or seek the assistance of...")

- There is no sitewide requirement for the conduct of supervisor/employee safety meetings to ensure that individual employees understand safety policy and requirements and to provide management with employee feedback on the safety requirements and their implementation.

- See Sections TS.2, FR.3, EP.2, MA.2, MA.4, MA.6, RP.10, and OS.2.

- See Concerns IH.2-1, IH.1-4, OP.6-1, RP.1-1, RP.1-2, RP.3-1, and MA.1-3.

CONCERN: (OA.5-3) (H2/C2) Complete and accurate information necessary for safe operation is not systematically and consistently being developed and promulgated to employees.

FINDINGS:

- There is no sitewide internal audit system to assess the technical adequacy of the activities undertaken to comply with procedural requirements. This assessment is undertaken to varying degrees at the option of the individual Associate Directors.

- Guidance for this optional audit program is provided by Quality Assurance Audits (M-078-QG-2). The guide states that the responsible manager of an activity initiates audits as required in his or her QA plans. A number of activities have no QA plans and a number of others are deficient with respect to auditing requirements.

- No formal mechanism has been established to ensure completeness and consistency of audit activities.

- Internal appraisals are a responsibility of the LLNL Associate Director for Administration and Operations as defined in Health and Safety Manual Supplement 1.13. The Principal LLNL Associate Director periodically reviews this appraisal program for independence and the adequacy of corrective actions. Only seven of these appraisals have been conducted since July 1988; three of them since the first of this year.

- A number of audit and appraisal activities have been undertaken in anticipation of the Appraisal Team's visit. The reviews have documented many of the concerns found in this appraisal.

- See Concerns QV.1-2, PT.3-1, and RP.2-1; and Section FR.5.

CONCERN: (OA.5-4) (H2/C2) The audit program does not provide needed management information on the conduct of activities undertaken to comply with procedural requirements as required by DOE 5700.6B.

FINDINGS:

- While a limited range of operational data reflecting facility safety performance are analyzed and trended by Hazards Control Safety Team Leaders as a service to the Program Associate Directorates, there is no formal specific basis for this activity. A review of data analyzed shows this activity to be of marginal value since it is limited to individual Associate Directorates. However, annual sitewide assessment of such data is performed.

- The Environmental, Safety and Health Council (established January 1, 1990) is chartered to consider such data and provide recommendations to the LLNL Director concerning appropriate actions; however, there is no defined mechanism for routinely providing this information to the Council.

- See Sections TS.4, FR.6, and MA.7; and Concern OA.5-1.

CONCERN: (OA.5-5) (H2/C2) A sitewide system for analysis and trending of operational data and consequent corrective action has not been developed and implemented by LLNL.

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:

- There is no effective sitewide set of requirements for personnel management and development.
- The assurance that personnel have the necessary qualifications and experience to perform satisfactorily is delegated to the Associate Directors. Statements of required qualifications are established at the time of hiring and are not required to be periodically reviewed.
- Specific job objectives are embodied in the form for annual performance appraisals, but these are general, vary from one Associate Directorate to another, and often do not address safety considerations except in a pro forma manner.
- Guidance for the conduct of performance appraisals is embodied in the Personnel Manual. No requirements for use of the guidance are established by the Manual.
- No audits of the conduct of performance appraisals have been performed since 1982. The 1982 audit showed that a major fraction (~80 percent) of LLNL personnel were being appraised. The audit did not address the safety performance of personnel.
- The University of California appraises the LLNL Director's performance every 5 years. The current Director has not been appraised, but he has been in place only 2 years.
- Sitewide career advancement programs and a supervisory and management succession plan have not been developed and implemented. These matters are discussed and defined on a case basis through Director/Associate Director meetings.
- See Sections OP.1 and MA.1.

CONCERN: (OA.6-1) (H3/C2) Means to ensure that job descriptions and qualifications reflect LLNL needs, and that personnel performance is measured in a consistent way, have not been established at LLNL.

FINDINGS:

- The Appraisal Team found that many positions lack job descriptions. Those that do exist are usually generic and are not documented consistently.
- Some safety responsibilities are listed in the LLNL Health and Safety Manual and others in the Site 300 Safety and Operational Manual. However, these are general in nature and may apply to similar classes of management or staff.

- In many cases generic job descriptions exist for purposes of advertising to fill job vacancies. These usually apply to a wide range of similar positions. These job descriptions are generally adequate for the working-level staff in identifying individual safety responsibilities.

- Job performance evaluations list some assigned duties and responsibilities, but do not always include safety responsibilities.

- See Section MA.1.

CONCERN: (OA.6-2) (H3/C2) Specific position/job descriptions, which delineate specific safety responsibilities, do not exist for all management personnel.

OA.7 DOCUMENT CONTROL

PERFORMANCE OBJECTIVE: Document control systems should provide correct, readily accessible information to support site/facility operations.

FINDINGS:

- Sitewide, the status of SARs and SAs is acknowledged by LLNL to be unsatisfactory.
- Of the high hazards facilities (Plutonium Facility, Tritium Facility and Heavy Element Facility), only the Plutonium Facility has a current SAR, but this SAR has not yet been approved by DOE-HQ. The Tritium Facility SAR was originally written in the 1970s but never approved by DOE. A contract with a vendor is in place to update the SAR to represent the facility as it exists and to meet current standards. The Heavy Element Facility SAR was written in 1982, was approved by DOE in 1985, and is currently under consideration for updating.
- At the LLNL main site, the SAs of some moderate hazard facilities are satisfactory, but a large number are not.
- Large numbers of low hazard facilities at the LLNL main site do not have current SAs.
- For many facilities, OSRs are embedded in the SAs. (See Concern TS.2-4.)
- The completion dates for SAs for the facilities at Site 300 vary from 1981 to still in progress.
- The SAN Management Directive (MD) 5481.1A, dated September 20, 1989, requires that "The cognizant line organization will review all applicable operations and new projects on a case-by-case basis in order to establish a preliminary 'Hazards Class' and to determine specific SA requirements."
- The SAN MD 5481.1A also requires a "Safety Analysis Document (SAD) for all low hazard and all moderate hazard non-nuclear facilities/operations"; and "The SAD shall be completed for all operations/projects that present potential hazards to operations personnel and have minor effect on the public or the environment."
- For Site 300, SAN/LLNL have identified 31 facilities/operations and 55 magazines that are classified as presenting a moderate or low hazard. (Moderate hazard facilities include 27 facilities/operations and 46 magazines; low hazard facilities include 4 facilities/operations and 9 magazines.)
- Of the 31 moderate and low hazard facilities/operations at Site 300, 12 have SARs and 19 are in varying degrees of preparation.

- Of the 55 magazines that are classified as presenting moderate or low hazards, a SAR is being prepared for only 3.

- See Concerns FR.3-1, OP.1-2, TS.2-2, TS.2-3, TS.2-4, and QV.1-2; and Sections FP.3 and EP.7.

CONCERN: (OA.7-1) (H2/C1) LLNL is not in compliance with DOE 5481.1B and SAN MD 5481.1A for the preparation of safety analysis documents for all facilities.

FINDINGS:

- Procedures and other instructions important to safety are not controlled to ensure that the most current revisions are available to those who need the information. The LLNL Health and Safety Manual and the Site 300 Safety and Operational Manual are not considered by all supervisors to be controlled documents.

- Neither manual is numbered, nor is there a positive system to ensure that all copies are kept up to date. Document audits are not conducted.

- Not all copies viewed in the field were up to date.

- Copies of these safety documents that were provided to the Appraisal Team could be picked up by any LLNL staff member and thus are not controlled.

- Both manuals contain procedures and instructions that should be kept up to date.

- In preparation for the Tiger Team visit, LLNL reviewed the status of "as-built" drawings for facilities and found them to be frequently deficient or unavailable and uncertain as to who had responsibility for them.

- See Concern QV.1-1 and Section EP.5.

CONCERN: (OA.7-2) (H2/C2) Current key safety documents are not available and controlled in accordance with recommended standards such as ANSI/ASME NQA-1 as indicated in DOE 5700.6B. (See Concern TS.3-2.)

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:

- LLNL has promulgated a substance abuse program which aims at a drug-free workplace. Supervisors have been trained to detect and deal with cases of substance abuse. An employee assistance program has been established to provide abuser rehabilitation and counseling.

- While the LLNL Substance Abuse program embodies "testing for cause" for substance abuse, urine testing related to pre-employment and preassignment to sensitive activities is not used. However, assignment to sensitive activities is conditional upon the results of extensive physical and psychological testing which potentially could detect substance abusers without subjecting them to chemical testing.

- The Substance Abuse policy is not applied to construction contractors. Instead, a list of prohibited articles is contained in all construction contracts, and persons detected as being under the influence of a controlled substance can be removed from LLNL and denied further access. Contractor personnel are subject to search and such searches have been performed. No formal guidance has been established for this purpose. Contract managers and inspectors are not trained to detect and handle substance abuse; however, their supervisors are trained.

- The Substance Abuse policy is not applied to supplemental labor contractors. There is a provision in relevant contracts which reserves the option to the University of California (UC) to direct the seller to institute a preaccess controlled substance testing program, a "for cause" controlled substance testing program, and a controlled substance rehabilitation program for the seller's employees. This provision has not been implemented. Supplemental labor contractor employees are treated in a manner similar to that afforded to construction contractors as discussed above.

- Visitors are provided with a list of prohibited articles but not with applicable details of the Substance Abuse Policy. Visitors found under the influence of a controlled substance can be removed from LLNL and barred from further access.

CONCERN: (OA.8-1) (H2/C2) The LLNL fitness-for-duty program is deficient with respect to its application to prospective employees, employees in sensitive positions, visitors, and subcontractor employees.

4.5.2 Quality Verification

4.5.2.1 Overview

The scope of the Quality Verification appraisal included all seven Performance Objectives in this discipline. The Appraisal was conducted by interviews with LLNL staff and crafts personnel; observation of activities in progress; and review of pertinent documentation, including the Quality Assurance Manual (QAM), Quality Assurance Plans (QAPs), Health and Safety Manual (HSM), Facility Management Plans, Facility Safety Plans, Safety Analysis Reports, and relevant procedures and records sitewide. The facilities reviewed included the High Explosives Applications Facility (HEAF) at the main site, Bldg. 345 Detonator Research, and all major facilities at Site 300, including Bldg. 873 Welding and Mechanical Engineering Shops, Bldg. 874 Plant Engineering Electric Shops, Bldg. 848 Weather Station, Receiving and Warehouse facility in Bldgs. 875 and 876, the East Firing Area, Chemistry Area, Process Areas, and Physical Environmental and Dynamic Test Area. Interviews were conducted with personnel in the Materials Management Group, Environmental Quality Verification Group, Revitalization Program, and Environmental Restoration organization. The LLNL main site facilities reviewed included all high hazard facilities (Bldg. 251 Heavy Element Facility, Bldg. 331 Tritium Facility, and Bldg. 332 Plutonium Facility) as well as selected moderate hazard facilities, programs, and special service organizations. These included the Bldg. 334 Hardened Engineering Test Facility, the Special Isotope Separation Engineering Demonstration System (SIS-EDS), facilities of the Lasers Program, the Portable Radiation Detection Instruments Section, the Calibration Services Section of the Engineering Services Division, the Quality Assurance Office (QAO), the Mechanical Inspection Services Group of the Materials Fabrication Division, the Nondestructive Evaluation Section Facilities, Bldgs. 3226 and 329, and Receiving areas in Bldg. 411 and the Lasers Program.

The quality assurance (QA) program at LLNL has been documented in the QAM M-078, Rev. 1. It contains a Director's Statement that establishes the LLNL policy that all programs and line organizations use quality assurance to provide confidence that objectives will be achieved. The QAM is not effective in defining requirements and standards to meet the objectives. The QAM does not contain the requirements in DOE 5700.6B for the selective application of the elements of quality assurance in national standards and for independent verification of quality achievement. It does not require that Quality Assurance Plans consider QA elements. As a consequence, the QAPs do not reflect independent verification as a part of the line QA program and do not fully reflect consideration of all QA elements. The QAPs lack specificity in most instances. Performance indicators are not included. In most cases, the QAPs are either not implemented or are not available at Site 300. The QAO performs no surveillance or walkthroughs of sitewide facilities, and only four QA audits at Site 300 have been performed in the past 3 years. None have yet been done in 1990 and none have been scheduled. Audits at the LLNL main site and the Internal Appraisal program are ineffective and insufficient to meet the criteria for periodic program evaluations cited both in the LLNL QAM and DOE Orders. The QA program as implemented at Site 300 and HEAF does not surface issues for senior LLNL management information and action.

Procurement of materials sometimes requires onsite inspection at vendor sites. Procurements do not require review by Hazards Control except when the requisition indicates that it is for hazardous materials. There are no requirements for independent review of procurement by the QAO for verification of the safety significance of the procurement. These responsibilities are with the line organization. Receiving and preinstallation inspections are not addressed in the LLNL QA program.

LLNL does not have a sitewide calibration policy for measuring and test equipment. Each program establishes its own requirements. Hazards Control sitewide has implemented a control and tracking system to ensure that all radiation monitors are uniquely identified and within calibration intervals. Some other programs have developed less formal calibration systems, while most have not addressed the issue. The Lasers Program is one exception. The QAO has no regularly scheduled overview of calibrations other than QAO audits (which contain some calibration requirements). The Performance Objectives related to inspections and control of special processes were reviewed but found to be not applicable at Site 300. Control of special processes at the LLNL main site is considered to be satisfactory even if these processes are not regulated by formal administrative controls. With a few exceptions, the inspections program at the LLNL main site is mostly informal, undocumented, and insufficient.

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 LLNL quality assurance program is documented in Quality Assurance Manual (QAM), M-078, Rev. 1, dated September 1985. This document does not meet the DOE 5700.6B requirement for quality assurance program plans to include independent verification of quality attainment.

- The Quality Assurance Plans (QAPs) developed by program divisions sitewide do not include provisions for independent verification of quality attainment. There are no independent sitewide verification activities to ensure management that design reviews are conducted and documented in accordance with established procedures, that maintenance activities are conducted in accordance with requirements, that procurement and supplier control systems are implemented, that measuring and test equipment is calibrated and controlled, and that systems important to safety are identified and receive appropriate quality assurance and quality control. The Lasers Program is a notable exception.

- The LLNL QAM does not meet the DOE 5700.6B requirement for the selection and application of the QA elements of industry standards such as the preferred standard for nuclear facilities, ANSI/ASME NQA-1. The QAM does not consider the NQA-1 elements for control of interfaces between organizations; qualification of inspection and test personnel; design control; procurement document control; document control; control of purchased items and services; control of special processes (such as welding and nondestructive testing); test control; control of measuring and test equipment; handling, storage, and shipping; inspection, test and operating status; and control of nonconforming materials. It fails to notify that the DOE Order provides for exceptions from nonessential elements on the basis of approved written justification.

- The QAPs applicable to the program divisions at Site 300 range from good to nonexistent. The Materials Fabrication Division QAP dated May 19, 1988, contains many QA elements but lacks consideration of procurement document control, document control, independent verification, and corrective action systems. Many of the other plans are nonspecific and lack performance indicators. None contain provisions for independent verification of quality achievement. This is dependent on audits by the Quality Assurance Office (QAO). Many QAPs indicate that the QAO audits are performed when requested by the program.

- Since 1977, 131 QAPs have been prepared, with or without QAO assistance, but all except one have had QAO review or approval. Some are still in draft (neither approved nor released) but have had M-078 dash numbers assigned by QAO, who is responsible to track the QAPs. Of the total, 46 are active, 2 are completed, 1 is unofficial, and 10 are drafts. The balance of 72 are inactive (i.e., previously used for specific programs or projects), but are superseded, canceled, or otherwise terminated. The Appraisal Team has reviewed 21 QAPs at the LLNL main site and has found none to be in full compliance with DOE 5700.6B. The 1985 QAP for the Materials Fabrication Division is incomplete and has never been incorporated in the official numbering system. The Nondestructive Evaluation (NDE) Section of Engineering Sciences Division, QAP M-078-04, October 1978, is the best written in terms of specifically defined and described QA actions, but is also incomplete. The Engineering Demonstration System (EDS) Operations QAP, M-078-41, October 1988, is most nearly complete in terms of addressing elements of ANSI/ASME NQA-1, but often lacks specificity. The three packaging and transportation related QAPs, M-078-91, -92, and -93, are inconsistent with each other and with DOE 5700.6B. A draft QAP for Tritium and the QAP for the Plutonium Facility have the same number, M-078-20.

- See Sections OA.5, QV.2, QV.3, QV.4, QV.5, QV.6, QV.7, FP.7, RP.7, PT.3, OS.1, OP.1, and TS.4.

- See Concern OA.7-2.

CONCERN: (QV.1-1) (H2/C1) The LLNL quality assurance program does not meet the requirements of DOE 5700.6B for independent verification of activities that affect quality and for the selective application of the quality assurance elements in the recognized standard ANSI/ASME NQA-1.

FINDINGS:

- At LLNL, many QA functions elsewhere commonly assigned to QA organizations are assigned to the line organization.

- Some QAPs were up to date, but one had not been revised in over 12 years. The QAP for the NDE Section, M-078-04, is dated October 1, 1978. Some QAPs, such as the QA Policy and Plan for W Program and Weapons Engineering Division dated March 25, 1985, and reissued September 22, 1989, were not available at Site 300. Other QAPs are developed but they are not implemented. Some examples of QAPs that are not implemented are those for Nuclear Design, Nuclear Explosives Engineering Division, Nuclear Energy Systems Division, and Plant Engineering Site 300 Division.

- At the LLNL main site, the Engineering Division and Electronics Services Group lack approved QAPs. Mechanical Engineering and Materials Distribution Division have QAPs in draft. Bldg. 331 Tritium Facility has a new QAP under development, as does the Uranium Atomic Vapor Laser Isotope Separation (AVLIS) program. Some directorates and divisions that do have QAPs at the highest levels fail to provide specific requirements and specific

guidance to the divisions, sections, and groups who must also prepare QAPs.

- At Site 300, the Environmental Restoration Program could not provide a quality assurance document to the Appraisal Team.

- The Site 300 Materials Management QAP for Safe Packaging of Hazardous Materials for Shipping or Transport, M-078-91 Rev.1, April 1989, has been implemented for only about 1 year. No surveillances or audits have been conducted by the QAO. (See Section PT.3.)

- The QAO does not perform surveillance of ongoing activities. No representatives from QAO routinely visit Site 300 for surveillance or walkthroughs. The only visits are for the conduct of infrequent audits.

- Over the past 3 years, only four quality assurance audits have been conducted at Site 300. Two were conducted during 1987, two were conducted in 1988, none were conducted in 1989, and none have yet been conducted or scheduled for 1990. The audit reports address compliance to the Program Division QAP but do not address adequacy of the QAP. (See Concern PT.3-1.)

- Audits at the LLNL main site have been conducted more frequently (generally at the request of specific programs); however, these audit reports also fail to address the adequacy of the QAP.

- Audit findings are not tracked or closed by sitewide management. The QAO performs no analysis of the findings for causal factors, trends, or other deficiencies that require management attention.

- The Appraisal Team has verified that a high percentage of QA findings from SAN audits in 1985, 1987, and 1989 have not been satisfactorily resolved; these findings are confirmed by this Appraisal Team.

- The QAO does not have an audit and surveillance strategy or any other mechanism to actively collect information about the status of the QA Program, nor a system for the sitewide dissemination of lessons learned.

- The evaluation strategy employed sitewide is to provide for "Internal Appraisals" under the direction of the Associate Directors. Depending on the program, the appraisals are either annual, biennial, or triennial. A review of four of the latest appraisals determined that they were not effective. The High Explosive Safety and Nuclear Explosives Safety appraisals failed to address QA or quality verification. The Bldg. 332 Plutonium Facility closed prior appraisal findings solely on the basis of work in process concerning completion of the QAP and auditing, while the Appraisal Team found that the promised auditing has never been done and the QAP does not meet DOE 5700.6B requirements. The appraisal of the Bldg. 251 Heavy Element

Facility in July 1989 found no deficiencies in compliance with DOE 5480.5, even though that facility clearly does not meet the QA provisions of that Order.

- The QAP document is controlled in only one instance: at the Plant Engineering Division. Other document control systems are not in evidence. The Site 300 QA records files that include QAPs, audit reports, and other QA actions are out-of-date.

- Sitewide management has not implemented formal actions to fulfill the QA Policy requirement to review annually the QAPs and supporting documents of each sitewide operating group.

- The QAO has not fulfilled its responsibility to provide QA training and auditor certification for line organization personnel. No one interviewed at Site 300 had received any QA training from QAO. There are few exceptions to this finding at the LLNL main site.

- The HEAF has included a Quality Assurance Section in the Facility Management Plan, dated July 14, 1989. The Quality Assurance Section does not address how the QA Program will accomplish its stated purpose, "to provide the (Facility Management) mechanisms and information channels that allow him or her to control activities." No QAP has been developed, as required in DOE 5700.6B, that addresses what will be controlled, how it will be controlled, and when it will be controlled. There is no consideration of the elements of a quality assurance program, nor is it clear how the QA program will ensure fulfillment of the objectives of the Facility Management Plan, the Facility Safety Plan (FSP), or the Safety Analysis Report (SAR). The QAP deficiencies of this finding also apply to Bldg. 332 Plutonium Facility and Bldg. 251 Heavy Element Facility.

- The SAR is not in compliance with Health and Safety Manual Supplement 6.06, September 1988, that requires a QA section to the SAR. It is to contain a list of the QA requirements that will ensure that the established QA objectives are being met.

- The SARs for Bldg. 251 Heavy Element Facility (SAR UCID-19579, October 1982) and Metal Production Line Facility (SAR UCID-20429, February 1986) lack a QA section.

- The SAR for Bldg. 331 Tritium Facility is being revised by a contractor to add a QA section, among other revisions.

- The SAR for Bldg. 332 Plutonium Facility (UCAR-10211) is still in draft form. Along with the recently approved SAR for Bldg. 334, Hardened Engineering Test Facility, QA sections are provided, but they do not specify how the QA elements will mitigate/alleviate hazards or risks.

- See Concerns OA.7-1, RP.2-1, and OA.5-4; and Sections FR.4, FR.5, PT.3, TC.1, and OP.1.

CONCERN: (QV.1-2) (H2/C1) Quality assurance (QA) requirements are not being implemented to meet DOE 5700.6B and the LLNL Quality Assurance Manual requirements for QA elements such as auditing, staff training, and developing and implementing quality practices.

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:

- Procurement requests for spare parts, equipment, and materials are initiated sitewide. They sometimes include requirements for compliance with codes and standards and may specify vendor certifications or vendor site inspections by LLNL. There is no requirement for independent review by the Hazards Control Department (HCD) or by the QAO to ensure that the requirements for the safety significance of the procurement are established correctly (e.g., application in SAR-designated safety systems).

- Only identified hazardous and safety-related material procurement are subject to approval by HCD. The requester indicates hazardous material on the purchase order request. The Health and Safety Manual requires that the Procurement Department screen all requisitions to meet this review requirement. Hazardous materials received by LLNL are inspected for damage and conformance to the requisition. They are then released to the user. There are no independent checks or audits of the system to ensure that all hazardous materials requested receive concurrence from HCD.

- Requisitions in high hazard facilities (Bldgs. 251, 331, and 332) that affect Building Safety Systems (BSSs) are routinely reviewed by HCD personnel assigned to the facility; however, they do not have a formal approval by HCD, nor are there any procedures or administrative controls to verify that HCD reviews these requisitions. QA coordinators may or may not review requisitions, depending on the practice of the Facility Manager, but have no approval authority, nor do they provide independent verification of the adequacy of the procurement process.

- Requirements for independent review (such as by the QAO) of safety significance for purchased materials have not been developed and implemented.

- See Concern PT.3-3.

CONCERN: See Concern QV.1-1.

QV.3 RECEIVING AND PREINSTALLATION 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:

- o LLNL inspections at vendor sites are performed when specified by the requisitioning organization. Test requirements, inspector hold points, and acceptance criteria are established in the specifications by the line organization. Independent review and verification of such requirements is not required (e.g., applications for safety systems).
- o Materials and equipment used at the LLNL main site are generally delivered to the requisitioners for acceptance testing and/or inspection. No provisions for the use of formal procedures or independent verification is established except for the Lasers Program.
- o The receiving organizations at Site 300 perform no technical inspections, tests, or measurements of incoming material. Visual inspections are made for apparent damage and for general conformance to the requisition.
- o At the LLNL main site (Bldg. 411), some dimensional checks are made at the request of the requisitioner, but procedures are old, uncontrolled checklists.
- o See Section PT.6.

CONCERN: See Concern QV.1-1.

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:

- o LLNL has no established sitewide calibration policy for control of instruments, gauges, tools, and other measuring and test equipment as required by DOE 5700.6B and ANSI/ASME NQA-1. Each division establishes its own requirements. There is no independent assurance that calibration activities conform to accepted codes and standards. This issue was previously identified in the SAN Quality Assurance Appraisal dated September 20, 1985.

- o Site 300 has not established a calibration policy. Each program activity develops its own requirements.

- o Only one Site 300 organization has developed a tracking system to monitor status of calibration. HCD has implemented such a system. It uniquely identifies each instrument and shows its location, the last calibration date, and the calibration due date. A few organizations have developed lists of instruments to be calibrated, but most have not implemented any formal calibration program.

- o HCD has implemented a similar system at the LLNL main site, but it relies solely on facilities personnel for compliance. There is no policy to verify that uncalibrated equipment cannot be used.

- o The Lasers Program has established calibration controls at the LLNL main site, but its labeling procedures for installed equipment are not consistent with the procedures used by calibration facilities such as the Electronic Instrument Services Section.

- o Some QAPs include a requirement for establishing a calibration assurance activity. This requirement has not yet been implemented. Review of the facilities indicates that most depend on the organization that performs the calibration to maintain records and traceability to national standards. Most facilities do not have a listing of the instruments which require calibrations.

- o Calibrations sitewide are performed by onsite technicians, by LLNL main site shops, and by outside vendors. Onsite technicians perform calibrations and functional tests of equipment used in the test programs. These consist mostly of electronic and high-speed photography equipment. Records of dry runs and test runs are maintained. Procedures that indicate which records are to be maintained are usually not available.

- LLNL main site shops perform calibrations and maintain a master list of devices in the calibration system. There is no recall system to ensure calibration maintenance; each user must request calibration services, except for the Lasers Program.

- Vendor calibrations are the responsibility of the cognizant program but most lack administrative controls to ensure effective utilization and consistent implementation of the vendor support.

- The LLNL QAM does not address calibration as required by DOE 5700.6B and ANSI/ASME NQA-1. No policy or guideline for LLNL organizations is given.

- See Concern QV.1-1 and Sections MA.2 and RP.8.

CONCERN: (QV.4-1) (H2/C1) There is no sitewide LLNL calibration policy for measuring and test equipment as required by DOE 5700.6B and ANSI/ASME NQA-1.

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 LLNL QAM and the program division QAPs do not address the requirement for identification and control of hardware. The program divisions and facility managers are responsible to ensure that materials used in new applications, maintenance, and modifications meet the established requirements. Only one of the Site 300 QAPs reviewed contained provisions for nonconforming materials.

- At the LLNL main site, Materials Fabrication Inspection Section personnel mark the material they inspect per the print-by-engraving processes. They use informal, uncontrolled procedures in doing so.

- Rejected materials at Receiving (Bldg. 411 and Lasers) and at Mechanical Inspection (Bldg. 321) are tagged, but special isolation or segregation areas are not provided.

- There are no provisions for Material Review Boards or other independent reviews of the disposition of rejected material. Reject material may be "used as is" at the discretion of the requisitioner alone.

CONCERN: See Concern QV.1-1.

QV.6 INSPECTIONS

PERFORMANCE OBJECTIVE: Prerequisites should be provided in written inspection procedures with provisions for documenting and evaluating inspection results.

FINDINGS:

- Documented inspections are carried out at the LLNL main site in an orderly manner by Mechanical Inspection groups, NDE personnel, and Lasers Program personnel to the requirement levels requested by their customers; however, except for the Lasers Program, only informal and uncontrolled procedures and checklists are used.

- Inspection personnel at the LLNL main site are all well qualified, trained, and certified. Their on-the-job training programs are not well documented and controlled. (See Section TC.8.)

- Neither facilities QA personnel nor the QAO participate in independent verifications of satisfactory work completion and modifications. If the plant engineer does not otherwise provide for inspections, the work is self-inspected by those performing it.

- None of the audit reports reviewed (and few of the QAPs) address inspections as an element of their program, nor is independent verification specified.

CONCERN: See Concern QV.1-1.

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 sitewide QA Manual (M-078, Rev. 1) does not address the Control of Special Processes nor do any of the QAPs reviewed (except for M-078-04).
- The QAO is not involved in verification activities to assure conformance with applicable codes, standards, QA procedures and specifications except through infrequent audits and internal appraisals.
- The Lasers Program has implemented a comprehensive set of welding and brazing procedures, including training and certification, but did not incorporate the requirements into their QA Plan (M-078-41).
- Facility managers use the access lists to their buildings to ensure that craftspersons (welders, etc.) are qualified and/or certified to do work in their areas. No administrative procedures document this practice even though copies of certifications and test results are on file as QA records.
- The NDE Section (Bldg. 3226) practices conforming control of special processes, including training and certification, but their QAP lacks some elements of DOE 5700.6B and is not compatible with the National Fire Protection Association (NFPA) codes for records storage in ANSI/ASME NQA-1.

CONCERN: See Concern QV.1-1.

4.5.3 Operations

4.5.3.1 Overview

This Appraisal addressed all eight Performance Objectives in the Operations area. Major attention was focused on LLNL Site 300 operations of the B-, W-, and Chemistry Divisions and of the Process Area (Materials Fabrication Division and the Nondestructive Evaluation Section of the Engineering Sciences Division), plus operations of the Laser Programs Directorate, the Chemistry and Materials Science Directorate, and the Nuclear Chemistry Division on the LLNL main site. Due to time limitations, the LLNL main site appraisal had to be restricted to those operations that were judged to have the greatest safety vulnerability. The appraisal of Site 300 operations was augmented to include operations in the High Explosives Applications Facility (HEAF) on the LLNL main site (Bldg. 191). The scope of the main site appraisal included observations of operations in 25 buildings; discussions with more than 150 managers, professionals, and support personnel; and a detailed review of pertinent safety documentation. The buildings in which main site operations were appraised were 131, 151, 161, 162, 165, 166, 169, 214, 222, 235, 241, 243, 251, 321, 322, 327, 331, 332, 341, 361, 391, 481, 482, 490, and 1677.

Because of the recent standdown of all high explosives (HE) operations, the Site 300 appraisal process consisted of observation of dry runs of operations and walkthroughs of the various facilities with supervisors and operators. An in-depth evaluation of the functional aspects of operational safety was not possible during the appraisal period. Operations and processes reviewed included explosives machining, radiographic inspection, isostatic pressing, explosives waste cleaning, explosives firing, as well as flash X-ray, dynamic and thermal testing, and explosives mixing. In each case, managers, supervisors, and operators were interviewed in order to obtain an understanding of how operations were performed and controlled. Logbooks, training records, and operating procedures were examined and discussed. Actual HE operations, however, were not observed.

Operations at Site 300 appear to be conducted in an informal manner, but with safety overriding all other considerations. Employees at all levels have been made aware that safety is of first concern and should accordingly be integrated into their thinking and activities. The role of the experienced supervisor or manager cannot be underestimated in achieving and maintaining a high level of safety consciousness. Many Site 300 supervisors have over 15 years of work experience at the site. Many LLNL main site managers with line responsibilities for operational safety seldom visit Site 300 facilities to review, or to update their knowledge about, the operations for which they are responsible. As a rule, LLNL main site managers do not play a significant role in ensuring compliance with the policies and procedures that govern the operations at Site 300.

Extensive administrative and physical controls are employed in all Site 300 operations, although commonly used guidance mechanisms such as checklists are not routinely employed. Particular emphasis is placed on any operation that involves HE handling or radiation. The Site 300 Safety and Operational Manual, which supplements the LLNL Health and Safety Manual, provides a comprehensive set of procedures for the standard operations at Site 300. Operational Safety Procedures (OSPs), usually initiated by those performing

experiments at Site 300, are mandatory for all other operations having an inherent hazard potential. The Appraisal Team observed a lack of strict adherence to policies and procedures governing operations at Site 300 facilities. Also lacking is a formal document defining the safety responsibilities and authorities of Site 300 managers and supervisors.

The matrix type of organization is complicated and therefore difficult to understand. However, the long tradition and successful functioning of the matrix organization at LLNL is accepted by all personnel and appears to cause few difficulties in operations of the facilities or in understanding management authorities and responsibilities. The lack of uniformity in the formal administrative controls for operations between different parts of the organization reduces the effectiveness of the administrative controls and in some cases results in noncompliance with DOE Orders and SAN Management Directives. Also, safety performance goals are not uniformly established for all operations groups; nor is there a sitewide requirement to address employee safety performance as part of the annual performance appraisals.

At the LLNL main site, control room operations were observed to be carried out in a thorough and professional manner. Sufficient supervision was present in active control areas to monitor operations, to respond to off-normal events, and to incorporate plans for subsequent operations. Shift logs were observed to be maintained properly in the few areas that have shift operations.

Operators must complete a series of formal training courses and 6 months or more of on-the-job training before being qualified for independent operational responsibilities. For most operations (particularly those in the Site 300 Process Area) an annual requalification review is required. By and large, supervisors monitor systems and employees on a daily basis and observe operator proficiency, performance, and fitness to perform hazardous operations. Determining the nature and extent of the on-the-job training program for a novice operator-to-be is primarily the responsibility of the facility supervisor. The training, qualification, and maintenance of skills of operators are not covered by formal Site 300 procedures and guidelines. Regardless of the degree of training or expertise of an operator, working alone is not permitted in operations where a high energy potential is present. There are no written procedures directing how operators-in-training may be used to support operations.

Facility Safety Procedures for bunker explosive experiments at Site 300 are not sufficiently detailed to guide the operations staff when unusual or abnormal situations are encountered at the firing table. Not covered, for example, are experiments where unexpended energetic materials are to be intentionally left on the firing table after a firing operation.

Operational Safety Procedures were noted throughout the LLNL main site and appropriate review and sign-offs were evident. Logbooks were kept in most experimental areas reviewed. There is a concern that there is not sufficient use of procedures in Bldg. 331, as recent tritium release reports cited lack of procedure as a main cause for the releases.

The Facility Managers for the individual buildings at the LLNL main site are responsible for the parameters, controls, and documentation requirements to ensure a safe operation. Alarms, interlocks, key-control panels, and status

panels provide proper control to critical equipment. Locks and tags observed at operational facilities were effectively and correctly employed, with the exception of one lock and tag that should have been removed years ago. However, the Health and Safety Manual, Supplement 26.13, General Lock and Tag Procedure, does not comply with the provisions of 29 CFR 1910.147, as supervisors and employees are not fully trained on the use and inspection of locks and tags.

Sufficient support equipment and material was readily available to support normal operations. Housekeeping was generally good in all operational facilities. Some clutter and lack of order was evident in the vicinity of the firing tables at both bunkers visited at Site 300.

Operators and experimenters were vigilant in carrying out their activities. Attention was given to airborne radiation alarms and system pressure readings when performing activities using tritium in Bldg. 331. All operators interviewed were aware of the OSP-defined courses needed, and verified that they had taken them (and were updated as required). On-the-job familiarization with building and safety practices was cited as a requirement before independent operation at LLNL. The fact that safety-related information such as lessons learned, Unusual Occurrence Reports from other DOE sites, and accident investigation reports from other LLNL areas are not being received by the workers prompted a concern.

Of the facilities surveyed on the LLNL main site, routine shift operation was in effect only in the Laser Demonstration Facility (LDF). Observation of shift turnover showed it to be carried out professionally. Turnover of information was facilitated by physical props. Format for the turnover was well-defined and followed by all members of the incoming and outgoing crews. Day supervision was present, but did not lead the meeting. The "lead experimenter" participated, but the primary meeting leaders were the "lead technicians." A separate turnover was carried out between the incoming and outgoing shift supervisors. The shift schedule (10-hour shifts) allows for a 2-hour transfer of responsibilities, which is very helpful in maintaining continuity of operations.

Despite the sophistication of many of the LLNL main site facilities (particularly in the Laser Programs), human factors engineering has not routinely been considered in their design, operations, and maintenance as stipulated for nonreactor nuclear facilities by DOE 6430.1A on General Design Criteria. LLNL has a resident organization with highly developed capability in the field of human factors engineering. This group provides human factors engineering services to many outside agencies, but very little to LLNL program organizations. In fact, LLNL has no standards, or even guidelines, for the inclusion of human factors engineering in the design, layout, and operations of its facilities.

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:

- o LLNL main site managers have not set precise, measurable safety goals and performance indicators for Site 300 facilities.
- o Some LLNL main site managers are not well versed in Site 300 operations and their safety implications because they infrequently visit the site.
- o Because of the lack of backup, any significant turnover in Site 300 operating supervisors could unfavorably impact safety.

CONCERN: (OP.1-1) (H2/C2) LLNL main site management does not maintain a continuous, in-depth involvement in Site 300 operations and safety issues.

FINDINGS:

- o Site 300 organization charts do not clearly delineate lines of authority.
- o A formal document does not exist to define the authority, responsibility, and accountability of each organization at Site 300.
- o The responsibilities and authorities of each position involved in operations at Site 300 are not set forth in a formal document.

CONCERN: See Concerns OA.1-3, OA.1-5, and OA.6-1.

FINDINGS:

- o Although Chapter 2, "Work Planning and Safety Procedures," of the LLNL Health and Safety Manual, M-010, January 1990, provides general information on formal documentation, it does not provide definitive guidance to ensure a consistent system of formal administrative controls for operations throughout LLNL.
- o As determined from discussions with operations managers and safety officers in several LLNL divisions, there is no specific definition of the hierarchy of administrative controls (SARs, OSRs, procedures) in effect at LLNL to meet requirements of DOE 5480.5 or DOE 5481.1B. There is also no definition of measures that must be taken if an administrative control is violated.
- o A survey of LLNL SARs (See Section OA.7) revealed that some (e.g., the SAR for the Metals Production Line in Bldg. 332) are not current with respect to up-to-date information or format; others are not available (e.g., the SAR for Bldg. 331 operations is in preparation but long overdue).

- Examination of the existing LLNL SARs showed that the OSRs cited therein are often dissimilar in format. The OSRs in the SAR for the LLNL Plutonium Facility follow the format stipulated in SAN MD 5481.1A; while those in the Final Safety Analysis Document for DOE Comment for the MOCVD Crystal Growth Facility in Building 166 (January 30, 1990) follow a general format without the structure cited in SAN MD 5481.1A.

- Examination of the wide variety of procedures used by personnel in different LLNL divisions indicated that:

  - Facility Safety Procedures (FSPs) vary widely in scope. Facility Safety Procedure 1000 for the Laser Complex (January 3, 1990) is primarily a policy document; whereas Facility Safety Procedure 151 (Rev. January 1990) provides great detail about all operations in Nuclear Chemistry Division Bldg. 151.

  - Operational Safety Procedures (OSPs) in different LLNL divisions are often dissimilar in character. OSPs in the Laser Programs (e.g., those in FSP-391) are general in scope with primary emphasis on hazards analysis and derivative controls; OSPs for Bldg. 332 operations are broad in scope and very detailed. Moreover, in the Nuclear Chemistry Division, OSPs are prepared only for those operations that are outside the limits established by their FSPs.

  - Operations in the Nuclear Chemistry Division Bldg. 151 are performed according to procedures written by technical professionals; but these procedures are not registered, in the sense that they are not normally numbered, dated, or signed. Furthermore, they are not in any system that formally requires review for continued validity on a periodic schedule.

- Incident reporting practices for operations vary throughout LLNL. Although Chapter 4 of the LLNL Health and Safety Manual, M-010, January 1990, cites requirements for notification of accidents or incidents, it does not stipulate preparation of "unusual event" reports; nor does it specify the review process that could escalate the event to an Unusual Occurrence for treatment under the requirements of DOE 5000.3.

- See Concerns OA.1-1, OA.7-1, and QV.1-1; and Sections FR.3 and TS.2.

CONCERN: (OP.1-2) (H2/C1) Formal administrative controls for operations are not consistent in the way they are provided, applied, enforced, and monitored throughout LLNL; nor do they conform completely to the format specified in SAN MD 5481.1A.

FINDINGS:

- No safety performance goals are established for the operations groups at LLNL.
- With a few exceptions, safety performance is not a defined segment of the annual performance appraisal.
- See Concerns OA.3-1, OA.6-1, IH.3-1, and QV.1-2.

CONCERN: (OP.1-3) (H3/C2)

There is no sitewide requirement to address safety performance as part of the annual performance appraisal within the operating divisions at LLNL.

OP.2 CONDUCT OF OPERATIONS

PERFORMANCE OBJECTIVE: Operational activities should be conducted in a manner that achieves safe and reliable operation.

FINDINGS:

- The on-the-job training of Site 300 operators varies from facility to facility and is primarily left to the discretion of the facility supervisor.
- In most cases, the on-the-job training of operators is informal and proceeds without preestablished checklists or guidelines.
- There are no written policies for the various Site 300 facilities directing how trainees may be used to support operations. This decision is left to individual supervisors.

CONCERN: See Concern TC.1-1.

FINDINGS:

- The Engineering Sciences Division has a requirement that, in order to maintain their skills and familiarity with equipment and procedures, qualified radiographers/HE handlers who are to be utilized as replacements at Site 300 nondestructive evaluation (NDE) facilities shall be assigned to the site a minimum of 1 day of work every 60 days. This requirement is not being adhered to.
- In the absence of the NDE Facility Associate, who normally is the only Engineering Sciences Division qualified radiographer/HE handler at Site 300, a replacement would have to be sent from the LLNL main site. Records showed that there is no qualified replacement who has had recent and frequent exposure to Site 300 NDE operations.

CONCERN: (OP.2-1) (H2/C2) No document includes procedures and guidelines covering the maintenance of skills of operators assigned to the various Site 300 facilities.

OP.3 OPERATIONS PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Approved written policies, procedures and data sheets should provide effective guidance for normal and abnormal operation of each facility on a site.

FINDINGS:

- The Site 300 Process Area Procedures (Nos. 205-228) are not being reviewed annually, as stated within these procedures.
- Site 300 policies and procedures do not clearly define the many interfaces to be encountered in the matrixed management structure employed by LLNL.
- As a rule, LLNL main site managers do not play a significant role in ensuring compliance with policies and procedures that govern the operations at Site 300 for which they are responsible.
- OSP No. 191.14, Chemical Synthesis, does not state that the Peer Review Committee at LLNL functions as the Explosives Development Committee in approving synthesis and scaleup of new explosives. DOE/EV/06194, DOE Explosives Safety Manual, gives the procedures and requirements for approving an explosives development program by an Explosives Development Committee.

CONCERN: (OP.3-1) (H2/C2) Documentation does not demonstrate that the policies and procedures governing operations at Site 300 and the High Explosives Applications Facility (HEAF, Bldg. 191) facilities are strictly adhered to.

FINDINGS:

- There is no recovery plan for Site 300 delineating steps to be followed in the event of an incident on, at, or near a firing table during or following a firing operation.
- Procedures governing the operation of explosive experiments do not cover steps to be followed when unexpended energetic materials are to be intentionally left on the firing table.
- There is no OSP covering steps to be taken if an equipment malfunction (e.g., in the control instrumentation) occurs at a firing facility after a firing sequence has been initiated.
- Video coverage of the firing table area at Bunker 801 does not completely support the muster control system, nor does it allow a thorough post-shot inspection of the area around the firing table.

CONCERN: (OP.3-2) (H1/C2) Existing procedures and equipment do not effectively guide or support the Site 300 operations staff when unusual or abnormal situations are encountered.

FINDINGS:

- OSP No. 801-900215 was prepared to cover the destruction in place of the damaged unit from Shot 1804M at Site 300 Bldg. 801 because movement of the unit was considered an unacceptable

risk. This OSP did not require that a radiographic operation be performed on the unit, because it was considered that this operation was covered by FSP No. 134, Nondestructive Field Radiography - Site 300.

- o Section 2 of the LLNL Health and Safety Manual states that "a safety procedure is probably required" for "any activity that is not in compliance with a mandatory code or standard of an existing safety policy."

- o See Section PT.3.

CONCERN: (OP.3-3) (H1/C2) Not all policies defining activities that require Facility Safety or Operational Safety Procedures may be sufficiently specific to cover all hazardous operations at Site 300.

FINDINGS:

- o Operations at the various Site 300 facilities do not generally follow a preestablished, step-by-step sequence.

- o Often procedures are based on the knowledge and experience of involved personnel rather than on a written checklist. For example, at Bunker 851 in February 1990, an incident at the grounding panel led to the inadvertent firing of the capacitor discharge unit.

CONCERN: (OP.3-4) (H1/C2) The safe conduct of routinely performed, normal operations at Site 300 is not always ensured or guided by formal mechanisms such as written checklists.

FINDINGS:

- o Unusual Occurrence Report (UOR) LLNL-89-23-B-331 cited the causes of a 180 to 300 Ci tritium release as "Personnel" and "Procedure." The operator who generated the UOR stated there was no procedure to cover the operation in question.

- o UOR LLNL-85-3-Bldg. 331 cited "Procedure" as the reason for the release of 900 Ci of tritium.

- o Eighty Ci of tritium were released in Bldg. 331, Room 135, on November 1, 1989; no procedures were used.

- o Five rooms (130, 149, 153, 157, and 158) in Bldg. 331 can employ in excess of 1 kCi of tritium in normal experimental operations. A limit for operating without review by the Facility Manager and Hazards Control is 1 kCi according to the Facility Safety Procedure.

- o There is a program underway in Bldg. 331 to assess the number of Curies, the total gas quantity, the pressure, and which systems are being used, as the criteria related to the need for formal procedures.

CONCERN: (OP.3-5) (H2/C2) The LLNL program to improve the criteria for mandating the use of approved procedures in Bldg. 331 is not yet implemented.

OP.4 FACILITY STATUS CONTROLS

PERFORMANCE OBJECTIVE: Operations personnel should know the status of the systems and equipment under their control, should know the effect of nonoperational systems and equipment on continued operations. They should ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

FINDINGS:

- Health and Safety Manual Supplement 26.13, General Lock and Tag Procedure, revised June 27, 1984, does not require annual inspection and certification of energy controls in accordance with 29 CFR 1910.147. It also does not address training of employees as required by the OSHA standard.
- Supervisors and employees at Site 300 were generally unaware that the locks and tags in their facilities should be periodically inspected and that employees should be trained in the use of locks and tags.
- A lock and tag was found on a circuit breaker that was associated with a piece of equipment removed a number of years ago.

CONCERN: (OP.4-1) (H2/C1) Health and Safety Manual Supplement 26.13, General Lock and Tag Procedure, revised June 27, 1984, does not comply with the provisions of 29 CFR 1910.147 for use of locks and tags.

OP.5 OPERATIONS STATIONS AND EQUIPMENT

PERFORMANCE OBJECTIVE: Operations stations and facility equipment should effectively support facility operation.

FINDINGS:

- o Possible ignition sources were located inside a chemistry hood in the HEAF.
- o Interlocked access doors were not provided to Rooms 1314 and 1316 at HEAF, areas where remotely controlled explosive operations are conducted.
- o At a number of Site 300 facilities (Bldgs. 834E, 834J, 854H, and 854J) electric lines servicing the facilities are not installed underground from a point not less than 50 feet away.
- o At several Site 300 explosives facilities, including Bldgs. 817 and 827, overhead lines required to be in proximity to the buildings are closer than the length of the poles supporting the lines, so that a broken energized line could come into contact with the building.
- o The lettering on explosives and personnel limits signs in Bldgs. 341 and 345 was small and difficult to read. At least one room appeared to have approval for both a 500 and a 600 gram limit.
- o The penetration hole around the conduit pass-through in the reinforced concrete dividing wall between the Propellant Work Room 1618 and the Loading Dock at HEAF had not been filled with cement grout.
- o See Section AX.6.

CONCERN: (OP.5-1) (H2/C2) Not all explosives operations strictly comply with the provisions of DOE/EV/06194, DOE Explosive Safety Manual, with respect to items such as electrical line routing, personnel access controls, and ignition sources.

FINDING:

- o An explosives storage cubicle in Bldg. 229 was not provided with a steel plate and sand bag barrier to suppress missiles (hazardous fragments and debris) that would be projected from the building in the event of an accidental explosion in the storage cubicle as recommended by the 1985 Department of Defense Explosives Safety Board Inspection Team.

CONCERN: (OP.5-2) (H2/C2) One storage cubicle in Bldg. 229 did not have a barrier to suppress missiles from escaping the magazine, as recommended by a Department of Defense Explosives Safety Inspection Team in 1985.

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:

- In many cases, employees do not receive safety-related feedback regarding their and other work units' injury types, frequencies, and other specifics at LLNL.
- Little if any effective use is made of industry "lessons learned" (UORs and other DOE accident reports and bulletins), as most workers profess never having seen such information.
- Many of the operators interviewed stated that they attend safety meetings only two or three times a year.
- See Concerns OA.5-3 and TC.1-1 and Section PT.2 and FR.6.

CONCERN: (OP.6-1) (H2/C2) Safety-related information (unusual occurrence reports, lessons learned, and documented safety meetings) does not reach the operating staffs in a consistent or effective manner at LLNL.

OP.8 HUMAN FACTORS

PERFORMANCE OBJECTIVE: Human factors considerations should be incorporated in the design, layout, and operation of all facilities on the site in order to facilitate operator control, information processing, and the recognition and proper response to alarms, instruments, and other equipment.

FINDINGS:

- Labels and notes in Site 300 control rooms are frequently presented on "Post-it" note pads or stuck up by other means that are as easily dislodged.
- An approval system for the use of operating aids was not apparent.
- Not all operating aids were dated.

CONCERN: (OP.8-1) (H2/C2) A policy governing the approval and posting of operating aids in control rooms does not exist.

FINDINGS:

- Discussions with LLNL operations managers indicated that, with few exceptions, human factors engineering has not been considered in design, operations, and maintenance of LLNL facilities, as required by DOE 6430.1A, General Design Criteria, Section 1300-12 (April 6, 1989) for nonreactor nuclear facilities.
- Despite the fact that DOE 6430.1A, Section 1300-12.3.2 stipulates that "A human factors engineering program plan appropriate to the level of importance of a facility or system shall be developed during the system development process (i.e., as an integral part of the conceptual design phase)," the manager of the LLNL Systems and Human Performance group reported that except for the Engineering Demonstration System (EDS) project, this requirement has not been met at LLNL.
- The Systems and Human Performance group in the LLNL Nuclear Systems Safety Program organization has three engineers (in a group of seven) specifically trained in the field of human factors engineering; however, as determined through discussions with this group's manager, over 90 percent of their services is provided to agencies external to LLNL (e.g., the Federal Aviation Administration, the Nuclear Regulatory Commission, the Office of the Secretary of Defense, the U.S. Army, and the U.S. Navy).
- The Human Factors Engineering services from the Systems and Human Performance group were curtailed for the EDS project before the facility was started up. As a result, the Program Manager for Systems and Human Performance has never observed performance of the human factors measures that were incorporated into the design and construction of the EDS.

CONCERN: (OP.8-2) (H2/C1)

LLNL has no requirement for the inclusion of human factors engineering in the design, layout, and operations of facilities, as required by DOE 6430.1A, Section 1300-12 for nonreactor nuclear facilities.

4.5.4 Maintenance

4.5.4.1 Overview

This Appraisal included all eight Performance Objectives in the Maintenance area. The maintenance programs at Site 300 were evaluated primarily through interviews with both managers and technicians of various divisions; physical inspection of test, fabrication, and support-shop facilities; and review of directives and equipment records. The principal organizations at Site 300 that were reviewed were the Plant Engineering and Fabrication Divisions, but vehicle and electronics maintenance supervisors were also interviewed. The maintenance programs at the LLNL main site were evaluated through interviews and tours with managers and technicians of the Maintenance/Operations Department and its supporting divisions, and with managers and support personnel at Bldgs. 165, 194, 251, 298, 321, 332, 334, 343, 492, 511, 513, 514, 519, and 612. At these buildings, maintenance manuals, maintenance procedures, maintenance historical information, vendor manuals, and organizational policy manuals were reviewed, and inspections were made of buildings, utilities, and programmatic equipment.

In addition, sitewide inspections were conducted of the LLNL main site electrical distribution system as well as the potable water system, the low-conductivity water system, the natural gas system, and the compressed air system. The DOE SAN office in Oakland, California, was also visited.

Maintenance at Site 300 is inconsistent; adequate in some areas but quite weak in others. Weaknesses result primarily from a lack of appreciation of the different elements involved with maintenance and a lack of formal administration of maintenance activities. Maintenance administration activities must include effective training and qualification programs, areas where additional weaknesses were found.

Throughout the LLNL main site, maintenance, as measured by the condition of buildings and utilities at this point in time, was found to range from poor to fair. It is recognized that the maintenance program at LLNL has been underfunded for a number of years. It is also recognized that the maintenance organization has in place an aggressive program to return the LLNL main site to a more acceptable condition. However, at the time of this Appraisal, the general condition of the LLNL main site buildings and utilities was considered to be substandard. The support provided by management, and the efforts of the LLNL main site Maintenance/Operations Department in organizing and redirecting their efforts to recover from the past period of de-emphasis on maintenance, was considered to be motion in the right direction. As part of this activity, documentation describing the Maintenance/Operations Department, including the organizational structure, responsibilities, and interfaces, is being developed but is incomplete at this time. These relationships are generally well understood; however, backup documentation is required. In addition, DOE 4330.4, Real Property Maintenance Management, requires LLNL to develop, publish and implement a Real Property Maintenance Management Program. Most of the elements of this program are in place, but overall policy documentation establishing and clearly defining this program is incomplete.

Systems and equipment under the control of the programs were also examined from the standpoint of maintenance. In these cases, maintenance, as indicated

by the condition of the equipment, varied greatly from poor to excellent primarily according to the age of the particular system and the vitality of the program budget. Maintenance on equipment of this nature is much less formal, with a high level of reliance placed on the cognizant scientist or technician rather than on formalized procedures. The Appraisal Team considered that there was an imbalance here and that policies and procedures should be put in place to increase formality and control.

Some problems were noted in the interface between program activities and maintenance. Instances were noted where program equipment was developed without timely involvement with the maintenance organization to incorporate basic maintenance requirements. In other instances, programmatic equipment which should logically be maintained by the plant maintenance organization was not included in their system.

Maintenance activities involve preventive as well as corrective elements. Of these two elements, preventive maintenance includes the two sub-elements of routine upkeep (for operability) and general preservation of equipment and facilities. The principal criticism about routine upkeep preventive maintenance is that the checklists used for some of the fabrication equipment do not reflect all of the manufacturer's recommendations contained in the associated technical manuals. At both Site 300 and the LLNL main site, the vendor technical documentation was generally available to maintenance personnel. Nevertheless, this documentation was found not to be consistently considered or incorporated into the preventive maintenance program. In addition to missing some of the steps recommended by the manufacturer, preventive maintenance activities are often accomplished by the use of generic checklists that only provide a "tickler" for the repair person consisting of a place to check off the associated activities which might apply and a place to sign for the completion of the job. The checklists are neither component-specific nor expanded to include procedural steps or cautions which might be appropriate to the specific activities or systems applicable to the component.

The principal maintenance problem at Site 300 and to some extent, the main site, however, is the apparent lack of a systematic program for facility and system preservation, the other sub-element of preventive maintenance. A number of components are located in the open environment, exposed to the corrosive effects of the weather. Even equipment that is located inside LLNL buildings, however, is often neglected in terms of preservation. Many valves in systems such as the water supplies to the various buildings and services have been allowed to deteriorate. While it may sometimes be more cost effective to simply replace valves than to maintain them, from an operational and safety perspective, water supplies to the various buildings necessary for safety or sanitary purposes should always be available and reliable.

The second major element of maintenance, repair, also contains two sub-elements, predictive and corrective. Predictive maintenance is essentially not applicable to Site 300, since it is cost-effective primarily for relatively large rotating machinery found at facilities such as power plants. Corrective maintenance is thus the principal repair function performed at Site 300. The LLNL main site does include an extremely large number of rotating equipment items including, primarily, pumps and blowers; therefore, a predictive maintenance program emphasizing vibrational analysis is being initiated.

Corrective maintenance is primarily performed under the work request, or Whiz Tag System, which is based only on a single criterion, the amount of the time required for the repair person to do the job. The initial time estimate is sometimes made by a client who really does not know what is involved with the work, so the time criterion (8 or 16 hours, depending upon which document consulted) is considered to be flexible. The maintenance activities undertaken through the Whiz Tag System do not have a level of control that ensures compliance with either safety procedures or applicable technical manuals, and generally have no quality control checkpoints or design adequacy checks. However, in surveying over 100 recent Whiz Tag actions, all were found to be of a "housekeeping" nature with no safety implications.

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.

FINDING:

- The responsibilities and authorities of each position within the Site 300 Plant Engineering organization are not documented or well defined. At the LLNL main site, documentation describing the Maintenance/Operations Department including the organizational structure, responsibilities, and interfaces is in the process of being prepared; however, it is incomplete at this time. No schedule for completion was noted. (See Section OA.6.)

CONCERN: See Concern OA.6-4.

FINDINGS:

- Although a Plant Engineering Policy manual exists, the manual does not address maintenance policy. The section on maintenance is limited to a list f implemented maintenance programs.
- Although a Plant Engineering Standards manual exists, it is primarily intended for procurement activities. No formal guidance is provided on standards of cleanliness and preservation of equipment.
- There is no formal document control system for technical manuals.
- Maintenance management presence and oversight at Site 300 are not systematically used to ensure the proper performance of maintenance tasks. The geographical separation of the various buildings at Site 300 makes it difficult for supervisors to ensure that maintenance is performed properly.
- Organizational responsibility has not been assigned to inspect and maintain the trailers used in transporting hazardous wastes. Vehicles used for onsite transportation of hazardous wastes are not maintained in accordance with Federal regulations. (See Section PT.8.)

CONCERN: (MA.1-1) (H3/C2) Organizational documentation needed for an effective maintenance program is not complete since not all equipment is covered and maintenance is not systematically controlled in accordance with technical manuals.

FINDINGS:

- Training of maintenance personnel is not formal, so it is difficult to determine whether personnel are qualified to perform assigned tasks.
- Maintenance personnel are not formally task qualified to perform work. Most training is conducted on the job. The potential need for offsite vendor training is not systematically

considered. Plant Engineering and Maintenance Operations has a good apprenticeship program, but ongoing training for journeymen, other than for safety courses, is not established. A training plan document did not exist but was being developed.

- o Training and qualification programs are not in place to ensure that vacancies are filled with qualified personnel.

- o See Sections TC.5 and OA.6.

CONCERN: See Concern TC.1-1.

FINDINGS:

- o DOE 4330.4, Real Property Maintenance Management, March 25, 1982, stipulates developing, publishing, and implementing a real property management plan. While the LLNL main site Maintenance/ Operations Department has incorporated and employs most of these required elements, an overall policy implementing the requirements of this Order and describing responsibilities, control measures, and format is not in place.

- o The LLNL is not contractually required to conform to the requirements of DOE 4330.4.

CONCERN: (MA.1-2) (H3/C2) Conformance to DOE 4330.4 is not fully in effect and is not currently a contractual requirement.

FINDINGS:

- o A formalized system for conducting maintenance of plant buildings and utilities is in place; however, a similar system with regard to the maintenance of program equipment and experimental systems is not in place. A policy or procedures for establishing such a system is not evident.

- o A high level of reliance is placed on the experience, knowledge, integrity, and availability of technicians, mechanics, and experimenters in conducting maintenance activities on programmatic or experimental equipment.

- o Maintenance requirements and procedures for programmatic equipment, in most cases does not exist. Maintenance information is given (primarily) by vendor manuals which serve as the information source for troubleshooting. In general, corrective maintenance is done when equipment fails, or when a degradation of performance is noted.

- o LLNL stresses the high quality of LLNL personnel and the need for a feeling of ownership and contribution on the part of their employees rather than a reliance on detailed procedures.

- o The Appraisal Team noted that, in many key positions, technical personnel have left or are nearing retirement, with no clear means evident to transfer their knowledge.

- o See Concern OA.1-3 and Sections PT. 1 and OA.5.

CONCERN: (MA.1-3) (H2/C2) The heavy reliance on the skills of personnel to ensure proper maintenance and the assurance of continuity of talents is not sufficiently balanced by formally documented procedures.

FINDINGS:

- The budget for plant maintenance has decreased progressively for about 8 years and this decrease has only been reversed for the last 2 years. As a consequence, many of the plant buildings and utilities are in a general state of disrepair. This is indicated by: numerous structures needing paint; rusty components; missing, loose, or otherwise faulty fasteners; leaks; unmarked pipes; missing insulation; and deteriorated wooden structures. Goals for recovery actions and for an adequate budget are being put in place.

- The programs have traditionally demonstrated reluctance to provide sufficient resources to ensure proper maintenance for buildings and structures.

CONCERN: (MA.1-4) (H2/C2) The plant and utilities, particularly the older portions, have deteriorated to the extent that a major recovery effort is necessary.

FINDINGS:

- Cooperation between the programs at the LLNL main site and the maintenance organization has been deficient in several aspects. Instances were noted where:

  - Programmatic equipment has been procured or fabricated without detailed interfacing with maintenance to ensure that maintenance requirements are incorporated in a timely and complete fashion.

  - Programmatic equipment such as tank trailers which logically should be on the routine preventive maintenance program are, in some cases, not included and are maintained on an "as-required" basis.

  - Outages for maintenance are occasionally deferred excessively due to programmatic requirements.

- Numerous small satellite machine shops were noted. Maintenance and control of these operations is an added complication, and there is no means to ensure that this equipment will automatically be placed in the maintenance system.

- See Concern OA.1-1.

CONCERN: (MA.1-5) (H2/C2) No policy is in place to ensure that basic maintenance requirements are given the required emphasis and priority with respect to programmatic activities.

MA.2 CONDUCT OF MAINTENANCE

PERFORMANCE OBJECTIVE: Maintenance should be conducted in a safe and effective manner to support each facility and operation on the site.

FINDINGS:

- The informal work requests used in the Whiz Tag System at Site 300 do not specifically require consideration of codes and standards, safety precautions, or design changes and documentation. It effectively supports expeditious accomplishment of priority work, but relies on the individual worker to ensure safety.
- The Whiz Tag System does not provide safety precautions and supervisory check points; however, a review of several hundred recent Whiz Tag actions revealed only minor housekeeping-type activities which had no safety implications.
- See Sections MA.4, FR.2, and FP.7.

CONCERN: (MA.2-1) (H1/C2) CAT. II

In general, the Whiz Tag System does not contain guidance, criteria, and controls to ensure safe conduct of maintenance of plant systems and facilities nor control of safety system design features.

FINDINGS:

- Written procedures are not used to govern maintenance activities. Maintenance personnel refer to technical manuals for detailed information, but these manuals contain no site-specific information such as multiple power supplies or local modifications.
- Preventive maintenance procedures are listed and controlled by a computerized system which identifies the equipment, the procedure, and the maintenance period. This is an effective accounting tool, but the procedures are largely general checklists with very little requirement for quantitative information, checkpoints, or references to other more detailed procedures. Checklist-type procedures of this sort are generally satisfactory for simple systems but are not satisfactory for more complex or highly critical systems.
- Maintenance personnel are not informed in a systematic way of lessons learned from past experience.
- Lock and tag procedures are sufficient for most maintenance operations but are not independently verified or centrally managed as a means to control plant status. This results, for example, in the potential for safety-related systems (announcing systems and warning lights) to be de-energized at buildings that are not currently in operation, although deactivated facilities may require the presence of workers for non-process-related activities.
- See Section MA.8 and Concern OA.5-3.

CONCERN: (MA.2-2) (H3/C2) Maintenance procedures do not provide detailed guidance for maintenance activities.

FINDINGS:

- o Some buildings have holes or openings in exterior walls which appear to result from incomplete restoration following the removal of pipes and cables or from failure to provide an appropriate seal during initial installation.
- o A program for systematic preservation of valves and piping systems has not been established.
- o See Sections MA.5, AX.1, and AX.6.

CONCERN: (MA.2-3) (H3/C2) In some areas, building-specific responsibility for identifying and correcting preservation and maintenance problems is not clearly assigned and does not effectively support building systems such as water, gas, and electric utilities.

FINDINGS:

- o Maintenance procedures for programmatic equipment are rarely in evidence and in many instances they may not be required, but there is no indication that vendor information, engineering designs, or good practice have been examined to verify this and/or to generate procedures accordingly.
- o Procedures for periodic calibration of test instruments, particularly oscilloscopes are not uniform. Much uncertainty was noted with respect to whether or not an oscilloscope was in, or even required, calibration.
- o Essentially all calibration stickers noted were out-of-date.
- o See Concerns QV.4-1, OA.1-1, and RP.8-1.

CONCERN: (MA.2-4) (H2/C2) A policy establishing basic guidelines for maintenance and calibration of key programmatic equipment and instrumentation is lacking.

MA.3 MAINTENANCE FACILITY EQUIPMENT AND MATERIAL

PERFORMANCE OBJECTIVE: Facilities, equipment, and material should effectively support the performance of maintenance activities.

FINDINGS:

- Maintenance activities are performed at individual building and site locations with primary shop support provided by multiple craft shops at Bldgs. 511 and 519. Internal portions of Bldg. 511 are in the process of being rearranged to obtain more efficient usage of the area and, as a result, some expected disorder was noted. However, Bldg. 511 is in a serious state of disrepair. The outer surface requires painting, the main shop's floor is pitted, and the internal wiring is draped on the walls in a disorderly fashion.

- A faulty bridge crane was noted in Bldg. 511. This unit required corrective maintenance, and was not tagged out.

CONCERN: (MA.3-1) (H2/C2) The LLNL main maintenance shop, Bldg. 511, is in a poor state of repair.

FINDINGS:

- Machine tools around the main site are maintained out of the Materials Fabrication Shop, Bldg. 321. Maintenance consists of routine machine oiling and checking of belts. Maintenance personnel expressed some degree of frustration over insufficient resources and lack of access to key machine tools for maintenance due to programmatic pressures.

- Excessive oil leakage was noted at several locations.

- Numerous machine tools were observed at various satellite shops in the program areas. Concern was expressed that there were no positive mechanisms to determine whether all of these machines were under the cognizance of the Bldg. 321 maintenance program.

CONCERN: (MA.3-2) (H3/C2) There is no mechanism to ensure that all machine tools are included in the centralized machine tool maintenance program.

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:

- There is only one formal criterion for accomplishing work under the Whiz Tag System. The criterion involves the number of hours required to accomplish the work, but it is not clear if the criterion is 8 or 16 hours since it appears in the plant documentation with both time limits. Whiz Tags are scheduled on the basis of priority.

- A lack of coordination and planning reduces the effectiveness of routine maintenance requested through the Whiz Tag System. For example, job requests for piping work or welding are sometimes not followed with or coordinated with a work request for repainting or preserving the affected work area. Also, the need for post-repair testing and inspection may not be identified.

- The Whiz Tag System does not specifically require consideration of safety precautions or design changes and documentation. It effectively supports expeditious accomplishment of priority work, but relies on the individual worker to ensure safety.

- "Work packages" and procedures are not used in most maintenance activities, so safety and control points are not necessarily incorporated into the work. An exception to this is in Bldgs. 332, 331, and 251, where such controls are being put in place. Likewise, post-maintenance test requirements or procedures are not formally required or documented. Exceptions to this occur in Bldg. 332 and in the high-voltage distribution system.

- Maintenance supervisors at Site 300 do not routinely monitor work in progress.

- Documented maintenance procedures that include all of the necessary information and coordination requirements are not routinely used at Site 300.

- See Section FP.7.

CONCERN: See Concern MA.2-1.

FINDINGS:

- Scheduling for preventive maintenance is conducted using a computerized program which lists all maintenance items, associated procedures, and frequency of maintenance. This is an effective bookkeeping system but incorporates very little in the way of technical guidance, procedure review and control, and independent overview.

- Job planning and scheduling, employing Whiz Tags, rely heavily on the individual craftsperson to be knowledgeable with respect both to maintenance procedures and to interfacing with facility operational and hazards control personnel.

- Planning and scheduling for maintenance of programmatic equipment is the responsibility of the program, although plant maintenance personnel are occasionally employed for these tasks. Some tasks such as maintenance of vacuum pumps are done on a routine basis, but normally maintenance is done as required due to failure or degradation of performance.

- See Section FR.2 and Concern OA.5-3.

CONCERN: (MA.4-1) (H3/C2) Informal maintenance procedures impact maintenance planning and work control.

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:

- o Repair of fluid system leaks and preservation of flanges and valves where leakage has occurred is not routinely accomplished at Site 300, resulting in the need for increased corrective maintenance.
- o Corrective maintenance work at Site 300 is generally reactive to operational requirements. Repair of exterior walls to close holes, for example, is not normally requested or undertaken.
- o Numerous instances of poor maintenance were noted at the LLNL main site, including deteriorated paint, rust, loose or unsecured fasteners, unsecured panels, missing insulation, unmarked pipes, burned-out indicator lights, low oil level (one case), out-of-date notes on operating panels, out-of-date calibration or set point dates, loose wiring, and loose gasket materials.
- o See Concern MA.2-3.

CONCERN: (MA.5-1) (H2/C2) A high level of corrective maintenance to buildings and utilities is not evident at LLNL.

FINDINGS:

- o Corrective maintenance to programmatic equipment is done as requested on the basis of equipment failure or deterioration of performance.
- o The condition of individual programmatic equipment and systems was found to be largely dependent upon the age of the system. In the case of older equipment, significant outstanding corrective maintenance issues were noted including coolant leakage, oil leakage, and excessive rust.
- o Experimental systems nearing the end of their funding support or programmatic usefulness are seriously neglected from a maintenance standpoint.

CONCERN: (MA.5-2) (H2/C2) Older experimental systems do not receive the required level of corrective maintenance to ensure safe and efficient operations.

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 necessarily performed in accordance with vendor recommendations.
- Preventive maintenance is controlled and scheduled by a sitewide computerized system which effectively tracks these activities; however, preventive maintenance activities are not component specific. Generic checklists include items that do not apply to the specific equipment being maintained, so the worker must interpret the checklist based on experience and informal training.
- Preventive maintenance procedures for critical equipment do not incorporate sufficient hold or checkpoints for independent review or verification.
- See Concern OA.5-3.

CONCERN: (MA.6-1) (H3/C2) Preventive maintenance activities have not been optimized with vendor recommendations or with locally generated, component-specific procedures or checklists.

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:

- o A predictive maintenance program is in the planning stages which will include vibration analysis, oil analysis, infrared scanning, and ultrasonic scanning.
- o Vibration instrumentation has been installed in several facilities and is operational. Installation in all candidate facilities and installation of other preventive maintenance techniques have not been completed.
- o See Concern OA.5-5 and Section TS.4.

CONCERN: (MA.7-1) (H3/C2) A predictive maintenance program is not fully in place, and overall planning, scheduling, and budgeting have not been completed in sufficient detail to evaluate the planned program and its associated goals.

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:

- o Detailed maintenance or repair procedures are not routinely used. Checklists used in preventive maintenance are often generic for a particular type of equipment and do not include safety precautions or quality assurance checkpoints.
- o Field observations indicated that, in some instances, checklists are not used properly. That is, individual items are not necessarily done in the prescribed order, and each action is not necessarily checked off after completion. The lists provide guidance but little independent or backup assurance that each step is accomplished.
- o No group was identified as having the responsibility and special expertise or training in the preparation of maintenance procedures.
- o No policy exists regarding the preparation, control, and use of maintenance procedures.
- o Maintenance and equipment-record storage is carried out by the Maintenance/Operations Department. No consistent system to accomplish this was noted at the various program areas.
- o See Concern MA.2-2.

CONCERN: (MA.8-1) (H2/C2) At essentially all program areas examined, formal maintenance procedures for programmatic equipment are not employed.

4.5.5 Training and Certification

4.5.5.1 Overview

This Appraisal addressed 10 of the 11 Training and Certification Performance Objectives; Reactor Operations was not applicable to LLNL. The appraisal was conducted through interviews with personnel in the Hazards Control Department with training responsibilities, as well as supervisory, professional, and operations staff at the LLNL main site and at Site 300. The Bldgs. 801, 805, 817, 827, 851, and 875 were visited at Site 300. LLNL main site interviews were held at Hazards Control, Human Resources, Plant Engineering, HEAF, Plutonium Facility, Tritium Facility, Heavy Elements Facility, Emergency Preparedness Training, Security Protective Forces, Fire Department, Laser Programs, and the Nondestructive Evaluation (NDE) Group at Bldg. 327. Three safety-related training presentations and an emergency drill at the Bldg. 251 Heavy Elements Facility were observed. A review of relevant training documentation and records was made throughout the appraisal. Personnel at LLNL exhibited a genuine concern for safety, but several weaknesses were identified in the area of training.

Facility supervisors are responsible for seeing that all personnel in their facilities are appropriately trained. Formal, well-documented courses are taught by the Hazards Control Department. Management must initiate the request for personnel to attend these courses. On-the-job training (OJT) under the tutelage of experienced, qualified operators or by facility supervisors provides specific instruction to employees new to areas or operations. However, OJT at LLNL is deficient in documenting established training programs and plans and in evaluating employee performance for job-specific tasks. Graded exams to determine employee qualifications are being used in some areas, but in many cases they are nonexistent.

Training and qualification/certification requirements are not formally established for all assigned job tasks. Those requirements that do exist are not always established on a systematic basis sitewide. There is neither a policy and procedures manual nor a corporate standard for training. As a result there is considerable variability in each training activity and the way in which training is administered in different areas and by different supervisors. Trainee evaluation techniques and methods vary widely across LLNL and in many cases do not exist.

The Appraisal Team found the training program at Site 300 for employees who handle high explosives (HE) to be of high quality. The supervisory personnel interviewed by the Appraisal Team in the Site 300 Process Area, Chemistry and Formulation Areas, and Bldg. 801 maintained good employee training records and had documented training requirements for each employee. Operators and technicians interviewed in the above areas and in the HEAF facility indicated that they had received required training and demonstrated a good level of knowledge of safety.

There are no requirements, standards, documentation, or formal training program for Site 300 Maintenance personnel. The Appraisal Team found that the Quality Control Inspector training at Site 300 was nonexistent, except for that related to HE components, which was quite good.

All of the supervisory personnel at Site 300 interviewed accepted their responsibility for training. All of the supervisors involved in HE work (e.g., the Process Area Manager, the Chemistry and Formulation Supervisor, the Bldg. 801 Facility Manager, the Bldg. 851 Facility Manager, and the HEAF Manager) demonstrated basic management skills. The records examined for these supervisors indicated that some limited management training was received in addition to technical and safety training.

The training courses observed at the main site by the Appraisal Team were effectively presented. Instructors were technically competent and displayed good instructional techniques. The training facilities and equipment at LLNL main site were sufficient. The Plutonium Facility (Bldg. 332) had significantly improved its training program since the Technical Safety Appraisal of November 1986. The Facility Training Officer has established an effective safety training program to meet DOE requirements. Documentation of training records is kept current on a training database. The Tritium Facility (Bldg. 331) issued a revised Training Plan during this Appraisal. Improvements had been made, but deficiencies still exist. Training records and OJT evaluation methods for past qualifications were difficult to audit. The Heavy Element Facility (Bldg. 251) was somewhat deficient in documenting OJT.

Hazards Control provides hazards communication training to all personnel. Health and Safety technicians are current in their retraining requirements. However, records given to the Appraisal Team indicated that radiation retraining is not current for some employees who work at the nuclear facilities.

Plant Engineering Maintenance/Operations has a good apprenticeship program, but ongoing training plan for journeymen, other than safety courses, is not established. A training management plan document did not exist but was being developed.

The NDE technician training was well developed at Bldg. 327. Deficiencies were noted in documentation of past OJT experience. New checklists had been developed to improve OJT verification.

The Security Protective Force did not have an approved training plan and training records were difficult to audit. A task analysis was in progress and efforts were underway to develop a draft training plan. The Fire Department training program was well developed and had a database containing applicable training records. Qualification requirements were well defined.

The Laser Programs had just established a Training Coordinator to assist in assessment and training activities throughout the directorate. The Laser Development Facility (LDF) at Bldg. 490 had training programs in place for the Copper Laser activities and training records were well-documented. Advanced Applications had not yet identified activities that required certification programs, although ideas were being discussed. Nova operations had established training requirements, but OJT evaluation methods were not defined.

Personnel who work with waste in the Hazardous Waste Management areas were well trained. Training records indicated that approximately 200 hours of

training had been received for each of 13 employees. Training for personnel who are responsible for processing waste in the research laboratories is not as extensive. Training courses have been presented to this latter group and additional training is scheduled.

The LLNL Emergency Preparedness training was in an early stage of development. Training modules for the Crisis Management Team had been identified, but lesson plans had not been developed for initial and continuing training in accordance with good industry practice. (This is discussed further in the Emergency Preparedness Section.) Training interface with individual facilities was in need of improvement.

Human Resources coordinated training in personnel development and supervisory/management skills as requested. Personnel had been matrixed to provide expertise in training program development in such areas as the Plutonium Facility, Plant Engineering, Emergency Preparedness, and Environmental Protection. Efforts were underway to develop a LLNL Training Management Plan to provide policy and procedural guidance for performance-based training programs as specified in DOE 5480.18.

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:

- Training and qualification/certification requirements are not formally established for all assigned job tasks. Those requirements that do exist at Site 300 were not established on a systematic basis. At the LLNL main site, establishment of requirements on a systematic basis varied among the different organizations.

- There is neither a policy and procedures manual nor a corporate standard for training. As a result there is considerable variability in each training activity.

- Documentation of the on-the-job-training (OJT) programs is largely informal.

- Formal courses offered by the Hazards Control Department appeared adequately documented (e.g., course objectives, course outline, handouts, and visual aids). Tests were not administered for all courses.

- LLNL policy (Health and Safety Manual, 7.02) states that line management is responsible for assuring training and retraining. This is not done consistently throughout LLNL and not properly documented.

- Several organizations and facilities, such as the Security Protective Forces and Plant Engineering Maintenance and Operations, do not have an approved Training Management Plan document. The Tritium Facility issued an approved Training Plan during this Appraisal.

- The Heavy Element Facility Training Program, M-158, Rev. 1 (Section 9.0 of the Heavy Element Facility Handbook) requires a formal annual review of the training program. No such review has been documented since the May 1987 revision of the Training Program.

- Training records for the Security Protective Forces were not auditable. Individuals assumed supervisory positions before completing applicable requirements. An annual retraining program schedule had not yet been defined.

- Advanced Applications in Laser Programs had not yet determined training qualification requirements for the Metal Oxide Chemical Vapor Deposition (MOCVD), which will become a moderate hazard activity. The Nova operations group used shot checklists as operational procedures, but they had not used any type of OJT checklist as a basis for documenting trainee qualification.

- Many LLNL organizations sitewide do not take full advantage of the training record database capabilities of the Employee Development Division (EDD). EDD training resource capability is not being used consistently by all LLNL organizations.

- See Sections OP.2, OP.6, MA.1, TC.3, TC.4, TC.5, TC.8, and PT.2; and Concerns OA.1-1, SS.4-1, and QV.1-2.

CONCERN: (TC.1-1) (H2/C2) Training at LLNL is not supported by corporate policy and standards and is not formally established consistent with good practice and DOE expectations.

TC.3 NUCLEAR FACILITY OPERATIONS OTHER THAN REACTORS

PERFORMANCE OBJECTIVE: The nuclear facility operator and supervisor training and certification programs should be based on DOE 5480.5, as applicable, and should develop and improve the knowledge and skills necessary to perform assigned job functions.

FINDINGS:

- The Tritium Facility (Bldg. 331) training records audited by the Appraisal Team indicated that only three High Pressure Operators were certified. That contradicted the list of six individuals who were listed as certified as of February 23, 1990 in Appendix B attached to the Tritium Facility (Bldg. 331) Training Plan issued in March 1990.

- There are no certification policy statements for a minimum acceptable grade specified in any of the training plans for the LLNL main site nuclear facilities (Plutonium, Tritium, and Heavy Elements Facilities). The Plutonium Facility does specify an 80 percent passing criteria on individual exam cover sheets, but there is no written policy on passing criteria.

- The Heavy Element Facility (Bldg. 251) OJT for maintenance and support workers consists of orientation by the facility Health and Safety Technologist. He was on hospital leave during this Appraisal and no one in the facility could trace the documentation. Records documentation was person-dependent.

- The Heavy Element Facility (Bldg. 251) could not provide an individual's qualification documentation as an Isotope Separator Operator.

- LLNL management had not determined, during this Appraisal, how to certify the Tritium Certified Engineering Technicians. The Tritium Facility had established the safety training requirements, but the technicians were not discipline-certified by their supervision.

CONCERN: See Concern TC.1-1.

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 an 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:

- o LLNL has no formal policy on how to handle employees who fail to pass safety training examinations. There is no corporate policy on standards for testing of employees.
- o LLNL has not defined or assigned an oversight role for monitoring training.
- o There is considerable variation in the degree and quality of training provided by different managers.

CONCERN: See Concern TC.1-1.

FINDINGS:

- o Training records made available to the Appraisal Team indicated that Radiation Safety Training (HS-601 and HS-660) had expired past the 2-year retraining frequency for several workers in the Nuclear Chemistry Department. Some of those employees also were not currently retrained in Health Hazards Communication (HS-405).
- o Training records maintained by the Tritium Facility (Bldg. 331) indicated that not all facility workers had maintained currency on Radiation Retraining. The Facility Manager claimed that everyone was current, but the facility records were not available to ensure that. According to the Facility Management Plan for Bldg. 331, July 1989, facility management is responsible for monitoring the status of training in facility-required safety and security courses.
- o A March 13, 1990, DOE Memorandum from Peter N. Brush (Acting Assistant Secretary, ES&H-DOE) proposes that all existing radiation and occupational workers as of December 31, 1989, are to be certified no later than December 31, 1991.

CONCERN: (TC.4-1) (H2/C2) LLNL has not maintained radiological protection retraining requirements as specified in DOE 5480.11 or in accordance with good industry practice.

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:

- There are no requirements, standards, documentation, or formal training program for Site 300 Maintenance personnel.
- Plant Engineering Maintenance/Operations at the main site did not have an approved Training Management Plan.
- Shop supervisors determined the qualification of facility utility operators by OJT supervision. There was no documentation on how qualification was evaluated.
- Apprenticeship training in Plant Engineering was good, but training for journeymen did not have continual retraining courses scheduled other than safety-related courses.
- See Section MA.1.

CONCERN: See Concern TC.1-1.

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:

- The Appraisal Team found that the QC inspector training at Site 300 was nonexistent except for that related to HE components, which was quite good.
- Records of OJT and experience for the NDE technicians did not exist at the LLNL main site Bldg. 327.
- See Concern QV.1-2.

CONCERN: See Concern TC.1-1.

TC.10 TRAINING FOR SUPERVISORS, MANAGERS AND TECHNICAL STAFF

PERFORMANCE OBJECTIVE: Training programs for supervisors, managers and the technical staff should broaden overall knowledge of processes and equipment and develop supervisory and management skills.

FINDINGS:

- The Emergency Preparedness Training Program was not fully established. Lesson plan modules for training of Crisis Management Team personnel had not been developed. Full implementation of the program was estimated at 3 years from the time of this Appraisal.
- Emergency Preparedness training had not been developed to extend to and include "self-help" facility coordinators for sitewide interaction of emergency personnel.
- Initial and continuing training schedules for retraining of Crisis Management Team personnel were not established.

CONCERN: See Concerns EP.3-1 and EP.3-2.

4.5.6 Auxiliary Systems

4.5.6.1 Overview

This Appraisal addressed all nine Performance Objectives in the Auxiliary Systems area. Auxiliary systems at Site 300 and at the main site were evaluated primarily through physical inspections of the systems and through interviews with responsible managers, operators, and technicians. The buildings and facilities inspected at Site 300 included Bldgs. 805, 806, 826, 827, 836, 851, 871, 873, 874, 875, transformer stations, pumping stations, and hazardous waste storage areas. At the main site, Bldgs. 131, 151, 191, 231, 234, 251, 321, 331, 332, 334, 419, 492, 514, and 612 were appraised.

The principal auxiliary systems directly involved with safety at Site 300 are the fire alarm and warning systems. Since these are to be upgraded under the Secure Interactive Livermore Alarm System (SILAS) project, the only significant concern is that this project proceed quickly to completion to replace the older, increasingly obsolete systems. The emergency power generators, ventilation and exhaust systems, and waste handling facilities were the comparable auxiliary systems at the main site. These systems are either important to the safety of the process or personnel or important for the protection of the environment.

Power supplies for alarm and warning systems, including the voice communication system, were described to the Appraisal Team as having the potential to be de-energized inadvertently when specific areas at Site 300 are deactivated as various programs are completed. There is no systematic program at Site 300 that prevents de-energizing safety equipment.

As noted in the Maintenance area, the preservation of auxiliary system components is deficient. Besides general corrosion that affects the physical integrity of the water main system, the lack of preservation and lubrication of valves is an operability and reliability concern.

At the HEAF on the main site, some of the auxiliary system valves are located so high that they cannot be reached without a ladder. Also, some sections of the smoke removal system were reported as being inoperable.

Ventilation systems that have potential for unwanted release of hazardous or radioactive gases are exhausted through high-efficiency particulate air (HEPA) filters. These filters are dioctylphthalate (DOP) tested after installation before being placed in service and thereafter as required by procedures. Labels are placed on each filter depicting the date of the last test. Ventilation systems that exhaust potentially hazardous building areas or gloveboxes are provided with backup fans. Fans are powered by emergency diesel generators whenever normal electrical power is unavailable.

Emergency diesel generator systems are tested as required on a specified schedule. There are approximately 80 diesel generator systems at LLNL. Availability of the systems is ensured by periodic testing as outlined in applicable industry standards. One concern is that the tests are conducted without a checklist-type procedure which would ensure that test steps are performed in proper sequence. In addition, there is no requirement to periodically verify that the diesel fuel quality remains acceptable.

Hazardous and radioactive waste generated in the experimental laboratories was found to be properly prepared for transfer to the Hazardous Waste Management facilities. Procedures and operations at the Waste Management facilities were acceptable. Some problems are caused by delay in obtaining approval to use new facilities and temporary suspension from use of existing facilities. Personnel who work with waste in the Hazardous Waste Management areas are well-trained. A survey of training records showed that approximately 200 hours of training had been received for each of 13 employees. Training for personnel who are responsible for processing waste in the research laboratories is not as extensive. Training courses have been presented to this latter group and additional training is scheduled.

Efforts to reduce waste volume were reviewed. This is a twofold approach. First, generated waste volume undergoes size reduction; second, processes are being reviewed to determine whether modifications can be made to reduce the quantity of waste being generated. Both of the efforts have had some success. However, the program to implement the LLNL Director's Administrative Memorandum on Waste Minimization was not being aggressively implemented.

4.5.6.2 Findings and Concerns

AX.1 SYSTEMS REQUIREMENTS

PERFORMANCE OBJECTIVE: Auxiliary systems shall be considered under the same functional criteria for design, engineering, operations, maintenance, and modifications as the structural, confinement, and primary process system of the facility.

FINDINGS:

- Auxiliary systems in HEAF include a number of valves which are located so high that they cannot be operated without a ladder.
- The smoke removal system in HEAF is not operational in two zones.
- A number of valve and flange leaks in water or oil systems exist in HEAF and Site 300 auxiliary systems.
- Fire alarm and warning systems at Site 300 are old, and parts are no longer made for some of their components. The replacement alarm system is not receiving priority for installation. (See Section AX.8.)

CONCERN: (AX.1-1) (H2/C2) Auxiliary systems at the explosive testing facilities are poorly designed and maintained. (See Concern MA.2-3.)

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:

- Both radioactive and clean waste generated in Bldg. 251 laboratories are disposed of as radioactive waste.
- All waste in the radioactive material area of Bldg. 332 is assumed to be, and is handled as, radioactive waste.
- Launderable protective clothing use is not maximized. Paper laboratory coats, rubber gloves, and plastic shoe covers are used in some buildings and then discarded as radioactive waste.
- Kimwipes, used with alcohol to clean equipment in Bldg. 331, are disposed of as radioactive waste. Those used with acetone are disposed of as mixed waste for which there is presently no disposal process.
- The waste minimization program was outlined by the LLNL Director in his March 8, 1989, Administrative Memo. Subsequent plans, such as the Site 300 Facility Waste Management Plan dated February 2, 1990, do not specify continuing goals for reduction of waste. The goal of a "25 percent reduction over the next 3 to 5 years" provides no incentive to continue reduction efforts once the 25 percent level is achieved.
- Neither the LLNL Director's memo nor the Site 300 Plan emphasizes analysis to determine whether process or equipment changes can be made that would result in significant waste reductions.
- See Concern OA.1-1.

CONCERN: (AX.3-1) (H2/C2) The Administrative Memo, "Director's Statement on Waste Minimization," issued March 8, 1989, has not been aggressively enforced.

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:

- The Site 300 water system piping, valves, and pumps are not maintained and preserved (to prevent corrosion) in a manner that ensures proper operation.
- The Site 300 steam boiler in Bldg. 827 is not maintained and operated in a manner that ensures the safety of the operators, who are not formally certified for operation of the boiler.
- No long-term surveillance program is in place to ensure the proper operation and maintenance of auxiliary systems at Site 300, resulting in the deterioration of valves as well as ancillary devices such as pressure gauges and thermometers.

CONCERN: See Concerns OP.5-1, MA.2-3, and FP.7-4.

FINDINGS:

- A periodic test of the emergency diesel generators for Bldg. 251 was observed. The mechanic and electrician performing the test did not use a written procedure to verify correct test step sequence. Test data were recorded on a log sheet, but acceptance criteria are not provided on the log sheet.
- Approximately 80 emergency diesel generators are installed sitewide. These are all tested at least monthly. The diesel generator systems vary from one location to another.
- Most emergency generators, including those for Bldg. 251, are tested as prescribed by Standard ANSI/IEEE-446-1987, IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications. One system, for Bldg. 332, is tested as prescribed by applicable sections of Standard NFPA-110, Standard for Emergency and Standby Power Systems.
- Diesel fuel is not sampled to ensure that foreign matter such as water or sludge is not present in the day tank. Also tests for general degradation of the fuel are not performed. Diesel fuel is reported in Section 4.2.16 of ANSI/IEEE-446-1987 to degrade over a few months' time. A periodic test consumes only a small portion of a tank's content and the tank is then topped off.

CONCERN: (AX.6-1) (H2/C2) The availability testing of emergency generators does not verify operability of the system because there is no assurance that diesel fuel quality has not degraded, and a checklist is not completed by the test conductors as the test proceeds.

AX.8 ENGINEERED SAFETY SYSTEMS

PERFORMANCE OBJECTIVE: Engineered Safety Systems should be reliable and available to provide protection to the facility when required.

FINDINGS:

- o Fire alarm and warning systems at Site 300 are very old and parts are not available for some components.
- o A potential exists for inadvertently de-energizing systems important to safety, such as voice communication systems and warning signal systems, when an area of Site 300 is deactivated.

CONCERN: See Concern AX.1-1.

4.5.7 Emergency Preparedness

4.5.7.1 Overview

This Appraisal addresses all seven Performance Objectives in the Emergency Preparedness category. In addition it addresses 29 CFR 1910.120 criteria for hazardous materials training and the LLNL Emergency Public Information Program requirements outlined in DOE 5500.4.

The existing LLNL Emergency Plan (EP) does not describe the emergency management team, support staff, and emergency response team duties and responsibilities in sufficient detail. The interfaces between LLNL, DOE-SAN, and DOE-HQ are not clearly defined. Organization charts do not portray the reporting chain of command for normal operations, emergency management, staff, and emergency response teams. LLNL has no matrix that reflects the relationship between the positions assigned to emergency management, support staff, and emergency response teams and their normal duty/position titles. Such a matrix would assist the Emergency Planning Training in developing an Emergency Planning Training course outline which depicts the type of training provided to members of the emergency response organization. A callout listing of all emergency response personnel, which is not referenced in the LLNL EP, is carried by the Laboratory Emergency Duty Officer (LEDO). A designated LEDO, who has been appointed by the LLNL Director and given the necessary responsibilities to perform his assigned duties, is available 24 hours a day, 7 days a week. The existing LLNL EP does not meet the criteria outlined in DOE 5500.3 and draft DOE 5500.3A. During the Appraisal Team Drill 90, emergency management team support staff and emergency response teams did perform their emergency function in a satisfactory manner to cope with the simulated event conditions.

The spectrum of emergencies likely to occur at LLNL includes major earthquakes (which, depending on circumstances, could result in a large number of casualties); fires involving hazardous and radioactive materials; civil disobedience, terrorist actions, and threats; and spills of hazardous and radioactive materials. Currently the LLNL Emergency Preparedness staff have indicated that there would be no offsite consequences from any credible release of radioactive or hazardous materials. This assumption was based on a recent LLNL Site Evaluation Program dated February 27, 1990.

Professionals in the Fire Department and Protective Services Group also provide an important component in the emergency response organization. Extensive use is made of volunteers to fill various key emergency response functions; i.e., Building Managers, members of Self-Help Building Emergency Teams, Search and Rescue, First Aid, Emergency Medical Technicians (EMTs) and other auxiliary functions. The existing LLNL emergency preparedness training program is not established as required by DOE 5500.3A.

LLNL Emergency Preparedness has developed a 2-year drill and exercise schedule that includes all aspects of credible emergencies that could affect the LLNL site. During the Appraisal Team Drill 90, the pre-drill briefing for controllers/evaluators was conducted and was very effective. The post-drill activities, including verbal and written critique and documentation, were commendable.

The LLNL Medical Treatment Facility has a well-designed decontamination and treatment center. The LLNL Fire Department demonstrated during the Appraisal Team Drill 90 an excellent method of initial response to the simulated emergency to assume command and control required of the On-Scene Incident Commander. Due to a breakdown in communications, the Incident Commander performed his responsibilities with little or no assistance from the Emergency Operations Center (EOC).

During the Appraisal Team visit, an emergency management response drill provided the Appraisal Team with an opportunity to view the LLNL emergency response organization function under simulated drill conditions. The selected LLNL Facility was Bldg. 251, a high hazard facility. The simulated drill scenario involved a mixing operation, including a dust explosion that caused injury and contamination to the experimenter. The explosion activated an automatic sprinkler, the heat detector, and the room CAM, and contaminated the room. The CAM downstream of the high-efficiency particulate air (HEPA) filter went into an alarm condition, indicating failure of the filters that caused a release to the atmosphere outside the building. The LLNL response and activation of the LLNL emergency response organization was evaluated as appropriate for the situation.

Emergency equipment, materials, and communication systems appear to be adequate to support the requirements of LLNL during emergency response efforts. The Self-Help Emergency Lockers are stocked with first-aid supplies, flashlights, portable bullhorns, and respirators. These Self-Help kits are located at each facility and at Zone locations. Within the past few months an upgraded public address system was purchased and a test of the new system during the Appraisal Team Drill 90 was found to be acceptable. Announcements are clear and can be directed to one facility, a selected group of facilities, or sitewide. However, tests are limited due to the concern of possibly interfering with experimental or research activities. During the Appraisal Team Drill 90, late Public Address announcements were experienced.

LLNL has developed necessary Emergency Action Levels for ensuring that emergency situations are properly classified. However, recovery and termination are functions not to be addressed as emergency classifications. There was a breakdown in providing protective actions for onsite personnel during the drill via the public address system; however, it was corrected by the EOC staff. All information posted on status boards is retained by a computer operator before it is removed from the status boards.

Personnel protective requirements are contained in LLNL Health and Safety Manual, M010, January 1990, which was established using guidance in DOE 5480.1A and 5480.10, for use in emergencies for saving life or mitigation of damages to vital equipment. There are sufficient calibrated instruments for use during emergencies. As previously stated, LLNL has a complete medical decontamination facility and ambulances to transport injured personnel. Sufficient respiratory equipment, protective clothing, and material are available to support emergencies. The Self-Help Plans developed for each facility provide the necessary information to ensure a prompt evacuation of these facilities, site evacuation during emergencies, and first responder capabilities.

LLNL has developed a training program to address criteria established in 29 CFR 1910.120 for hazardous materials operation. An outside training vendor provides 24- and 40-hour training courses, as well as annual requalification training courses. This program has all the necessary documentation; i.e., training records, medical surveillances, attendance rosters, etc.

The Emergency Public Information Plan has been developed along with implementing procedures. A Letter of Agreement has been developed to use an offsite city facility as the backup news media working area. Annual briefings for local and surrounding area news media agencies are conducted on an individual basis. Within 4 to 6 months an Emergency Public Information Brochure is expected to be disseminated to offsite population.

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:

- Responsibilities and authority for each person in the emergency response organization are not clearly defined in the LLNL Emergency Plan (EP).
- Technical support and maintenance personnel are not identified in the LLNL EP.
- Twenty-four-hour operation is not addressed in the LLNL EP.

CONCERN: (EP.1-1) (H2/C1) The LLNL Emergency Plan is not in compliance with DOE 5500.3 or draft DOE 5500.3A, Chapter III, Sections 1b and c.

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:

- The existing LLNL EP is based on site-specific safety analyses of potential abnormal conditions; however, this information is contained in another uncontrolled document.
- The LLNL EP was not coordinated with DOE-SAN, other Federal, State, and local emergency response groups.
- The detailed actions required to carry out the emergency plan are not specified in the implementing procedures. Procedures are not consistent with, and not cross-referenced with, the EP and other documents.
- Description of emergency response facilities, installed equipment capabilities, and communications systems is not included in the EP.
- An emergency planning matrix to show the relationship between all emergency response titles and normal duty positions has not been developed and included in the LLNL EP.
- See Concern OA.5-3.

CONCERN: (EP.2-1) (H2/C1) The LLNL Emergency Plan is not in accordance with DOE 5500.3 or draft DOE 5500.3A, Chapter III, Planning and Preparedness (i.e., Hazards Identification, Updating Hazards, Analysis Requirements, Accident or Event Characteristics).

FINDINGS:

- Existing controlled Emergency Plan Implementing Procedures (EPIPs) do not have revision numbers, date of issuance, or approval signatures.
- The majority of the EPIPs do not contain any written responsibilities, precautionary or limitation statements; mostly they consist of checklists.
- EPIPs do not provide detailed information and specific written instructions and actions necessary to implement the LLNL EP.

CONCERN: (EP.2-2) (H2/C1) LLNL Emergency Plan Implementing Procedures are not in accordance with the requirements of DOE 5500.3 or draft DOE 5500.3A which address the facility emergency operations.

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:

- o Facility Managers and the Facility Technical Coordinator have not received any formal, documented training in emergency response functions.
- o See Section TC.10.

CONCERN: (EP.3-1) (H2/C1) Emergency Response Training Programs have not been developed for all LLNL Facility Managers and Technical Coordinators and do not ensure adequate documentation of the program in accordance with DOE 5500.3 or draft DOE 5500.3A, Chapter III., Section 1.

FINDINGS:

- o The existing LLNL Emergency Response Training program is not formalized; it does not include lesson plans, training matrix, job task analyses for each member of the Emergency Management Team, required documentation and retention of records, and written examination with passing grade.
- o See Section TC.10.

CONCERN: (EP.3-2) (H2/C1) LLNL Emergency Response Training is not in compliance with DOE 5500.3, draft DOE 5500.3A, and the DOE Training Accreditation Program (TAP).

FINDING:

- o The annual requirements for providing public information briefings to the local news media, television, and radio stations have been accomplished, but there is no documentation available to record these briefings.

CONCERN: (EP.3-3) (H2/C1) The Emergency Public Information Program is not in accordance with DOE 5500.3 or draft DOE 5500.3A, Chapter III., Public Information, in that timely release of public information was not made to simulated offsite agencies.

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.

FINDINGS:

- o Drill participants do not use the phrase "THIS IS A DRILL OR EXERCISE" during all conversations on telephones, radio, nor end all conversations including all Fax messages with these terms.
- o Required facility-generated local drills are not documented; i.e., attendance records, scenarios, and other supporting documents are not provided as informational material to the Manager, EP Training.

CONCERN: (EP.4-1) (H2/C1) The LLNL Emergency Preparedness drill and exercise program does not comply with requirements of DOE 5500.3, that all facility drills are not documented.

EP.5 EMERGENCY FACILITIES, EQUIPMENT, AND RESOURCES

PERFORMANCE OBJECTIVE: Emergency facilities, equipment, and resources should adequately support site/facility emergency operations.

FINDINGS:

- o LLNL has recently upgraded the public address (PA) system which was demonstrated twice during the Appraisal Team Drill 90. However, PA system tests were not routinely conducted due to possible interference with research programs. This PA system has the capability to make announcements sitewide or to selected individual buildings.

- o "As-built" drawings of facilities are not available in the EOC. There are numerous blueprints but no microfiche prints. See Concerns TS.3-2 and OA.7-2.

CONCERN: (EP.5-1) (H2/C2) The equipment, materials, resources, and documentation requirements of draft DOE 5500.3A are not used to ensure that all required items are available for emergencies in the LLNL Emergency Operations Center.

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:

- Emergency Classifications used at LLNL consist of "Unusual Event" through "General Emergency"; however, LLNL has added "Recovery" and "Termination," which are not considered event classifications; both are phases of our post-emergency operations.

- An initial coordination meeting held on February 22, 1990, with the State and local agencies to begin to develop offsite relationship with offsite emergency management. LLNL Emergency Action Levels (EALs) have not been reviewed or approved by the State or local agencies.

- The LLNL EP does not address the 15-minute notification requirement for offsite agencies.

CONCERN: (EP.6-1) (H2/C1) LLNL does not have the necessary coordination meetings by the State and local emergency management agencies to obtain approval of the LLNL Emergency Plan, Emergency Action Levels and Emergency Classification Systems, as required in DOE 5500.3.

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:

- o A detailed listing of hazards for LLNL has not been developed and entered into the LLNL EP including events specified in draft DOE 5500.3A for Sabotage Assessments, Pre-Fire Plan, Chemical; including amounts and storage locations; and listing of hazards contained in environmental reports.
- o Accidents analyzed in the SAR are not included in the LLNL EP. In addition, the hazards caused by more severe initiating conditions are not analyzed per DOE 5632.1A.
- o Protective action guidance is limited as addressed in the LLNL EP.
- o See Concerns IH.3-1, OA.7-1, TS.2-2, and TS.2-3.

CONCERN: (EP.7-1) (H2/C2) The LLNL Emergency Plan does not meet the requirements of draft DOE 5500.3A, Chapter II, Hazards Assessment, in providing a detailed listing of hazards and accidents analyzed in the Safety Analysis Report.

4.5.8 Technical Support

4.5.8.1 Overview

Five of the eight Performance Objectives were addressed in the Technical Support area. Reactor Engineering was not applicable to LLNL; Criticality Safety and Packaging and Transportation of Hazardous Materials were appraised as separate areas by other Appraisal Team members. The scope of this Appraisal included visits to major LLNL facilities at both Site 300 and the main site, interviews with management and staffs of technical support organizations, and reviews of manuals, procedures, Safety Analysis Reports (SARs), and record files. Program facilities visited were Bldgs. 191, 251, 321, 331, 332, 513/514, 801, 817, 827, 834, and 851. Support organizations interviewed were the Hazards Control Department, the Environmental Protection Department, the Engineering Directorate, and Plant Engineering.

Technical support for LLNL programs is provided by elements of the Hazards Control Department, the Environmental Protection Department, Program Divisions, the Engineering Directorate, and Plant Engineering. This support is primarily provided through a matrix system, which assigns responsibility for individual facilities or groups of facilities to subcomponents of the support organizations. This system enhances the support staff's familiarity with the facilities and programs, but also leads to a diversity of approaches and quality.

Overall, the technical support functions were judged to contribute effectively to the LLNL programs and facilities. There were, however, seven concerns identified during the Appraisal of Technical Support. These concerns were related to SARs, Operational Safety Requirements (OSRs), procedure reviews, Operational Readiness Reviews (ORRs), "as-built" drawings, and exhaust system monitoring.

Technical support organizations are staffed with well-qualified personnel: supervisors, engineers, scientists, technicians, and craft staff. Duties, responsibilities, and qualification requirements are defined in job postings and in annual appraisal documents for each individual. Some organizations, such as Plant Engineering, have published manuals defining duties, responsibilities, and authorities of all organizational components. Overall, the technical support staffs were found to have sufficient definition and understanding of their roles to provide effective support.

Four concerns were identified in the Procedures and Documents area. Most of the facilities do not have approved, in-place SARs or OSRs as required by DOE Orders and DOE SAN Management Directives. Most of the SARs that are in place are several years old and do not meet current standards for content and format. Efforts to provide up-to-date SARs for Bldgs. 331 and 332, prompted by recommendations from earlier TSAs, are in progress and targeted for completion this year. The few OSRs that have been written are also deficient in content and format. Facility Operating Procedures and Operational Safety Procedures, which currently provide the procedural safety envelope, are generally effective but have some deficiencies. Procedures for technical support activities (e.g., design procedures, analytical procedures, and surveillance/testing procedures) vary in quality and detail from one

organization to another. However, the support activities overall are performed effectively.

Facility modifications are designed and implemented by qualified technical staff. Formal review processes, which involve review of designs by the appropriate program, Hazards Control, Maintenance, Security, and other interfacing organizations, are in place and are used. The engineering organizations are cognizant of, and use, relevant codes, standards, and regulations, including those mandated by DOE 5480.4 and DOE 6430.1A. Two concerns were identified in this area: lack of definitive guidance for ORRs, and deficiencies in "as-built" drawings.

Equipment performance testing and monitoring are conducted in accordance with prescribed schedules. The use and quality of written procedures for this activity varies from organization to organization. Equipment performance data are compiled and stored in computer databases. Trending and analysis of the data are not done on a formal basis, except for a few special areas (e.g., vibration monitoring and performance of high-speed cameras).

Site management has made reasonable efforts to minimize quantities of radioactive and hazardous materials released to the environment. Contaminated and suspect liquid wastes are collected in holding tanks, sampled, and analyzed prior to release. Exhaust air and gas streams are filtered, scrubbed, etc., as appropriate. Construction of onsite sewer diversion capability, as recommended by an earlier TSA, is in progress. Systems for monitoring and sampling effluent streams are not capable of quantifying all hazardous material releases and their sources. Programs to identify and meet anticipated needs for additional monitoring have been initiated.

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:

- Use of procedures for performing technical support services such as engineering design, sample analysis, etc., is variable across LLNL. Plant Engineering and the Mechanical Engineering Department of the Engineering Directorate have rather well-developed procedures, but there is no LLNL system requiring development and use of procedures.

- Safety Procedures are circulated to a series of reviewers comprising facility management, program management, health and safety disciplines in the Hazards Control Department, the Safety Team Leader, and any others as specified by anyone who reviews the procedure. In the review process, a copy of the circulating draft or revised procedure is marked up by sequential reviewers, who also sign off their review on a signature sheet. The procedure is then modified by its author based on this input and the final draft is recirculated to facility, program, and Hazards Control Department representatives for signature approval. Its use is finally approved by signature of the appropriate manager. At Site 300 this is the Resident Manager. At the main site the approval level depends upon the safety issues, as specified in the LLNL Health and Safety Manual.

- The records for auditability of all persons who have reviewed procedures is inconsistent. At the time of procedure issue or reissue, the marked-up draft copy is disposed of. In the past, individual signature sheets have also been disposed of; thus the only source of the review's auditability is lost.

- Observations of available signature sheets and of procedure signatures indicate that Operational Safety Procedures (OSPs) or Facility Safety Procedures (FSPs) do not receive an independent technical peer review at the facility or program level prior to review by Hazards Control, other support organizations, and management.

- The technical organizations which design facility systems do not routinely review operating and maintenance procedures for the equipment.

- See Sections PT.1 and CS.3.

CONCERN: (TS.2-1) (H2/C2) The review system for LLNL safety procedures does not ensure auditability of reviews or performance of independent technical peer reviews within the originating organization.

FINDINGS:

- o A proposed hazard classification listing of LLNL facilities was submitted to DOE SAN in July 1989. Discussions with Hazards Control Department staff indicated that this listing was not based upon a systematic technical analysis of facility hazards, but largely upon a qualitative examination.

- o Responsibility for safety documents lies with the line program organizations. There is no function at LLNL that tracks status and needs on a sitewide basis. The Safety Analysis function within Hazards Control has been reduced to one of maintaining the LLNL Safety Analysis Guide and providing guidance to the programs when requested.

- o There has been no systematic determination of the adequacy of safety documentation for most ongoing LLNL operations, as required by DOE 5481.1B, Chapter I, Part 4. Needs for SAR upgrading have been identified primarily through DOE appraisals or impending changes to facility configuration and/or operations.

- o See Sections TS.4, EP.7, and FP.3, and Concern OA.7-1.

CONCERN: (TS.2-2) (H2/C1)

LLNL has not made a determination whether existing safety analysis documentation adequately identifies the risks associated with all of its operating facilities that can be reasonably expected to have potential for major onsite or offsite impacts to people or the environment, as required by DOE 5481.1B, Chapter II, Section 4.

FINDINGS:

- o Many of the LLNL facilities that would require approved SARs or Safety Analysis Documents (SADs) under SAN MD 5481.1A guidance do not have such documents in place. Such documents were never written for some facilities. For other facilities, including Bldg. 331 (Tritium Facility) and Bldg. 332 (Plutonium Facility), SARs were written but did not receive formal DOE SAN concurrence, and are still considered drafts.

- o TSAs of Bldgs. 332 and 331, in 1986 and 1987, respectively, identified SAR deficiencies. Actions to provide up-to-date SARs which meet current standards are in progress, with completion targeted for 1990. At the time of the facility TSAs, completion was expected in 1987 and 1988.

- o The SARs and SADs which do exist date back as far as the 1970s, and do not conform to current format and content guidance provided in DOE 5480.5, Section 8.a, and SAN MD 5481.1A.

- o DOE SAN's current position is that it approves Operational Safety Requirements (OSRs) and authorizes facility construction and operation based upon safety analyses, but does not formally approve SARs and SADs.

- o Existing SARs for Bldgs. 251, 520, 804, 850, and 851, and SADs for Bldgs. 151 and 419 and the 514/612/614 complex, do not have a true accident (e.g., off-normal event) analysis, any facility

Operational Safety Requirements (OSRs), recognition of any limiting conditions for operations (LCOs), nor designations of equipment important to safety. A number of the "analyses" in these documents consisted largely of unsupported assertions.

- See Concern OA.7-1 and Sections EP.7 and TS.4.

CONCERN: (TS.2-3) (H2/C1) Not all LLNL facilities that require Safety Analysis Reports have them in place, and existing Safety Analysis Reports and Safety Analysis Documents do not adequately define Operational Safety Requirements, designate equipment important to safety, or reflect complete safety analyses as required by DOE 5480.5, DOE 5481.1B, and LLNL Safety Analysis Report guidance.

FINDINGS:

- With few exceptions the LLNL facilities do not have OSRs, as required by DOE 5480.5 for nuclear facilities and recommended for all high, moderate, and low hazard facilities in the guidance of SAN MD 5481.1A.

- SARs for HEAF (Bldg. 191) and Hardened Engineering Test Building (HETB) (Bldg. 334) do contain OSRs. However, these exhibit several deficiencies:

  - Neither set of OSRs is in complete conformance with the content and format recommended in the LLNL Safety Analysis Guide (SAG), SAN MD 5481.1A, or the appropriate NRC Regulatory Guides (3.26 and 3.39). It was noted that the SAG and DOE-SAN guidance is not entirely consistent with the two NRC Regulatory Guides.

  - The OSRs do not contain bases that clearly identify the safety implications of exceeding limits or controls, nor do safety analyses elsewhere in the SARs make an adequate case for the OSRs.

  - The OSRs do not present the recovery methods associated with their violation. The HETB OSRs do not contain Surveillance Requirements.

  - The HETB OSRs, in general, do not contain numerical limits; for example, no alarm levels are specified for the oxygen monitors.

- The HETB OSRs and Facility Safety Procedures (FSPs), e.g., Bldg. 331, do not clearly distinguish between requirements and descriptive material. The style is largely narrative, with a mix of "shalls," "shoulds," "wills," "ares," etc., and there is no clear definition of which items are mandatory.

- See Sections OA.5 and FR.3, and Concerns OA.7-1, FR.3-1, and OP.1-2.

CONCERN: (TS.2-4) (H2/C1) Not all LLNL facilities have Operational Safety Requirements (OSRs) in compliance with DOE 5480.5 requirements and SAN MD 5481.1A guidance. Those OSRs that do exist are deficient in content and format.

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 assure proper design review, control, implementation, and documentation in a timely manner.

FINDINGS:

- The LLNL Health and Safety Manual, in Part 2.09, identifies an Operational Readiness Review (ORR) as a particularly critical safety evaluation to be performed before a work activity is to start. This brings the DOE 5480.5 and SAN MD 5480.5 ORR requirements into the LLNL system.

- For guidance on the ORR process the Health and Safety Manual merely says to "Contact your Safety Team Leader for specific guidance." There are six main site Safety Team Leaders, each responsible for a set of facilities. There is no definitive written guidance to direct the Safety Team Leaders and provide consistency in ORR approaches and quality across LLNL.

- The Engineering Directorate staff stated that the ORR planning process currently is an iterative process between LLNL and DOE SAN.

CONCERN: (TS.3-1) (H2/C2) There is no definitive guidance within LLNL to ensure consistency of approach and quality for Operational Readiness Reviews.

FINDINGS:

- Not all copies of drawings maintained in facility files reflect "as-built" status. In fact, not all facility drawings in the Plant Engineering master files reflect "as built" status as required by the Plant Engineering Policy and Operations Manual.

- The Site 300 Plant Engineering Group has facility drawings on site, but the staff does not know if the sets are complete or accurate. Existing drawings are reportedly checked against actual configurations before scheduling related work or improvements.

- The incomplete status of "as-built" drawings was the subject of a recommendation in the 1986 Tritium Facility TSA. Discussions with the Tritium Facility Manager disclosed that the focus for upgrading "as-built" drawing status was on systems important to safety. The upgraded drawings were available for DOE SAN review by the end of February 1990. There are no plans to create "as-built" drawings for other systems at that facility.

- Plant Engineering staff stated that "as-builts" for jobs performed by outside contractors are generally in good shape, as furnishing "as-builts" is required for contract closeout and payment. However, for in-house jobs there frequently are problems stemming from lack of funds for "as-built" work when

construction has been completed. Plant Engineering has issued an "As-Built" Drawing Documentation Procedure, dated March 1990, addressing this problem.

- Documentation of approvals (initials and dates) on facility drawings, as required by the drafting manual, is inconsistent. The same was noted on electronic schematics in Bldgs. 801 and 827, particularly for more recent drawings. Tower drawings for Job No. 8816, File No. 3308801, in the Plant Engineering Files, had been signed by a Registered Professional Engineer. The engineer had included his registration number, but had not stamped the drawings as required by LLNL for contractor-provided drawings. The LLNL approver had not reinitialed or redated the drawings following the last revision.

- See Section F.P.5.

CONCERN: (TS.3-2) (H2/C2) Facility and schematic drawings do not completely conform to the requirements of the LLNL Plant Engineering Policy and Operations Manual in regard to approvals and showing of correct "as-built" status. (See Concern OA.7-2.)

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:

- Performance testing and monitoring of support equipment are included in the maintenance and operating procedures. However, a formal equipment performance trending and analysis program is not in place for the electronics and mechanical equipment supporting the research equipment. Trending is done on an informal basis to check for problems in multi-group equipment.

- Maintenance and Operations Department staff compile performance and testing information in a computerized database. There is no formal process for analyzing the data; however, they are printed out and reviewed. This also was the practice for other organizations with which the analysis process was discussed.

- At this time, a process does not exist to examine and identify monitoring systems important to safety; thus no special monitoring, trending, or maintenance requirements have been imposed on them. However, the Maintenance and Operations Department is developing a program to identify a core group of critical systems and provide special knowledge of these systems. A document defining this program has been issued; implementation of the program, beginning with Bldg. 332, is expected to start by April 1990.

CONCERN: See Concerns TS.2-2, TS.2-3, QV.1-1, MA.7-1, FP.7-2, and OA.5-5.

TS.5 ENVIRONMENTAL IMPACT

PERFORMANCE OBJECTIVE: The impact on the environs from the operation of each facility on the site should be minimized.

FINDINGS:

- Liquid wastes that may contain radioactive and/or toxic materials are collected in holding tanks, sampled, and analyzed prior to release to the LLNL sanitary sewer system. The sewer stream is monitored, with alarm capability, prior to leaving the site and entering the Livermore City system. Diversion capability, recommended in the Plutonium Facility TSA in 1986, is being added in a project currently under construction and scheduled for completion in FY 90.

- Plans have been developed to increase the number of onsite sewer system sampling stations from five to nine, and to provide all nine stations with monitoring and alarm capability as well as sampling capability. The current schedule is for installation of the stations in FY 91 and addition of the monitoring capability in FY 92.

- Exhaust air streams that might contain radioactive materials are monitored and sampled. However, this is not done for all exhausts that might contain hazardous materials:

  - Exhausts from beryllium handling operations in Bldg. 331 and the C Wing of Bldg. 321, and

  - Exhausts from two enclosures in Bldg. 513 in which mixed wastes are processed.

  These specific exhausts are high-efficiency particulate air (HEPA) filtered, indicating some potential for generation of airborne toxic particles.

- There have been no systematic documented evaluations to support the lack of capability to monitor or sample for hazardous wastes in the exhaust streams.

- A proposal has been prepared, by the LLNL Environmental Monitoring Group, to evaluate the need for additional exhaust monitoring and sampling capability, and make any improvements indicated by this evaluation. This proposal has been submitted to DOE for funding in and beyond FY 91. Although the current site perimeter monitoring is believed to meet the Bay Area Quality Management District requirements for LLNL, more stringent monitoring requirements are anticipated for the future.

CONCERN: (TS.5-1) (H2/C2) Ventilation exhaust streams which might contain hazardous materials are not all monitored or sampled to quantify releases, and the lack of monitoring/sampling has not been justified by documented analyses.

4.5.9 Packaging and Transportation

4.5.9.1 Overview

All 10 Performance Objectives were used to appraise the Packaging and Transportation area. The program for packaging and transportation of hazardous materials at LLNL was evaluated based on a review of pertinent LLNL policy documents and manuals, Operational Safety Procedures (OSPs), Facility Safety Procedures (FSPs), Safe Operating Procedure (SOPs), and two audit reports. Interviews were conducted of staff and management personnel in Materials Management Division (MMD), Materials Distribution Division (MDD), Hazardous Waste Management Division (HWMD), and LLNL Safety Teams 3, 4, and 5 (including Site 300 representatives) to identify and validate findings. Packaging, in-transit storage, and onsite transportation operations were observed at both the main site and Site 300.

The packaging and transportation program benefits greatly from the high degree of staff expertise and conscientiousness in the three transport organizations involved. The accident record has been good.

This good past performance has been achieved in spite of the present management systems, rather than because of them, since those systems have resulted in numerous violations of Department of Transportation (DOT) regulations and DOE directives.

There is no cohesive, coordinated, consistent program at LLNL for packaging and transportation of hazardous materials. There is no focal point--no single office, no committee--for transportation matters.

There appears to be a complacent attitude of "assumption of compliance" toward transportation safety sitewide, except within MMD. In general, the belief seems to be that the lack of serious violations means an effective safety system exists.

There is little evidence that LLNL top management considers safety in the packaging and transportation of hazardous materials to be an important consideration. Management safety policies in packaging and transportation are sparse, nonspecific, and conflicting. Procedures are often missing or incomplete, insufficiently reviewed, and in conflict with one another. Responsibilities are clearly assigned, although sometimes conflicting.

The LLNL Safety Teams, which are relied on to provide guidance, assistance, and overview in packaging and transportation, have no transportation expertise and are not trained in that area. Staff turnover is high in both the Safety Teams and HWMD, limiting their ability to ensure safety compliance.

Except for the LLNL Safety Teams, the training program in packaging and transportation is extensive and effective, even though the program requirements are not well documented in procedures. There is no program for incorporating "lessons learned" from other DOE operations and industry.

The LLNL Quality Assurance (QA) program for packaging and transportation is deficient. Plans are incomplete, inconsistent, or missing. Sitewide QA directives are out-of-date and vague. Although there have been two recent

audits (MMD and HWMD), there is no effective independent audit system. Many of the audit findings are still unresolved.

For over 5 years, the DOE has urged LLNL to establish a sitewide safety checklist system. Except for MMD, checklists are rarely used in packaging and transportation operations. Many of the regulatory violations observed during the appraisal could have been avoided if this simple feature had been implemented.

Safety standards and procedures are developed, carried out, and verified by the same people. This conflict of interest precludes an objective overview and analysis of the operations to detect impending safety program failures and violations. Numerous examples of this breakdown were found. Many of the people interviewed thought that regulatory standards themselves constitute procedures, rather than procedures being a way to meet the standards.

There is no efficient and effective mechanism at LLNL to detect and correct transportation safety system problems before they occur. There was ample evidence of mismarked drums of waste, mislabeled gas cylinders, unplacarded vehicles, inappropriate means of carriage, and incorrect paperwork. The system for handling, identifying, and transporting hazardous materials is a Category II concern (Concern PT.6-1).

The major causal factors of the present deficiencies in the transportation program appear to fall into five general categories. It should be noted that the numerous deficiencies found were not the result of an extensive or complete sample, but are interpreted to be representative of the predominant situation:

- Ineffective independent oversight of packaging and transportation.
- Absent or ineffective checks and balances to assure that the procedures have been followed.
- Absence of a central coordinating group for all packaging and transportation activities.
- Inconsistency between the three primary transportation organizations.
- Assignments by management of responsibilities and duties that inherently constitute conflict of interest.

The LLNL Quality Assurance Manual (QAM), M-078, asserts that safety relies more on good leadership than on written procedures. The Appraisal Team found that philosophy to be prevalent in the operations, and also found those operations to be in violation of DOE directives and the Federal regulations. When applied to the overall transportation safety program, such a philosophy is counterproductive and out of place in a modern safety culture.

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 Department of Energy (DOE) Orders, particularly DOE 5480.3, Federal and State regulations, and good industrial practices in operations involving packaging and transportation of hazardous materials.

FINDINGS:

- There is no evidence of a documented or demonstrated recognition by LLNL top management of the need for a comprehensive and consistent Packaging and Transportation (PT) safety policy or program. For example, the subject of PT safety was not mentioned in the inbriefing for LLNL Tiger Team. (See Concern OA.4-1.)

- There are three separate PT functions: (1) Materials Management Division (MMD) for "controlled" hazardous materials, (2) Hazardous Waste Management Division (HWMD) for hazardous wastes, and (3) Materials Distribution Division (MDD) for all other hazardous materials. All three operate independently, resulting in a fragmented sitewide program.

- There is no central PT coordinating group, contrary to LLNL's Hazardous Materials Control Policy (HMCP). In fact, the PT program is not coordinated. The LLNL Quality Assurance Manual (QAM), (M-078, Suppl. 1, pages 5, 11, 12), implies that MDD is the coordination point for PT. The MDD draft QAM (M-078-93) makes the same implication, but in practice MDD does not perform this role. LLNL Health and Safety Manual (HSM), Sections 8.09 and 33.41, implies that MMD, rather than MDD, might have some of these same coordinating functions. (See Section PT.9.)

- There is no provision for ensuring uniformity in PT operations at LLNL, contrary to LLNL's HMCP. In fact, the three activities do not operate uniformly. They only occasionally communicate with each other on PT operations, and then usually in reaction to some problem.

- There is no documented overall PT safety program at LLNL for either onsite or offsite operations. (See Sections PT.8 and PT.9.) LLNL sitewide PT policy statements are vague and do not provide specific guidance.

- There is no sitewide transportation committee to review and coordinate the various interrelated facility PT activities. (See Concern FR.1-1.)

- Procedures and standards for providing safety in hazardous materials packaging and transportation, both on and off the site, are incomplete, inconsistent, conflicting, and too general to be of practical operating use.

- Section 8 of the HSM does not specifically cover HWMD operations, and covers MMD and MDD only generally. Procedures for offsite shipment of hazardous material cover only fragmented portions of the total operation. Sections 8, 24, 29, 33, and 35 of the HSM make some mention of PT, but there is no in-depth coverage.

- LLNL departmental and divisional policies, procedures, and operating instructions for PT safety are lacking in detail and are inadequate to meet the requirements of DOE 5480.3, Sections 9. and 10.

- Responsibilities are assigned in the various PT documents, but there are overlaps, inconsistencies, and conflicts between MMD, HWMD, and MDD. For example: pages 11-12 of QAM (M-078, Suppl. 1) state that MDD releases all commercial shipments, but HWMD also does it in practice, and is authorized to do so in their own documents. The Supply and Distribution Department Procedure 420-5 defines hazardous materials differently than the HSM Section 8. There is also a mismatch in responsibilities and procedures between Procedure 420-5 and the MMD Manual, Vol. VI. (See Concerns OA.1-1, OA.1-2, and OA.1-3.)

- The MMD Material Accountability Manual states that the Site 300 MMD representative has no authority or responsibilities for PT, but in practice that person has many responsibilities and exercises significant authority in PT.

- There was little evidence that LLNL Safety Teams 3 and 4 can or do carry out the PT-related duties assigned to them in HSM Section 8.09; LLNL Safety Team 5 is somewhat more involved in PT. (See Section FR.2.)

- Safety review of PT aspects of procedures, QA plans, and other such documents is insufficient.

- Observations of available signature sheets indicate that the requirements for PT safety review and sign-offs on QAPs and operating procedures are inconsistent. There is no stated requirement for Safety Team sign-off on such documents. Site 300 Procedure 108, regarding operation of vehicles carrying explosives, was not signed off by MDD or MMD.

- There is no program for cross-review (technical peer review) by MMD, HWMD, and MDD of each other's PT procedures and QA documents, with resultant nonuniformity of procedures. The Hazards Control Department (HCD) and its Safety Teams are only sporadically involved in review of MMD, HWMD, and MDD written procedures and QA documents covering PT. Safety reviewers are assigned on an ad hoc and inconsistent basis.

- LLNL Safety Teams 3 and 4 are too short-handed to meet their responsibilities for safety verification. Staff turnover is high.

- Staff turnover in HWMD is a continuing problem. HWMD staffing is insufficient to perform all PT operations with a high degree of assurance of regulatory compliance. There are 9 unfilled technician positions (out of a total of 23 such positions) in HWMD, which makes it difficult to provide sufficient attention to detail. (See Section PT.6.)

- See Concerns OA.1-6, TS.2-1, PT.6-1, and MA.1-3.

CONCERN: (PT.1-1) (H1/C1) The hazardous materials transportation program is fragmented, uncoordinated, inconsistent, ineffective, and not in compliance with DOE Orders.

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 Parts 173 and 390-397.

FINDINGS:

- The documented training requirements for PT personnel do not reflect the significant depth and frequency of the training actually performed. Written procedures are nearly silent on training requirements for hazardous materials packagers and drivers.

- There is no sitewide formal program for incorporating "lessons learned" into the PT activities. It was observed that there is no DOE-wide information system for "lessons learned" on PT.

- HCD is assigned the responsibility for providing and coordinating safety training, but most PT training is arranged for directly by the three PT organizations. There is no sitewide PT training plan.

- Training for LLNL Safety Teams 3, 4, and 5 is inadequate to allow them to provide safety advice, assistance, or overview in packaging and transportation safety required of them in the LLNL procedures. Those teams have the responsibility for providing PT services to MMD, HWMD, and MDD but have no team members trained or experienced in hazardous materials packaging and transportation.

CONCERN: See Concerns TC.1-1, PT.6-1, and OP.6-1.

PT.3 QUALITY ASSURANCE

PERFORMANCE OBJECTIVE: A system of checks and balances should exist that ensures that the quality assurance (QA) requirements of the applicable DOE Orders and ANSI NQA-1-1986 are met.

FINDINGS:

- The LLNL QAM (M-078, Suppl. 1) for packaging and transportation is vague, does not provide specific guidance, and is out-of-date (September 1985). The QAM does not contain the essential QA program elements required by DOE 5480.3, DOE 5480.5, or DOE 5700.6B.

- The individual QAPs for the three LLNL PT organizations are general and inconsistent. The MDD QAP is still in draft after over 5 years in preparation. There is no program for cross-review (technical peer review) of each other's QAPs.

- There is no PT QAM specific to Site 300. The draft MDD QAP does not cover Site 300. Coverage of Site 300 in the MMD QAP is minimal.

CONCERN: See Concern QV.1-1.

FINDINGS:

- HSM Sections 8.09 and 33.41 assigns responsibility for "controlled" (including radioactive) materials to MMD to: (1) provide guidance and interpretations of regulations, (2) develop procedures to ensure compliance, (3) follow the procedures (do the packaging and transportation), (4) determine the adequacy of the procedures, and (5) verify compliance (overview their own work). This is a conflict of interest within MMD in that it does not provide for either independent oversight of PT compliance or an independent safety organization review of PT safety standards.

- The LLNL Safety Teams have much the same responsibilities as MMD. The HCD cannot provide independent oversight of the PT safety operation in which they have been involved.

- The inherent conflict of interest in the PT safety functions precludes checks and balances between the three basic elements of safety: setting standards, operational compliance, and compliance verification. The conflict of interest does not allow an objective implementation of the PT safety program.

CONCERN: See Concerns FR.1-1, QV.1-1, and OA.2-1.

FINDINGS:

- The audit and appraisal program for PT does not meet the requirements of DOE 5480.3 and DOE 5700.6B.

- There is no routine QA program for overview of the various PT functions. Audits by an independent group are infrequent and irregular, contrary to the DOE requirements. They are not sufficient to document deficiencies in the PT QA program. There

was also no independent overview of the LLNL Safety Teams with respect to their PT functions.

- The annual PT program appraisals prescribed in the QAM, (M-078), page 2, are not done. The audits required by Supplement 1, page 14, on a 1- to 3-year cycle, have not been routinely done throughout LLNL. Independent audits were recently completed for HWMD and MMD, but an audit of MDD has not yet been done.

- The LLNL QA audit program has no member expert in, or even reasonably knowledgeable in, PT of hazardous materials. Knowledgeable experts outside of the QA office can be used if they have received QA training and a certified lead auditor is used.

- The QA staff lacks sufficient expertise to recognize the need for including transportation safety items in precontract award inspections and in routine onsite and offsite shipping and transportation activities.

- See Concerns FR.4-2, QV.1-1, and OA.5-4.

CONCERN: (PT.3-1) (H2/C1) The audit and appraisal program is insufficient in both frequency and depth to ensure that the quality assurance (QA) requirements of DOE 5480.3 and DOE 5700.6B are met.

FINDINGS:

- Except for MMD, there are no provisions at LLNL for the use of checklists of other documentation to guide the conduct of a PT activity and to measure how it was performed.

- Checklists are seldom used and do not exist for some critical PT activities in HWMD and MDD. They are not referred to in the procedures. There is no system to ensure that checklists are periodically reviewed or updated.

CONCERN: See Concerns OP.3-3, MA.1-3, PT.6-1, and QV.1-2.

FINDINGS:

- There is no effective formal documented program for corrective action and for following up on findings of PT appraisals/audits, as required by LLNL QAM (M-078, page 4), and DOE 5480.3 and DOE 5700.6B. Several problems identified in previous appraisal reports (e.g., container procurement verification, quality assurance, onsite and offsite transportation safety manuals, documented training program, checklists) are still unresolved. Response has not been timely and positive. Audit findings are not reviewed by LLNL management to ensure timely closure.

- See Concerns FR.6-1, PT.4-1, and OA.5-1.

CONCERN: (PT.3-2) (H2/C1) The system for corrective action and followup on packaging and transportation audits and appraisals does not comply with DOE Orders.

FINDING: o The program for quality assurance in hazardous materials container procurement, as required by DOE 5480.3, Section 9, and by 49 CFR 173.474(a)(1), is deficient. There is no effective system to ensure that the containers purchased by LLNL for packaging of hazardous materials are manufactured in conformance to the DOT specifications. Manufacturers' QA programs are not reviewed, nor are plants inspected for conformance to specification. (See Section QV.2.)

CONCERN: (PT.3-3) (H2/C1) The hazardous materials container procurement and inspection program does not provide assurance that containers will meet DOE Orders and Department of Transportation (DOT) regulations.

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:

- The system for ensuring and measuring compliance with applicable State and Federal regulations in PT of hazardous materials is ineffective. Numerous violations were noted. (See Sections PT.3, PT.6, and PT.9.)
- The program for detection of existing and potential hazards in PT of hazardous materials is not effective.
- There is no program for factoring the provisions of forthcoming DOT and EPA regulations and draft DOE 5480.3A and draft DOE 1540.X into planning for future PT operations.
- There is no program for management evaluations of LLNL use of DOE alternatives, DOT exemptions, National Security Provisions, or other regulatory variances.
- There is no documented and effective program requiring assessment of new or modified operations involving existing or potential hazards in PT, or periodic reviews of routine operations.
- See Concern PT.6-1.

CONCERN: (PT.4-1) (H2/C1) There is no comprehensive and consistent sitewide program for ensuring that packaging, identification, and transportation of hazardous materials (on site, between sites, offsite) meet Department of Transportation (DOT) and Environmental Protection Agency (EPA) regulations, as required by DOE 5480.3, Section 7.

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:

- o Operating procedures for PT are incomplete, nonspecific, or missing. (See Section PT.1.) Checklists are not routinely used. (See Section PT.3.)

- o There is no cohesive onsite PT program. (See Section PT.8.)

- o Marking and labeling of hazardous materials awaiting movement is inconsistent and not under control. A limited sampling of packages of hazardous materials revealed a startling number of violations:

  - Marking/labeling for onsite movements differ from that for offsite shipments. (See Section PT.8.)

  - At some of the buildings in the southwest area of LLNL (e.g., Bldgs. 221 and 227), the pallets are labeled instead of the drums.

  - In the Bldg. 612 yard, four drums of hazardous wastes awaiting offsite shipment were mismarked (e.g., drums marked as containing low hazard solids actually contained flammable liquids), thereby violating both DOT and EPA regulations.

  - "Onsite only" compressed gas cylinders are identified differently than cylinders that move offsite.

  - There is no reliable system to identify which gas cylinders are full and which are empty.

- o Gas cylinders are transported at the main site on an unplacarded forklift. One such operation was observed by the Appraisal Team. This forklift operates on the main thoroughfares, creating a mix of slow and fast traffic. The use of forklifts as primary transportation vehicles for hazardous materials on a multiuse site is not good industry practice, which recommends such transport only by a roadworthy vehicle. The reason given by MDD for this practice was shortage of staff; the use of both a truck and a forklift would require an additional person. A safety analysis of that operation was not performed.

- o Incoming vendor-delivered gas cylinders are not routinely inspected on receipt at Bldg. 518 for compliance with marking and labeling regulations. Several missing labels and markings were observed during this Appraisal. The defects are not routinely corrected prior to delivery on site to the users. Some labels were so faded that they no longer showed the prescribed hazard warning colors. These incidents involve

violations of 49 CFR 172.301(a), 172.304, 172.400(a), and 172.407(a)(2); DOE 5480.3, Section 7a; and DOE 1540.1. (See Section QV.3.)

- o There is no documented program to verify that legal and contractual requirements for transportation safety are being met by vendors or subcontractors.

- o See Sections PT.1, PT.2, PT.4, PT.8, PT.9, and QV.3, and Concerns RP.3-2 and RP.10-2.

CONCERN: (PT.6-1) (H2/C1) CAT. II — LLNL does not have a system for handling, identifying, and transporting packages of hazardous materials, in compliance with the safety policies and criteria prescribed in DOE 1540.1, DOE 5480.1, and DOE 5480.3, and in State and Federal regulations.

FINDINGS:

- o Development of a computerized shipping paper system (PARIS) was initiated over 5 years ago but is still not implemented. This system was to ensure that all LLNL shipping papers consistently meet the State and Federal regulations. Pending system completion, there is no central control of all hazardous materials shipping papers.

- o A recent audit of HWMD shipping manifests found numerous errors, including use of incorrect shipping names, unauthorized abbreviations, and improper hazard classifications. These documents accompany the shipments and are subject to inspection by State Police and DOT inspectors.

CONCERN: (PT.6-2) (H2/C1) CAT. II — Shipping manifests do not consistently meet the Department of Transportation (DOT) and Environmental Protection Agency (EPA) regulations in that they do not provide the required information in the specified format.

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:

- There is no all inclusive LLNL onsite transportation safety program, manual, or procedure, as required by DOE directives.
- Onsite transportation of hazardous materials does not meet the DOT regulations whenever practicable as stated in draft DOE 5480.3A and draft DOE 1540.X and the LLNL Health and Safety Manual, Section 33.41. Deviations from the DOT regulations have not been analyzed or specifically authorized. Each of the three PT organizations can make its own determinations of which DOT regulations should apply for onsite movements.
- The safety standards for onsite transportation differ significantly from the standards for offsite shipments, particularly in the areas of packaging, marking, and labeling of packages, and selection and placarding of transport vehicles. There are also differing training requirements for drivers. (See Section PT.6.)
- Onsite transfers of hazardous materials are made without being covered by approved procedures, and are not in conformance with applicable standards and accepted safety practices. (See Section QV.1.)
- All vehicles used solely for onsite transportation of hazardous materials are not maintained in accordance with 49 CFR 396. Operations do not comply with 49 CFR 392. (See Section MA.1.)

CONCERN: See Concerns PT.1-1 and PT.6-1.

PT.9 OFFSITE SHIPMENTS

PERFORMANCE OBJECTIVE: Offsite shipments of hazardous materials should be conducted in a safe, consistent, and accountable manner, following approved procedures, in conformance with applicable regulations, standards, and accepted practices.

FINDINGS:

- The program and procedures for offsite shipments of hazardous materials are fragmented, uncoordinated, incomplete, and/or nonexistent, and do not comply with DOE 1540.1 and DOE 5480.3.
- Other than for controlled materials, hazardous materials are not routinely checked for compliance with DOT regulations for marking and labeling. (See Section PT.6.)
- There is no LLNL sitewide manual or set of procedures covering offsite shipments of hazardous materials. Compliance with DOE 5480.3 and the various transport regulations cannot be assured.
- In numerous instances, inspected manifests did not comply with the DOT and EPA regulations. (See Section PT.6.)
- The LLNL HSM assigns MMD responsibility for verifying regulatory compliance for offsite hazardous material shipments, including radioactive waste. However, the appraisal revealed that MMD does not perform this function for shipments by MDD or HWMD. (See Section PT.1.)
- Health and Safety Manual, Section 3.06, requires all offsite shipments via common carrier to meet DOT regulations, but provides no guidance on shipments via government vehicles.

CONCERN: See Concerns PT.1-1 and PT.6-1.

4.5.10 Nuclear Criticality Safety

4.5.10.1 Overview

All five Performance Objectives were used to appraise Nuclear Criticality Safety on the main site. The facilities that were reviewed in depth included the Plutonium Facility (Bldg. 332), the Heavy Elements Facility (Bldg. 251), and the Nondestructive Evaluation Facilities (Bldg. 239). Also reviewed were the preliminary analysis and safety of proposed operations for the Uranium Separation Demonstration Project (Bldgs. 490, 491, and 492).

The Facility Safety Procedure for the Plutonium Facility was reviewed in great detail, along with most of the frequently used Operational Safety Procedures (OSPs) for workstations in the building. The OSPs for the Metal Production Line and the Engineering Demonstration System were also reviewed. A significant part of this Appraisal included interviews with Facilities Safety Officers, Health Physicists, and facility coordinators to review their interface with Criticality Safety. The Criticality Safety and Analysis Group was interviewed and review of their individual duties was conducted. Random operations in the Plutonium Facility were observed, and criticality safety limits and procedures were discussed with mechanical technicians and supervisors.

The Criticality Safety Program at the main site has been documented in Chapter 31 of the Health and Safety Manual. The organization and administration of this program is well-defined and documented. The Criticality and Safety Analysis Group performs safety functions and helps ensure that the program meets the requirements of DOE 5480.5 and ANSI/ANS 8.1-1983. A Noteworthy Practice was identified in the manner in which formal internal audits are performed.

The nuclear criticality safety evaluation identifies the parameters used to ensure subcriticality; limits are included in the OSP. A high degree of respect and understanding toward criticality safety was observed throughout the facilities reviewed by the Appraisal Team. The qualifications and experience of the Criticality and Safety Analysis Group are excellent. It was found that, although the peer review to confirm the adequacy of nuclear criticality safety evaluation is very good, it does not always include a formal documentation of the review process.

The Criticality and Safety Analysis Group determined, as a result of recent audits, that the sound levels of the criticality alarm system in Bldg. 332 do not conform with the recommendations of ANSI/ANS 8.3-1986.

4.5.10.2 Findings and Concerns

CS.3 NUCLEAR CRITICALITY SAFETY EVALUATIONS

PERFORMANCE OBJECTIVE: Nuclear criticality safety evaluations of the design and operation of process equipment should ensure that subcriticality is maintained under normal and credible abnormal operating conditions.

FINDINGS:

- A review of the nuclear criticality safety evaluations performed by the Criticality and Safety Analysis Group shows a very good system supported by personnel with excellent qualifications in the nuclear criticality safety field. In some cases, however, the documentation of the independent review to confirm the adequacy of the nuclear criticality safety evaluation is too informal, consisting only of a statement that a review has taken place.
- See Concern TS.2-1.

CONCERN: (CS.3-1) (H3/C2) The criticality safety evaluations performed by the Criticality Safety and Analysis Group do not always include a formal documentation of the review process.

CS.5 CRITICALITY ALARM SYSTEM AND EMERGENCY PROCEDURES

PERFORMANCE OBJECTIVE: All reasonable steps should be taken to mitigate the consequences of a nuclear criticality accident.

FINDINGS:

- Review of the criticality alarm system in Bldg. 332 found that a test of the decibel levels for Bldg. 332 criticality horns was conducted on July 29, 1989. From the data showing the recorded sound level measurements and frequency distribution (Plan LEA 89-2715-01-B-0) it can be concluded that the sound levels of the criticality alarm system do not satisfy the recommendations of ANSI/ANS 8.3-1986 ("...sound pressure level not less than 10 db above ambient noise level..."). Review of recent audits performed by the Criticality Safety Group shows that this deficiency was addressed by the auditors.

- LLNL has received approval and funding to correct the alarm system deficiencies; a request is in place for Plant Engineering support to design, purchase, and install a new evacuation alarm module.

CONCERN: (CS.5-1) (H2/C2) The sound levels of the criticality alarm system in Bldg. 332 do not conform with the recommendations of ANSI/ANS 8.3-1986.

4.5.11 Security/Safety Interface

4.5.11.1 Overview

All four Security/Safety Interface Performance Objectives were addressed in this Appraisal. The Appraisal of the main site was accomplished through interviews of group leaders, administrators, facility managers, safety officers, department heads, and supervisors to ascertain how operations were conducted, managed, and controlled. Records and procedures were examined, and policies and practices were reviewed. In addition, visits were made to Bldgs. 111, 231, 232, 271, 321, 337, 332, 415, 482, 490, 511, and 533.

Protective Services was observed to control the site adequately during the emergency exercise conducted during this Appraisal. Protective Services provides for unhindered access to the site during such events. Protective Services participates in site safety and security drills and exercises and their subsequent critiques.

The Protective Force Division Emergency Evacuation Plan provides for orderly and unimpaired egress during a site evacuation. However, the plan does not explicitly state who will assume control of the evacuation after the Emergency Operation Center (EOC) is operational.

The responsibilities of security and facility personnel during emergencies are clearly defined in the facility emergency plans.

Those new facilities or facility modifications accomplished through the Facility Engineering Department are reviewed by representatives from security and safety. The process is such that drawings cannot be released for construction without the concurrence of Security and Safety.

There are, however, several methods by which modifications to facilities and equipment can be made without receiving a review commensurate with that of the original design.

Analyses as required by DOE 5480.16 of the potential safety consequences associated with using weapons, vehicles, and other protective force equipment in the vicinity of safety-related systems or components have not been performed, nor are currently planned.

4.5.11.2 Findings and Concerns

SS.1 SECURITY/SAFETY INTERFACE

PERFORMANCE OBJECTIVE: Security/safeguards improvements and modifications should not create or increase hazards that would impede the safe, reliable operation or shutdown of any facility on the site in normal, abnormal, or emergency situations.

FINDINGS:

- There is no documented guidance regarding the changes technicians may make to program equipment or facilities.
- In accordance with the Whiz Tag Information Book, Whiz Tags may be used to obtain support for programmatic needs or experiments from Production Maintenance and are generally used to accomplish jobs requiring less than 16 hours to complete.
- There are no documented criteria by which Whiz Tags are evaluated to determine if a review and approval by Security or Safety is needed prior to starting the work requested.
- In several instances, door locks had been installed which when locked prohibited or limited egress from laboratories containing hazardous materials.

CONCERN: (SS.1-1) (H2/C2) There exist several mechanisms by which facilities and equipment may be modified without receiving a Security/Safety review to the same codes, standards and criteria afforded the original design.

SS.3 FACILITY PLANNING FOR SECURITY/SAFEGUARDS EMERGENCIES

PERFORMANCE OBJECTIVE: Safety authorities and responsibilities for all types of security/safeguards emergencies should be well defined and understood by all involved parties.

FINDINGS:

- The LLNL Protective Force Division (PFD) Emergency Evacuation Plan, December 15, 1989, provides conflicting guidance regarding who may authorize a site evacuation:
  - Section I, Introduction, states, "The Laboratory Emergency Duty Officer (LEDO) is authorized to implement an area-wide evacuation if deemed necessary after receiving a situational assessment from the Incident Commander."
  - Section III, Plan, states, "Console operator will notify the PFD Operations Sergeant in Bldg. 271 that an evacuation of the Laboratory has been issued by the appropriate department (Fire/Security) in concert with the LEDO."
- The plan states, "Until the EOC can be manned and activated, the Sergeant will inform the lead dispatcher to initiate one of the following seven appropriate evacuation plans based on the direction of the threat, time and type of work day." The plan, however, does not provide guidance as to which official will assume control of the evacuation after the EOC is declared operational.
- See Concern OA.1-1.

CONCERN: (SS.3-1) (H2/C2) The Protective Force Division Emergency Plan does not clearly establish lines of authority and responsibility under all applicable conditions.

FINDING:

- Analyses have not been performed of the potential consequences associated with using weapons, vehicles and protective force equipment in the vicinity of safety systems and hazardous materials and processes as required by DOE 5480.16.

CONCERN: (SS.3-2) (H2/C1) Safety limits have not been established as required by DOE 5480.16 for the use of security weapons and equipment near safety systems and hazardous material.

SS.4 SAFETY OF SECURITY ACTIVITIES

PERFORMANCE OBJECTIVE: Safety aspects of security activities involving use of weapons and other protective force equipment in the vicinity of safety systems and/or hazardous processes and materials should be identified and understood by all involved parties.

FINDINGS:

- o Protective Force Supervisors are trained to recognize deterioration in physical or mental condition of subordinates as a result of substance abuse; however, training is not provided to recognize deterioration in the physical or mental condition of subordinates resulting from fatigue, mental impairment, or other related causes as required by DOE 5480.16.

- o 10 CFR 1046 requires a physical fitness certification to be passed annually. A sample of the protective force training records revealed cases with an interval of as much as 15 months between subsequent certification for which extension were granted. The extension in one case was granted based on a medical evaluation that the officer was not in a physically fit state to attempt the fitness requalification.

- o The LLNL physical fitness training program does not ensure "...that security inspectors maintain the requisite physical fitness for effective job performance and to enable the individual security inspector to pass the applicable annual physical fitness requalification test without suffering any under physical injury."

- o Special Order 86-04 states the Security Emergency Response Team "... will qualify with those firearms dedicated to S.E.R.T. quarterly. This qualification is in addition to the department qualification cycles." The training records do not reflect this frequency of qualification.

- o DOE 5480.16 requires an employee to demonstrate technical and practical firearm safety semiannually to remain in an armed status. The protective force training records indicate that some officers have maintained armed status for a year by demonstrating their firearm safety proficiency twice in the same month.

- o See Section TC.1.

CONCERN: (SS.4-1) (H2/C1) The protective force training program and its implementation are not in compliance with Special Order 86-04, Security Emergency Response Team (S.E.R.T.), revised January 22, 1987, and DOE 5480.16.

FINDINGS:

- o A document specifying the content, control, and retention of training records for protective force officers does not exist.

- o The protective force training records for the range master did not contain evidence of his annual cardiopulmonary resuscitation

certification for the year 1989, as required by DOE 5480.16. The required documentation was sent to the range master by the Safeguards and Security Group providing the certification. The protective force training organization was not notified of the certification.

- The protective force training records for each protective force officer are not retained in a single master file. Portions of the records are retained by each of the following organizations: Basic Academy, Central Training Academy, weapons range, physical fitness, and medical.

- The state of the protective force training group records was such that the status of the protective force officers qualifications could not be determined by a review of these records.

- An annual protective force training schedule which documented the officers' qualifications, the training required to maintain the qualifications, and the planned date for the completion of the training did not exist.

CONCERN: (SS.4-2) (H3/C1) The protective force training records are not auditable, and therefore, do not provide demonstrated evidence of officer qualification in accordance with DOE 5480.16.

CONCERN: (SS.4-3) (H2/C1) The LLNL physical fitness training program for protective force officers is not in compliance with 10 CFR 1046.11.(d).

FINDINGS:

- Protective force officers receive facility-specific safety training for Bldgs. 251 and 332. However, they do not receive such training for Bldg. 331 and other buildings containing equipment and processes which present unique hazards.

- Training in addition to the general employee training is provided to protective force officers in health physics, but such training is not provided for chemical and lasers hazards which they may encounter in the execution of their duties.

- Training in the current Emergency Plan has not been provided to protective force personnel.

CONCERN: (SS.4-4) (H2/C2) Protective force officers do not receive training in the specific safety rules and hazards associated with some facilities and processes at LLNL.

4.5.12 Experimental Activities

4.5.12.1 Overview

The Appraisal for the Experimental Activities category included all four Performance Objectives; Experiment Categories, which deals primarily with independent safety review of experimental proposals, is treated in additional detail in the Appraisal Section on Site/Facility Safety Review. Because of the experimental nature of much of the programmatic work at LLNL, information treated in the Operations area of this Appraisal pertains to the Experimental Activities area as well.

Because of the wide diversity of experimental programs at LLNL, the measures for reviewing experimental proposals vary between divisions. A very formal system exists in the Nuclear Chemistry Division for review of experiments proposed for the Heavy Elements Facility (Bldg. 251). The Experiment Review Committee, chaired by the Facility Manager and including other facility experts, examines and judges each proposal after formal submission in writing. This Committee interacts with the experimenter to resolve any previously unreviewed safety questions. All such issues must be resolved before approval is given to proceed with the test. A charter for the Experiment Review Committee is given in Section 9.0 of the Heavy Element Facility Handbook, M-158, Rev. 1, May 1987.

The review technique for proposed experiments in the LLNL Plutonium Facility (Bldg. 332) involves examination and approval of Operational Safety Procedures or Supplemental Operational Safety Procedures by the line managers with responsibilities as specified in the Health and Safety Manual, Appendix 2-C. In the Laser Programs, nonroutine tests, if acceptable, are approved by the Facility Manager after review by him and other resident program experts. The LLNL review process for Experimental Activities is deficient in some areas because the majority of the reviewers are not "independent," as stipulated by DOE 5480.5, Paragraph 9.h. This deficiency is treated in the Appraisal Section on Site/Facility Safety Review.

Personnel interviews with several groups of experimenters indicated established, well-defined relationships between experimenters and the operating groups. Also, discussions with the Facility Managers of all buildings that were reviewed indicated no incidents or accidents during the conduct of specially approved experiments in facility equipment.

4.5.13 Site/Facility Safety Review

4.5.13.1 Overview

All five of the Site/Facility Safety Review Performance Objectives were covered in this Appraisal. The Appraisal was conducted by interviewing the Safety Team Leaders, Administrators, facility managers, safety officers, department heads, and supervisors; and by reviewing safety committee charters, reports, inspections, and action item documentation. Bldgs. 191, 231, 232, 321, 331, 332, 482, 490, and 801, 805, 817, 827, 851, and 875 were visited.

LLNL has no fully functioning Safety Review Committee (SRC) or group of committees providing independent safety oversight as required by DOE 5482.1B. Several of the functions of the SRC are covered to some extent by other review groups. An Environment, Safety and Health (ES&H) Council to advise the LLNL Director on ES&H policies and oversee the effectiveness of activities and programs to implement these policies was recently formed; however to date, this Council has only performed limited functions relative to LLNL. The charter for this council does not address all of the functions of a SRC. This Council replaced a Health, Environment, Safety, and Quality Assurance Committee which was not proactive in pursuing safety issues.

A LLNL Assurance Office sees that some appraisals are conducted on a periodic basis. This office selects reviewers to conduct the appraisal. Results of the appraisal are transmitted to the program/facility reviewed. These in turn are responded to by the recipient and the response is assessed at the next appraisal. These appraisals however do not meet all the requirements of DOE 5450.5 and DOE 5482.16 and are not conducted in accordance with a formal, documented program.

Due to the occurrence of three Unusual Occurrence Report (UOR) incidents involving high explosives (HE) in the 6 weeks prior to this Appraisal, the LLNL Associate Director-at-Large called for a special review of activities involving HE and appointed two special committees to review HE procedures and operations for safety. At least one of the Incident Analyses indicated that the lack of an adequate peer or safety review was a contributing factor.

Multidisciplinary Safety Teams are established to discharge the responsibilities of the Hazards Control Department by assisting the facilities with safety. The LLNL Safety Teams are not entirely independent of the organizations they serve, since they provide consultation to and are funded by those same organizations. The LLNL Safety Teams are more service- than oversight-oriented; they review procedures, perform design reviews, provide technical analyses to facility and program managers, and perform building or facility inspections as part of this service.

Line management at each facility has been delegated overall safety responsibility for each facility. The Resident Manager or Associate Director annually appoints a three-person committee to perform a safety review of the facilities. No review was performed of Site 300 in 1989 or Bldg. 251 in 1988.

Many informal systems to track the status of safety issues, including closure of safety action items are in use at various facilities.

Safety items generated by Hazards Control that are outstanding for 60 days or more are placed in the Hazards Information Record and Control (HIRAC) system, a computerized database for tracking action items. Active action items can be made inactive, but not removed from the HIRAC database, by unauthorized persons.

There is no LLNL site safety event tracking system that provides for capture of safety events, screening and analysis of the events and the monitoring of the follow-up actions to ensure timely closure. LLNL has not implemented an effective follow-up system that ensures that appropriate and timely corrective actions are taken to address safety events.

Detailed investigation of significant safety events is performed to ascertain root causes, generic implications, and corrective measures.

The Department Head for Hazards Control performs a review of the LLNL Safety Teams annually. Every other year a more in-depth review is performed. There are no formal LLNL policies or requirements addressing the review of the safety review system. The review is usually initiated by an informal request from the Hazards Control Department Head to the Safety Team Leader for specific safety data and a status report. The information is informally presented to the Department Head. No formal report is issued. A formal triennial review of the safety review system for explosives operations is not conducted as required by DOE 5482.1B.

4.5.13.2 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:

- There is no Safety Review Committee (SRC) as such at LLNL. Several of the functions of the SRC are covered to some extent by other review groups such as the LLNL Assurance Office.

- In his memo of January 9, 1990, the LLNL Director established an Environment, Safety and Health (ES&H) Council to advise the Director on ES&H policies and oversee the effectiveness of activities and programs to implement these policies. As of this Appraisal, the Council has only performed limited functions relative to LLNL. The charter for this Council does not address all of the functions of a SRC.

- The ES&H Council replaced the existing Health, Environment, Safety, and Quality Assurance (HESQA) Committee. The HESQA committee was charged with reviewing the health, environmental, safety, and quality assurance aspects of operations at LLNL and with making recommendations to the Director regarding policies and practices in that regard. The HESQA Committee met at varying intervals and reviewed safety issues brought before them. Minutes were kept at these meetings. The HESQA Committee was not proactive in pursuing safety or quality assurance issues.

- LLNL management may appoint special committees to review specific issues. Due to the occurrence of three UOR incidents involving high explosives (HE) in the 6 weeks prior to this Appraisal, the LLNL Associate Director-at-Large called for a special review of activities involving HE and appointed a special committee to review HE procedures and operations for safety. In at least one case the Incident Analyses indicated that the lack of an adequate peer or safety review was a contributing factor.

- Multidisciplinary LLNL Safety Teams are established to discharge the responsibilities of the Hazards Control Department by assisting the facilities with safety. The responsibilities of these Safety Teams are described in the Hazards Control Manual, revised December 1989, and in the LLNL Health and Safety Manual.

- The LLNL Safety Teams are not entirely independent of the organizations they serve in that they are funded by those same organizations. The Safety Teams are more service- than oversight-oriented; they review procedures, perform design reviews, provide technical analyses to facility and program

managers, and perform building or facility inspections as part of this service.

- The Safety Teams meet with different frequency and no meeting minutes are kept.

- The Resident Manager has overall safety responsibility for Site 300. He has weekly staff meetings. No meeting minutes are generated in these staff meetings, but a list of action items, including Safety Team findings, is generated. No documentation is made of the closure of safety action items. The Site 300 Safety Team Leader does keep informal track of the status, including closure, of action items.

- The Resident Manager annually appoints a three-person committee to perform a safety review of the Site 300 facilities. No review was performed in 1989.

- An annual appraisal of Bldg. 251 was not completed during 1988.

- See Sections PT.1, PT.3, FP.1, and FR.2.

CONCERN: (FR.1-1) (H2/C1) There is no fully functioning Safety Review Committee or collection of committees providing independent safety oversight for LLNL operations as required by DOE 5482.1B.

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:

- o LLNL Safety Teams may participate in selected UOR investigations. The Safety Team Leader reviews all UORs involving facilities or operations under his purview.

- o The LLNL Safety Team reviews all Facility Safety Procedures (FSPs) and Operational Safety Procedures (OSPs). The Safety Team reviews major facility or operational changes, requiring Job Orders, but not smaller changes handled with less formal work requests (the Whiz Tag System). The Whiz Tag System may involve small jobs that nevertheless may have safety significance. It is incumbent upon the requester or personnel performing the work to request a safety review for Whiz Tag System jobs. This is not routinely done.

- o LLNL Safety Teams informally become aware of procedure violations. There is no formal mechanism for notification.

- o See Section PT.1.

CONCERN: See Concerns FP.1-1, FR.1-1, MA.2-1, MA.4-1, and FP.7-1.

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:

- o A review of the OSP review and approval process as applied to several specific OSPs revealed that one of the reviewers toward the end of the review process had found safety problems that had gone undetected even though the OSPs had been reviewed and approved by representatives of industrial safety, industrial hygiene, environmental protection, fire protection, and other responsible groups.

- o Some FSPs have been extended past their expiration date, some for as much as a year, without being subject to a formal review.

- o The extension of FSP 251 expired on October 10, 1989. A memorandum further extending the FSP expiration date to April 30, 1990, was promulgated on January 29, 1990, some 3 months after the FSP expired.

- o The Incident Analyses conducted relative to three incidents (UORs) involving high explosives indicated that the lack of an adequate peer or safety review was a contributing factor.

- o See Concerns OA.5-3, OA.7-1, OP.1-2, IH.2-1, and TS.2-4.

CONCERN: (FR.3-1) (H2/C2) The conduct of the Facility Safety Procedure and Operational Safety Procedure review and approval process at LLNL is not consistent with the health and safety hazard presented by the process being considered.

FR.4 ANNUAL FACILITY SAFETY REVIEW

PERFORMANCE OBJECTIVE: An annual operating review of the facility should be performed by a committee appointed by top contractor management.

FINDINGS:

- o Health and Safety Manual Supplement 1.13, Safety of Nuclear Facilities, March 1989, Appendix A, L. Internal Review and Audit, does not address all of the areas applicable to the annual appraisal as stated in DOE Section 5480.5, 9.h., specifically, items 9.h.(2), (10), and (11) are not addressed.
- o See Concern QV.1-2.

CONCERN: (FR.4-1) (H3/C1) The annual appraisal guidance provided in the Health and Safety Manual is not in compliance with DOE 5480.5.

FINDINGS:

- o An annual appraisal of Bldg. 231 was not completed during 1989.
- o An annual appraisal of Bldg. 251 was not completed during 1988.
- o The 1989 annual appraisal of Bldg. 331 and the 1988 annual appraisal of Bldg. 332 did not address all of the criteria as required under DOE 5480.5, Section 9., Contractor Independent Review and Appraisal System, specifically Section 9.h.(2), (5), (10), and (11).
- o The report of the 1988 annual appraisal of Bldg. 332 did not list the records and documents reviewed, address the qualification of the reviewers, and did not identify those facilities that were inspected.
- o Personnel performing annual appraisals are not obligated to review and concur with the resolution proposed for the findings of the appraisal.
- o The qualifications of the appraisal team members are not documented in the annual appraisal reports in order to demonstrate technical competence in the area being appraised.
- o An operating review of the laser facilities has not been conducted in accordance with DOE 5482.1B.
- o See Section PT.3 and Concern QV.1-2.

CONCERN: (FR.4-2) (H2/C1) The LLNL Site Independent Review and Appraisal System is not in compliance with the requirements of DOE 5480.5, DOE 5480.1B, and generally accepted industrial practices.

FR.5 TRIENNIAL APPRAISAL OF SITE/FACILITY SAFETY REVIEW SYSTEMS

PERFORMANCE OBJECTIVE: A triennial appraisal of the safety review systems should be performed by contractor management.

FINDINGS:

- The Department Head for Hazards Control performs a review of the LLNL Safety Teams annually. Every other year a more in-depth review is performed.
- There are no formal LLNL policies or program addressing the triennial review of the safety review system as required by DOE 5482.1B.
- The review is usually initiated via an informal request from the Hazards Control Department Head to the Safety Team Leader for specific safety data and a status report. The information is informally presented to the Department Head. No formal report is issued.
- A triennial review addressing the laser program and facilities has not been performed.
- See Concerns OA.5-4 and QV.1-2.

CONCERN: (FR.5-1) (H2/C1) A formal triennial review of the safety review system for LLNL operations is not conducted as required by DOE 5482.1B and DOE 5480.5.

FR.6 OPERATING EXPERIENCE REVIEW

PERFORMANCE OBJECTIVE: Operating experience should be evaluated, and appropriate actions should be undertaken to improve safety and reliability.

FINDINGS:

- Those safety items raised by the LLNL Safety Teams that are outstanding for 60 days or more are placed in the Hazards Information Record and Control (HIRAC) system. The HIRAC system is a computerized database for tracking action items. Active action items can be made inactive, but not removed from the HIRAC database, by unauthorized persons.
- There is no documented program requiring that the corrective action and followup to outstanding safety items in the HIRAC system be documented.
- The status of many outstanding safety items is maintained on informal tracking systems. Numerous items have been in an unresolved status for several years; some items date back to 1985.
- Many of the tracking systems do not provide for the current status of the item, the person with the responsibility for the corrective action, projected closure date, and relative safety significance.
- The annual facility reviews required under DOE 5480.5 (nuclear facilities only) and DOE 5482.1B do not address the quantity and significance of open safety items.
- The status of all open safety items is not routinely reviewed by senior management at some facilities.
- TSA concerns dating to September 1986 have not been closed.
- See Concerns OA.5-1, OA.5-5, and PT.3-2.

CONCERN: (FR.6-1) (H2/C2) LLNL site management has not implemented a safety program that ensures the timely followup and closure of all safety items.

FINDINGS:

- A documented system which provides for the evaluation and feedback of relevant operations-related occurrences to the staff did not exist at some facilities.
- DOE UORs and industry and DOE operating experience reports are not reaching the operating staff in some facilities.
- Safety items and issues that are resolved in less than 60 days are not included in a tracking system nor are they included in the trending and analysis performed by LLNL.
- Required reading lists or similar mechanisms for safety and operations experience items were not used.

CONCERN: See Concern OP.6-1.

4.5.14 Radiological Protection

4.5.14.1 Overview

This Appraisal addressed all 12 Performance Objectives in the Radiation Protection area. The Appraisal involved discussions with top-level radiation protection managers, and direct interviews with the following personnel: Hazard Control management, Health Physics group leader, Program Management, Health Physicists, Health and Safety technicians, Internal Dosimetry Program coordinator, External Dosimetry Program coordinator, LLNL Safety Team Leaders, and workers and supervisors of the Bioassay, Wholebody Counting, Respiratory Protection, and Counting Laboratories. The following buildings were visited to observe work practices, review onsite documentation, examine instrumentation and assess the status of radiological controls: 151, 175, 190, 222, 227, 231, 241, 251, 253, 298, 321, 324, 331, 332, 419, 514, and 612.

In general, LLNL is performing a commendable job in modifying the radiation protection programs in response to a changing regulatory environment. A strong foundation is being developed to incorporate many advanced techniques and state-of-the-art instrumentation. During the assessment period, the external dosimetry program received its DOE Laboratory Accreditation Program (DOELAP) accreditation. A computerized internal dosimetry code based on ICRP-30 models has been developed and all supporting documentation and procedures are under development. The Calibrations Laboratory has one of the few computerized neutron exposure systems in the United States. The Respiratory Protection, Bioassay, Wholebody Counting, and Counting Laboratories presently have or have ordered state-of-the-art equipment to upgrade their existing capabilities. The effectiveness of the ALARA Program can, in part, be measured by the small number of radiation and contamination areas. Aggressive ALARA goals have been established and are being implemented.

Although positive changes exist and the overall structure of the Radiation Program has been defined, there are still more changes that need to be made. For example, more operational and administrative procedures need to be written to provide guidance in the implementation of the programs and to control interactions among the various functional groups. There also needs to be greater emphasis on the protection and control of records. In some instances, quality records, consisting of logbooks, exposure analysis, calibration records and computer codes, are generated and maintained in an unprotected, decentralized fashion.

Perhaps the most important finding is the need to provide direct evidence of more representative air monitoring to satisfy the requirements of DOE 5480.11. Air monitoring is the key element in the internal dose control program. Air monitoring results are used to trigger more frequent bioassay measurements. Based on the routine sampling frequency and type, bioassay measurements do not permit the detection of the derived assessment level for some radionuclides. Without a strong air monitoring program, some exposures may go undetected. Plans have been made to upgrade the air monitoring program by purchasing and installing additional CAMs.

The range of energies detected by the continuous air monitors (CAMs) is broad due to the variety of radionuclides processed. This means the alarm setpoint has been increased to reduce the number of false alarms due to background

radon. Since the alarm setpoint has been increased, personnel may receive greater exposure to the airborne concentration of alpha emitters before being warned to exit the room. DOE is planning to modify the standard to permit alarm setpoints to be adjusted higher based on known background interference.

Another observation was that air samplers and monitors do not appear to be strategically placed to capture a representative sample of a potential airborne release. Breathing-zone or lapel air samplers are not used in a radiological environment at LLNL. The present placement of CAMs appears to emphasize room air monitoring rather than representative workplace monitoring.

In addition, there is no filter or dust loading absorption factor used to analyze air sample filters potentially contaminated with plutonium.

These uncertainties exist in the air monitoring program, yet personnel are permitted to wear half-face masks in certain instances while working in a plutonium facility.

In summary, LLNL has a sound general plan, well-qualified administrators, and experienced personnel; however, there are concerns in the areas of records, procedures, and documentation of an effective internal dose control program.

4.5.14.2 Findings and Concerns

RP.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: Facility/site organization and administration should ensure effective implementation and control of radiological protection activities on the facility/site.

FINDINGS:

- o There are no written procedures for the calibration and testing of the following equipment in the counting laboratory and instrument laboratory: rotometers, alpha and gamma spectroscopy instruments, and portable air samplers.

- o There are no detailed written procedures which assign responsibilities for the transfer, accountability, and analysis of sample data to the various functional groups. These procedures are required by ANSI N13.6(b), ANSI N13.30, and DOE 1324.2.

- o Not all of the aspects of internal dosimetry program are covered by detailed procedures such as the following:

  - Some samples are prepared by the Bioassay Laboratory then transferred to the Counting Laboratory for analysis. The raw data are then transferred back to the Bioassay Laboratory for processing. Notifications are made to the Health Physicist, Internal Dosimetry Program Coordinator, and Program Management. The general process is described in Supplement 33.10 and samples are logged in and out.

  - One individual is responsible for analyzing the internal deposition data. Much of the analysis is performed by a computer model. There are written procedures which direct the processing of data and the operation of the computer system.

  - There are no procedures or notification levels indicated for informing management of significant results detected during sample analysis performed in the Counting Laboratory.

  - Quality control procedures as required by ANSI N13.30, Section 5.2.1, have not been written for the counting room.

- o See Section RP.3 and Concern OA.5-3.

CONCERN: (RP.1-1) (H2/C1) There is an insufficient number of operational and administrative procedures to provide guidance in the detailed implementation of programs and to control interactions among the various radiation protection groups.

FINDINGS:

- o There is no procedure to direct the development, approval, distribution, and revision of administrative and operational procedures. Some procedures, such as the counting of the NAD dosimeters, the operation of the swipe counters, and

recordkeeping and record archiving, have no date or signature approval. There is no indication that management has reviewed and approved the manner in which work is to be conducted.

- See Sections RP.3 and RP.6 and Concerns OA.1-1 and OA.5-3.

CONCERN: (RP.1-2) (H2/C2) Administrative and operational procedures are not consistently developed, reviewed, and approved.

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:

- The QA sitewide audits of radiological activities are issue oriented. Audit teams are created to evaluate issues of current interest to LLNL. There is no general audit plan to address all radiation protection program activities.

- Internal audits are conducted by the Hazards Control Group using the program elements listed in the Suggested Radiation Safety Checklist. The checklist does not have a detailed list of questions to ensure that each element is thoroughly covered as recommended by LLNL Quality Assurance Manual M-078-QG-2, Quality Assurance Audits, Section 4.0. The checklist does not address all of the audit elements required by DOE 5482.1B, Section 9.d., such as proposed plant modifications, proposed experiments, organization and staffing, and accident, incidents, and unusual occurrences.

- See Concerns OA.5-4 and QV.1-2.

CONCERN: (RP.2-1) (H2/C1) Audit plans of radiological activities do not ensure that all elements are addressed, including those specified in DOE 5482.1B, Section 9.d., and DOE 5480.11, Section 9.r.

FINDING:

- The audits conducted by the Hazards Control Group are not independent. Audits are conducted by personnel responsible for developing and implementing the LLNL Radiation Program.

CONCERN: (RP.2-2) (H3/C2) There is very little independence in internal radiation protection audit programs.

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.

FINDING:

- The implementation of DOE Orders, in some cases, cannot be traced to the operating level. Facility Safety Procedures and Operational Safety Procedures are traceable.

CONCERN: See Concerns RP.1-1 and RP.1-2.

FINDINGS:

- The radiation work permit (RWP) does not include provisions for stating the radiological conditions of the worksite. It is also noted that the RWP states "WORK PERMIT."
- See Concern OA.5-3.

CONCERN: (RP.3-1) (H2/C2) The radiation work permit does not provide information to the worker on the radiological environment of the workplace.

FINDINGS:

- Radiation protection procedures and instructions consisting of FSPs, OSPs, RWPs, and Discipline Action Plans (DAPs) provide guidance on conducting radiation protection activities at LLNL. The operational radiation protection procedures are primarily contained in the DAP. DAPs provide building-specific instructions on the routine activities conducted by the Health and Safety Technicians. The instructions in the DAP are a listing of general actions or activities rather than step-by-step instructions.
- Some instructions are outdated. Instruction number HP-5 was posted near the swipe counter of Bldg. 332 and dated January 10, 1986. This instruction has been superceded by HP-6. The procedure for the calibration of the Giraffe air sampler had a 1976 date. Many of the procedures had no date or signature approval.

CONCERN: See RP.1-1 and RP.1-2.

FINDINGS:

- Controlled Area signs in Bldgs. 6196 and 6197 are not conspicuously posted as required by DOE 5480.11, Section 9.k. The signs are located inside of the door frame opening.
- The controlled area sign for Bldg. 6198 was missing. The sign was reportedly located on a portable stanchion. The stanchion could not be located.
- A "radiation area" tape was used to define a controlled area at Bldg. 612.

- Waste accumulation area signs containing no radiological markings are used to identify areas where radioactive material is stored at Bldg. 175.

- Drums and containers containing radwaste are not properly posted. No radiological labels are on the transuranic (TRU) waste container in Bldg. 332. Waste containers in the waste accumulation areas do not have radiological information affixed to them. Radiological information is contained on the shipping form located in a plastic pouch on the side of the container. The papers are removed from the pouch and sent to shipping for approval. During this period, no radiological information is available on the container.

- See Concern PT.6-1.

CONCERN: (RP.3-2) (H1/C1) Radwaste containers and some controlled areas are not properly posted in accordance with DOE 5480.11.

RP.6 INTERNAL RADIATION EXPOSURE CONTROL PROGRAM

PERFORMANCE OBJECTIVE: Internal radiation exposure controls should minimize internal exposures.

FINDINGS:

- Two situations were identified in LLNL which may provide workers a false sense of protection from internal deposition while working around radioactive materials:

  - Half-face masks are worn while conducting some work activities in a potentially airborne radioactive environment. The "Guide to Good Practices" at Plutonium Facilities (P4-15) states that masks should be used for all bag-out, bag and glove changes, and any situation involving a potential or actual breach of containment. Full face masks are recommended. In accordance with Facility Safety Procedure Appendix D for Bldg. 332, half-face masks are permitted during "bag-in" and "bag-out" procedures.

  - Workers wearing half-face masks were observed conducting plutonium-related activities in an enclosure at a down-draft table which was contaminated with plutonium. This is permitted by OSP 332.41 Section 5.3.9.

  - The second situation was work being performed in fume hoods with high face velocities. The range of hood airflow velocities, as specified in the LLNL Industrial Hygiene standard, is to be 125 to 150 feet per minute. Hood airflow velocities were observed to be measured and accepted at velocities up to 200 feet per minute. These high velocities can cause a partial vacuum to be created in front of the worker, and the contaminated air inside of the hood may be drawn out into the breathing zone.

- See Section RP.7.

CONCERN: (RP.6-1) (H2/C2) LLNL practices such as wearing half-face masks and permitting high hood airflow velocities may not properly control potential internal radiation exposures.

FINDING:

- ANSI Z88.2 (Section 8.3) requires that respirators stored for emergency use be inspected monthly. This standard requires a physical examination of the equipment. Based on records posted at the emergency self-contained breathing apparatus stored in Bldg. 332, the monthly inspection consists of observing that the cylinder pressure is within range.

CONCERN: (RP.6-2) (H2/C1) Emergency respirator protection equipment is not being properly inspected in accordance with ANSI Z88.2.

FINDING: o Outdated respirators were found in storage areas in Bldgs. 175, 251, and 332.

CONCERN: See Concern IH.5-2.

FINDING: o General internal dosimetry policies and procedures are contained in the LLNL Internal Dosimetry Program Manual. Technical dosimetry information is contained in the draft copy of Technical Basis for Internal Dosimetry at LLNL. There are no procedures available to instruct personnel in the use of the collected data, the technical basis document, and computer system to calculate dose when significant internal exposures occur.

CONCERN: See Concern RP.1-2.

RP.7 INTERNAL RADIATION DOSIMETRY

PERFORMANCE OBJECTIVE: The internal radiation dosimetry program should ensure that personnel radiation exposures are accurately determined and recorded.

FINDINGS:

- The frequency and type of routine bioassay sampling does not permit the detection of 0.1 rem annual effective dose for some radionuclides. Urine bioassay samples are collected and analyzed on a semiannual basis. This frequency does not provide the sensitivity to detect certain radionuclides such as plutonium at the 0.1 rem level. For example, the DAL for Pu (weapons grade) is 4.5×10^{-3} dpm per 24 hour sample at a 6-month frequency while the minimum detectable activity is 3.0×10^{-2} dpm per 24-hour sample.
- Fecal bioassay sampling is not routine. Such sampling is conducted only during known or suspected uptakes.
- LLNL personnel indicated that air monitoring is used to establish possible uptake and to trigger more frequent bioassay measurement.
- See Section RP.9 and Concerns RP.6-1 and RP.9-1.

CONCERN: (RP.7-1) (H2/C1) The bioassay sampling frequency and type, in combination with the air monitoring program, may not detect internal exposures to all radionuclides at the levels specified in the DOE draft Performance Standards for Internal Dosimetry Programs.

FINDINGS:

- The quality assurance and quality control programs for the Wholebody Counting and Counting Laboratories are being updated to meet the requirements of ANSI N13.30 (Section 5.0).
- See Concern QV.1-1.

CONCERN: (RP.7-2) (H2/C2) The LLNL internal radiation dosimetry program does not meet the requirements of ANSI N13.30 for quality assurance and quality control.

RP.8 FIXED AND PORTABLE INSTRUMENTATION

PERFORMANCE OBJECTIVE: 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:

- The calibration and maintenance of fixed and portable instrumentation does not satisfy all parts of the ANSI Standard. Exemption requests for some specifications were submitted on April 17, 1989, and November 8, 1989. No responses to the exemption requests have been issued. The following are examples of specific findings which do not satisfy ANSI Standards or good industry practices:

  - Dose rate instruments are not source checked before each use as recommended by ANSI N323 (Sections 4.73 and 4.6). Check source devices are on order for these instruments.

  - Instruments are not labeled with the response to a given check source immediately following calibration as required by ANSI N323 (Sections 3 and 4.6) and this source may not be used with that instrument as required by Section 4.5(5) in the field.

  - Efficiency checks are conducted in the field rather than the ± 20 percent response to the check source as required by ANSI N323 (Section 4.6). There is also no limit specified for determining when the instrument is out of calibration.

  - The method of developing transfer instruments does not satisfy the ± 2 percent reproducibility requirement of ANSI N323 (Sections 5.1(1) and (2)) for the remmeter.

- Other miscellaneous findings associated with instrumentation follow:

  - Procedures do not address tagging out defective equipment or determining the impact of operating with out-of-calibration equipment upon discovery.

  - The "Operating Instruction" for the "Giraffe" air samplers only requires more oil to be added to maintain pump oil levels. The manufacturer recommends changing the oil and flushing the pump periodically. There is no well-defined preventive maintenance program for air samplers.

  - The mechanical timer associated with the "Giraffe" air sampler is not calibrated or tested for accuracy. An error in the collection time could lead to errors in determining airborne concentrations.

  - There is no definite recalibration frequency specified for the air samplers in the "Operating Instruction." The instruction states: "approximately once a year."

- The "Operating Instruction" also does not require calibration before first use.

- There were long overdue calibration stickers attached to the air samplers and rotometers stored in the Instrument Laboratory.

- The date on the calibration sticker was erased and redated on an air sampler in the Instrument Laboratory.

o See Concern QV.4-1 and Sections MA.2 and RP.9.

CONCERN: (RP.8-1) (H2/C2) The calibration and maintenance for some of the fixed and portable instrumentation do not satisfy all requirements in ANSI Standards and good industry practices.

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.

FINDING:

- The following observations were noted on the air monitoring systems for the internal exposure control program:

  - The maintenance and calibration program for some air sampling and analysis does not satisfy ANSI Standards and good industry practices. (See Concern RP.8-1.)

  - The passive air sampler and continuous air monitors (CAMs) do not appear to be properly placed to ensure the collection of a representative workplace air sample. An air flow characterization study was provided for one facility, Bldg. 332. The study indicated that airflow patterns were unpredictable and recommended placement of CAMs near the room exhaust. The study only considered the placement of CAMs and not the passive air sampler.

  - The present CAM placement (generally near the room exhaust) tends to emphasize general air monitoring rather than representative workplace monitoring.

  - No breathing zone air samplers are used in the radiation environment. Breathing zone air samplers can provide more definitive information on the airborne concentrations experienced by an individual worker.

  - There is no alpha or beta absorption factor used in the analysis of swipe and air sample filters.

  - The CAMs are not set to alarm at less than 8 DAC-hours of exposure as required by DOE 5480.11. DOE is planning to modify the standard to permit alarm setpoints to be adjusted higher based on known background interference.

CONCERN: (RP.9-1) (H1/C1) The air monitoring systems may not reliably provide the information needed for an effective internal dose control program.

RP.10 RADIATION MONITORING/CONTAMINATION CONTROL

PERFORMANCE OBJECTIVE: The radiation monitoring and contamination control program should ensure worker protection from radiation exposure.

FINDINGS:

- o Some of the general radiation practices do not ensure control of contamination. The following examples were noted:
  - Three pairs of torn shoe covers were worn repeatedly in Bldg. 251.
  - Radioactive liquid standards were stored in glass on a high shelf in the Analytical Laboratory, requiring the use of a stool in order to remove them. The liquid was stored without absorbent material.
  - A can containing UO_2 indicated a dose rate reading of 10 mrem/hr as read by the GM instrument. The reading was reverified with an ion chamber to read 2.5 mrem/hr. There was no indication of the dose rate on the can. The user also was not informed about the dose rate.
  - A hood in the Analytical Laboratory has a sink which drained to the sanitary sewer system. Radioactive material was stored in the hood.
  - Radioactive waste containers were not labeled with a radiation sticker or expected dose rate.
  - A radiation label was found in sanitary trash at Bldg. 175.
- o See Concern OA.5-3.

CONCERN: (RP.10-1) (H2/C2) Some work practices in a radiation environment do not ensure proper radiation control.

FINDINGS:

- o The October 1, 1986, instructions above the swipe counter indicate that if the area wiped is significantly less than 100 cm^2, the swipe must be read with a swipe counter. The minimum detectable activity (MDA) for the counter is approximately 20 dpm assuming a 20 percent efficiency. The release limit on smearable alpha contamination is 20 dpm/100 cm^2. Any reduction in the area smeared would decrease the detection capability of the instrument below the release limit.
- o There is no lower limit specified for the efficiency of the swipe counter. The Swipe Counting Manual indicates an efficiency of "approximately 10 percent" for alpha. If the efficiency were 10 percent, then the MDA would be 40 dpm.
- o See Concern OA.5-3 and Section PT.6.

CONCERN: Swipe counting procedures may allow the release of equipment above the smearable release limit specified in DOE 5480.11.
(RP.10-2)
(H2/C1)

RP.11 ALARA PROGRAM

PERFORMANCE OBJECTIVE: A formally structured, auditable program should be in place with estimated milestones to ensure that exposures are maintained as low as reasonably achievable (ALARA).

FINDINGS:

- o A member of the LLNL Safety Team was observed using a dolly carrying a number of shipping canisters containing radioactive materials to record data.
- o An excessive distance was permitted for air transfer from the shipping cask to the glovebox.
- o The hands were in contact with the samples during the removal of the sample containers from the plastic bags.

CONCERN: (RP.11-1) (H2/C2) The ALARA principles were not incorporated during the handling and processing of the samples.

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:

- o Some occupational radiation exposure records such as logbooks, exposure analyses, calibration records, and computer codes are maintained in an unprotected, decentralized fashion.
- o There is no centralized system or procedure for ensuring that all occupational radiation exposure records are properly collected, stored, and retained.
- o Portable survey instrument calibration procedures indicate that the records <u>should</u> be maintained for 5 years, then added to the history file for the instrument.
- o The IH Instrument QA Manual states that unless otherwise specified in writing, all records are to be kept for a period of not less than 30 years.

CONCERN: (RP.12-1) (H3/C2) Occupational radiation exposure records are not collected, stored, and retained in accordance with a uniform procedure or system.

4.5.15 Industrial Hygiene

4.5.15.1 Overview

This Appraisal addresses all six Performance Objectives in the Industrial Hygiene area. The Appraisal of the industrial hygiene program included review of program documentation, technical information exchange, and validation of performance. Review of the industrial hygiene program documentation included LLNL policies, procedures, and program documentation such as technical manuals. The adequacy of technical and technical/management information exchange was assessed by selective review of consultant and internal reports, DOE-SAN and LLNL self-assessment appraisals, available technical data such as chemical exposure monitoring reports, and interdepartmental correspondence. Interviews with industrial hygiene and safety personnel, medical staff, line management, research and crafts staff members; facility orientation tours; audits of records; observation of an emergency drill; and specific worksite visits were used to identify and/or validate LLNL performance in various program areas. There is considerable overlap in Industrial Hygiene (IH) and Occupational Safety (OS) Programs; to avoid redundancy in assessment and reporting, the IH and OS sections of this Appraisal should be considered an overall assessment of the nonradiological personnel protection programs at LLNL. Findings and/or concerns noted in either the OS or IH program are applicable to the overall LLNL Personnel Protection Program.

The 47 facilities inspected were selected to permit observation of various operational activities including laboratory research, crafts shops and support facilities, and unique applied technology (e.g., the High Explosive Applications Facility). The facilities inspected were determined to adequately represent the scope of operations and potential hazards at LLNL. Facilities inspected included the following locations: Bldgs. 221, 222, 223, 224, 225, 277, 175, 331, 322, 329, 292, 197, 332, 151, 361, 365, 366, 432, 242, 865, 827, 826, 825, 852, 801, 851, 817, 873, 876, 875, 879, 874, 871, 899, 828, 806, 810, 805, and 191.

The main site industrial hygiene program is clearly and appropriately demonstrated to be a line management responsibility. The matrix management system resulted in line accountability for essentially every operational activity including Site 300. Operational activities at Site 300 along with several main site activities were in an "operational standdown" that precluded formal operational task analysis for some operations during the assessment period. Therefore, the Site 300 personnel protection program review was integrated into the concurrent assessment of industrial hygiene and occupational safety programs at the main site. All findings and concerns identified were equally applicable to Site 300 and the main site.

Several concerns identified during the Appraisal warrant implementation of corrective action to enhance specific elements of the industrial hygiene program. One of the more significant concerns identified during the Appraisal involves the need for additional specialized training for the Health and Safety Technicians. This concern has been identified by LLNL and a corrective action plan has been developed along with a new training program. Another significant concern relates to the need for a sitewide health hazard evaluation and control program. Finally, a concern was noted regarding

compliance with all the stated provisions of the Hazard Communication Standard, 29 CFR 1910.1200.

The major causal factors of the current deficiencies can be summarized in three general categories as follows:

- Lack of effective independent oversight of program health and safety-related activities,
- Lack of consistency between program divisions for health and safety implementation, and
- Lack of early and mandatory involvement of technical health and safety personnel in operational/research activities.

In summary, line management appropriately assumes accountability for industrial hygiene responsibilities. The LLNL industrial hygiene program is staffed by technically qualified support personnel who have been effective in developing and implementing programs within the limitations of available resources. Moreover, there is no evidence of acute or chronic disease in the LLNL population due to exposures to chemical or physical agents in excess of that observed in similar operations elsewhere. The industrial hygiene program has been effective in ensuring employees are provided a generally safe and healthful workplace.

4.5.15.2 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:

- The Industrial Hygiene (IH) technical staff requirement is currently estimated by LLNL to require approximately 15 FTE positions. Currently, 3 of the 15 FTE positions are vacant and 2 additional staff member has accepted an intradivision transfer to another organization, resulting in 5 of 15 FTE vacancies in the IH organization.

- Plans are being made to fill the open positions in the Industrial Hygiene organizations as soon as possible. The availability of professional industrial hygiene support is important, considering the technical and training responsibilities assigned to the staff industrial hygienist.

CONCERN: (IH.1-1) (H2/C2) Industrial hygiene professional support to the Health and Safety Teams has not been sufficient to ensure effective identification and control of potential health hazards in the workplace.

FINDINGS:

- Implementation of IH program elements, such as routine personal employee monitoring, is commonly delegated to facility Health and Safety Technicians (HSTs). The HSTs are similarly relied upon to support other health and safety program elements. Specialized training provided to the HSTs has not been sufficient to ensure a consistent and effective Health and Safety Protection program throughout the facility. Revisions to the HST training program have been developed and are expected to be fully implemented by the end of FY 90.

- Twenty percent of the HSTs have not completed the advanced Health and Safety Training course. In addition, necessary retraining of the majority of the technicians has yet to be completed to ensure effective implementation of the industrial hygiene program.

CONCERN: (IH.1-2) (H2/C2) A significant number of Health and Safety Technicians have not been provided sufficient industrial hygiene training to ensure consistent implementation of the industrial hygiene program.

FINDINGS:

- There is evidence of insufficient early and/or mandatory involvement of technical health and safety personnel in routine operational/research activities. The following examples illustrate typical activities observed that reflect a lack of direct technical health and safety review and/or participation:

  - A bank of compressed air cylinders had been placed in use as breathing air without assurance that the air met Grade "D" criteria as required for breathing purposes.

- An exhaust ventilation hood was being constructed in the welding shop for which there had been no disciplined review; the hood did not meet American Conference of Governmental Industrial Hygienists (ACGIH) Ventilation Manual requirements (DOE-prescribed standard).

- Environmental assessment personnel responding to hazardous material incidents do not have the training required by OSHA (29 CFR 1910.120).

- Industrial hygiene personnel monitoring, in the machine shop of Bldg. 151, was not completed as recommended by good practice guidelines and prescribed by DOE 5480.10. The assigned technician did not provide necessary calibration of the sampling train during the course of a 4-week-long workplace evaluation.

o LLNL has published excellent reference documents such as the Health and Safety Manual and its associated Supplements; however, these documents require knowledgeable application guidance by technical health and safety personnel to assure compliance with their intent.

CONCERN: (IH.1-3) (H2/C1) Health and Safety Technicians are not sufficiently involved in routine operational research activities to minimize potential hazards or monitor the effectiveness of controls.

FINDINGS:

o LLNL has clearly and appropriately assigned health and safety program implementation as a line management responsibility. The LLNL matrix management system inherently results in two lines of management accountability; specifically, the Program (e.g., funding organization) and Program Support (e.g., LLNL work force) management lines. Since each "Project" at LLNL has an essentially unique matrix organizational makeup, each "Project" has unique line management structures.

o LLNL personnel routinely perform work in multiple facilities and on/for various programs; it is common for some work to be performed in such a manner on a daily basis.

o The LLNL IH program resources are a component of the Hazards Control Division and serve LLNL organizational units as technical consultants. IH is a component of the LLNL Safety Teams which serve as the principal coordinating unit for technical health and safety support services to various facilities. LLNL "programs" or "projects" may be served by multiple Safety Teams if several facilities are involved. The IH personnel, like all members of the Safety Teams, support but do not direct implementation of health and safety programs on an operational basis.

- Observations during the assessment period indicated significant differences in the implementation of specific health and safety program elements on a project-by-project and facility-by-facility basis. Examples include:

  - Implementation of the Hazard Communication Program (e.g., practices regarding use of facility/room posters for hazard inventory/identification; location, source, and completeness of Materials Safety Data Sheets (MSDSs) for chemical inventories; level of employee awareness of potential chemical hazards). The LLNL construction safety program had not included implementation of the hazard communication requirements of 29 CFR 1910.1200, although it is an OSHA-prescribed construction industry standard.

  - Implementation of the Respiratory Protection Program for employees assigned to the Laser Program utilizes relatively stringent operational controls and well-defined lines of communication and approval procedures. In contrast, the Hazardous Waste Management operation utilized relatively ineffective program controls, accountability, or approvals for personnel usage.

- Within the Hazards Control Division, several permit systems have been implemented to assist in the implementation of hazard controls at LLNL. These include, but are not limited to, permits for confined space entries (e.g., potential oxygen for deficiency and/or toxic gas exposure) and high fire risks (e.g., welding, open burning, use of flammable gases). The permit for high fire risks is called a "Hazardous Work Permit," but is limited only to fire risks; there is no coordination of this generically titled permit to other significant potential hazards.

- See Concern OA.5-3.

CONCERN: (IH.1-4) (H2/C2) LLNL does not have controls or effective procedures in place to facilitate consistent interpretation and implementation of the industrial hygiene program across organizational units.

IH.2 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Procedures and documentation should provide appropriate direction, record generation, and support for the industrial hygiene program.

FINDINGS:

- o A sitewide ALARA policy for nonradiological health hazards has been developed and implemented by LLNL.
- o The main site health and safety policies are delineated in the Health and Safety Manual. Facility Safety Procedures (FSPs) or Operational Safety Procedures (OSPs) are prepared for specialized activities or operations which have potentially significant health hazards. LLNL has not developed OSPs as required for some potentially hazardous operations. For example, in Bldg. 222, Room 1117, methylene dianiline, a suspected carcinogen, was stored without an OSP or evaluation in place.
- o Industrial hygiene sampling equipment and air cleaning devices are maintained according to manufacturer specifications and accepted operational guidelines. Contrary to DOE 5480.10, documentation of calibration and maintenance procedures has not been provided for industrial hygiene equipment used throughout the main site.
- o See Sections FR.3 and OA.5.

CONCERN: (IH.2-1) (H2/C1) LLNL has not consistently implemented operational safety procedures to ensure that potential employee exposures to chemical and physical agents are maintained at levels consistent with the ALARA goals for the main site or with DOE 5480.10.

IH.3 MANAGEMENT OF HEALTH CONCERNS

PERFORMANCE OBJECTIVE: Chemical, biological, physical, and/or other environmental stresses arising in the work place should be identified, evaluated, and controlled.

FINDINGS:

- Many workplace operational activities have formally completed thorough and comprehensive health hazard inventories. However, contrary to the requirements of DOE 5480.10, some health hazard inventories have not been prepared for main site operations which may involve potential employee exposure to physical, chemical, and biological agents.

- The main site industrial hygiene staff and Health and Safety Technicians have assigned responsibilities for characterizing the extent of the health hazard using appropriate professional judgment and analytical sampling methods.

- A total of about 19,000 samples a year are analyzed by the Industrial Hygiene analytical laboratory. Most of the analytical work is completed in support of the R-Program employee surveillance program (10,000 samples). Analysis of beryllium swipes and area samples (5,000 samples) is also a high priority of the analytical laboratory. The remaining samples are analyzed in support of the ongoing industrial hygiene program or the environmental monitoring and surveillance program.

- Several operations at the main site involving the use of potentially hazardous chemical or physical agents were not monitored to establish baseline exposure levels or validate the operational effectiveness of engineering controls. Areas to be evaluated include, but are not limited to, the following operations:

  - Salt leaching operation using Butyl alcohol in Bldg. 222, Room 1015,

  - Silver soldering operations located in the basement of Bldg. 151, and

  - Generation of an electromagnetic field near a test station located in Bldg. 131, Room 1432.

- Employees who are in the personnel monitoring program are notified through the line supervisor. Exposures in excess of the allowable OSHA standards are directly forwarded to the Medical Department for inclusion into the individuals medical record.

- Contrary to DOE 5480.10, industrial health hazard evaluations and exposure data are not readily accessible to the Occupational Medical Department, with the exception of the R-Program. LLNL is currently developing a data management system to enhance the

exchange of information and provide a basis for necessary trending work of industrial hygiene records.

- See Sections EP.7 and OP.1.

CONCERN: (IH.3-1) (H2/C1) LLNL has not implemented a uniform health hazard evaluation, control, and tracking program for potential sitewide health hazards.

FINDINGS:

- The Hazards Control Department initiated a sitewide study evaluating the use of different types of personal protective control devices (i.e., respirators, gloves, laboratory coats, coveralls, etc.), specified for sitewide protection involving potentially toxic chemical operations.

- Several potential areas of concern involving the use of protective clothing were identified during the Appraisal. Examples include, but are not limited to, the following:

  - Shop coats and shoe coverings in the beryllium (Be) operations of Bldg. 321, and

  - Protective gloves recommended for use in solvent operations in Bldg. 222, Room 1024.

- The draft DOE 5480.10 addresses specific requirements for the use of protective clothing for Be operations.

CONCERN: (IH.3-2) (H2/C2) Operations at LLNL involving potential exposure to toxic agents and chemical carcinogens [i.e., metals (Be), solvents, and amine-based curing agents] are not evaluated in light of current personal protective equipment guidelines.

IH.4 SURVEILLANCE OF HEALTH CONCERNS

PERFORMANCE OBJECTIVE: Appropriate surveillance of activities should be conducted to measure industrial hygiene performance and ensure the continued effectiveness of controls.

FINDINGS:

- Exhaust ventilation systems are surveyed on a scheduled basis. The frequency for the evaluations is scheduled based on the assigned hazard potential rating; i.e., high hazard exhaust ventilation systems are evaluated quarterly, and monthly smoke tests; low hazard exhaust ventilation hoods are evaluated yearly, and monthly smoke tests. Acceptance labels are generally posted on the front of the exhaust ventilation system.

- Several chemical fume hoods evaluated during the Appraisal are equipped with visual indicators of operational performance. Visual indicators are used on several new hood installations and laboratory fume hoods which require the use of chemical carcinogens. Implementation of a consistent program for the use of the visual indicators was not evident in operations reviewed during the Appraisal.

CONCERN: (IH.4-1) (H2/C2) The main site has not developed criteria for continuous performance-based indicators for high hazard exhaust ventilation systems.

IH.5 COMPLIANCE WITH OCCUPATIONAL HEALTH STANDARDS

PERFORMANCE OBJECTIVE: Site/facility operations comply with DOE-prescribed standards for the evaluation and control of occupational health standards.

FINDINGS:

- o LLNL asbestos abatement procedures require the use of ongoing controls to ensure that exposures are maintained below both the recommended OSHA compliance level and the internal ALARA goal for the facility. There was one instance observed where vinyl asbestos floor tile was removed contrary to the internal LLNL asbestos abatement procedures. Vinyl asbestos tile was removed in Bldg. 331, Room 135, without use of appropriate controls or recommended asbestos disposal practices. (Tile being removed was subject to specific radiological waste disposal procedures.)

- o A quantity of vinyl asbestos tile was found in a main site dumpster. The tile had been disposed of in the dumpster without the use of approved containment prescribed in the LLNL asbestos abatement procedure. There was no indication regarding the origin of the tile.

- o LLNL is conducting a field study to evaluate the significance of potential exposure to asbestos-containing materials used during maintenance performed on vinyl asbestos tile floor surfaces. No exposure information was available for employees who were involved in the two incidents referenced above.

CONCERN: (IH.5-1) (H2/C2) The LLNL implementation of a comprehensive asbestos control program is not consistent with internal LLNL guidelines and requirements of the ALARA program.

FINDINGS:

- o Documentation and technical aspects of the respirator protection program are appraised annually by internal and external experts consistent with the provisions of the prescribed DOE Standard, ANSI Z88.2. However, the Appraisal program does not include an in-depth evaluation of the usage and workplace practices of respirators used throughout the main site.

- o Several respirator program deficiencies were observed during the review. Specific examples are listed below:

  - Three respirators were found in a storage cabinet in Bldg. 331. The timely return of respirators is not consistent with LLNL operational respiratory protection procedures.

  - A box of 3M 8710 respirators was observed on a bench top located near dust-producing operations in the high-bay area of Bldg. 131. There was no indication of the assigned responsibility for approval for use of the respirators as required by the prescribed standard ANSI Z88.2.

- A respirator storage area in Bldg. 611 was not controlled as recommended in the internal respiratory protection guidelines.

o A program has been initiated to review workplace implementation of the LLNL respiratory protection program. Comprehensive reviews of the respiratory program have been completed in Bldgs. 332, 175, and 177. Plans have been made to complete the comprehensive review of the respirator program for the remainder of the main site by the end of FY 91.

o See Section RP.6.

CONCERN: (IH.5-2) (H2/C2) LLNL has not completed a sitewide review of respirator usage, as recommended in the prescribed DOE standard, ANSI Z88.2.

IH.6 PERSONNEL COMMUNICATION PROGRAM

PERFORMANCE OBJECTIVE: Site/facility personnel should be adequately informed of chemical and biological stresses that may be encountered in their work environment.

FINDINGS:

- LLNL has not implemented an effective program for the receipt and distribution of Materials Safety Data Sheets (MSDSs) at LLNL. Accessibility and availability of MSDS in selected areas was not consistent throughout LLNL. An example of the need for an effective receipt and distribution program was observed in HEAF (Bldg. 191). Near machine shop 1140, a table reference library contained over 15 volumes of MSDSs; few of which reflected materials actually in the shop. The first two trade name products (Kool Mist and Mobil 350) picked up in the work area did not have MSDSs available. These materials are common machine cutting/cooling oils and are in daily use.

- Inventory control is also essential to effective chemical hazard management. For example, LLNL has a dating and shelf life policy for peroxidizable materials (such materials potentially form unstable chemical compounds); however, an undated bottle of tetrahydrofuran was observed in Bldg. 827-C. The bottle had exceeded LLNL-prescribed shelf lives for both opened (shorter life) and unopened containers. It was unsafe to test the cap to determine if the bottle had previously been opened.

- The inventory of chemicals and chemical compounds subject to some regulatory identification and management requirements at LLNL is in the thousands. In addition to OSHA standards for employee hazard communication, EPA standards (e.g., SARA Title III) require very specific "community right to know" reporting.

- LLNL has assembled a "task force" to identify needs and recommend chemical inventory and information management action plans; a draft document has been prepared and is waiting management review. LLNL has been aware of general chemical inventory management information needs, and promulgating standards, since the early 1980s.

- A significant number of chemical containers were not labeled as to content or did not have appropriate hazard warning information. In Bldgs. 241, 231, and 321, for example, beryllium operations and containers used a label stating "Contains Beryllium." However, the LLNL Health and Safety Manual Supplement 21.10 for beryllium recommends the use of a label to warn of the long-term health effects associated with beryllium exposure, particularly the potential for respiratory effects.

- Several different types of labels were used to identify hazardous chemicals in the workplace.

- A number of employees interviewed did not have a specific knowledge of health hazards or measures to protect themselves from chemicals they used routinely.

CONCERN: (IH.6-1) (H2/C2) LLNL has not fully implemented all elements of the OSHA Hazard Communication Standard, 29 CFR 1910.1200, particularly those aspects of the Standard related to availability of Materials Safety Data Sheet (MSDS) labeling requirements, and maintenance of chemical inventory.

4.5.16 Occupational Safety

4.5.16.1 Overview

The Occupational Safety portion of this Appraisal addressed all six Performance Objectives for the Occupational Safety area. The information developed during the course of the Appraisal resulted from personal observations, reviews of existing documentation, and interviews of staff and operating personnel. Input from the associated OSHA Appraisal provided additional insight into the state of safety programs at LLNL.

During the Appraisal, walkthrough inspections were conducted in Bldgs. 125, 161, 162, 171, 175, 177, 179, 191, 197, 214, 232, 292, 310, 312, 321, 322, 326, 327, 329, 332, 335, 411, 418, 490, 511, 516, 520, 611, 624, 801, 805, 806, 810, 817, 825, 826, 827, 828, 851, 852, 363, 871, 873, 874, 875, 876, 879, 899, 4177, and 4230. Facilities inspected included maintenance areas, laboratory areas, program areas, and administrative areas. Documentation reviewed included laboratory manuals, Facility Operating Procedures, Operational Safety Procedures, technical reports, and LLNL self-assessment appraisals in addition to LLNL correspondence. Interviews conducted involved both technical personnel from the safety-related disciplines and representatives from the facilities and related programs.

One of the Appraisal Team's findings in Organization and Administration relates to the concept of independent oversight for health and safety-related activities. The current LLNL Safety Team concept did not provide the necessary level of independent oversight. A second concern addressed errors in the data going into the OSHA Log 200 form. There are insufficient controls to assure that the data going into the report are correct.

In the Performance Objective of procedures and documentation, the LLNL system consisting of the Health and Safety Manual, Supplements, Facility Operating Procedures, and Operational Safety Procedures was found to be very appropriate. Several situations were observed, however, where the system had not been fully implemented. One situation involved the lack of documented procedures in the vehicle maintenance area.

In examining LLNL procedures and practices for surveillance of safety concerns, it was observed that the documented construction safety program was ineffective. This determination was based on the observation of significant numbers of OSHA-related inconsistencies at nearly every construction site visited. Because of the numbers and types of inconsistencies observed, this situation was determined to represent a Category II concern.

The majority of findings and concerns developed during the portion of the Appraisal related to Compliance with Occupational Safety Standards. The findings and resulting concerns represent those situations which were characteristic of the state of the safety program at the time of the Appraisal. With one exception, all the concerns relate to industrial hazards common to industry. The one exception was in how the OSHA requirements for hoists relate to the glovebox activities in Bldg. 332. Although OSHA requirements in 29 CFR 1910 apply to all industry, including LLNL, the issues associated with operating, inspecting, and maintaining hoists inside plutonium gloveboxes present unique challenges which will have to be addressed.

Even though a number of concerns were documented during the course of this Appraisal, LLNL still has a good overall safety performance record in comparison to both general industry and other DOE laboratories. LLNL has successfully demonstrated that it can maintain an accident, injury, and illness rate below what general industry is able to achieve. Wherever possible, safety deficiencies observed by the Appraisal Team were corrected immediately by LLNL management.

LLNL management recognizes its responsibility to support and maintain an occupational safety program to ensure its employees a safe and healthful workplace.

4.5.16.2 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:

- o Facility tours demonstrated a lack of consistency between program divisions/facilities for health and safety program implementation. (See Concern IH.1-2.)
- o LLNL recently retained the services of a consulting engineering firm to conduct similar compliance-type inspections of LLNL facilities. This program has been effective in significantly reducing OSHA compliance items; however, the inspections are limited to facilities and equipment and do not include health and safety programmatic elements (e.g., hoisting and rigging, respiratory protection, record keeping, hazard communication) assessments or Appraisals. The inspections are generally limited to OSHA standards and do not address compliance with other DOE-prescribed standards.
- o In high and moderate hazard facilities, annual facility inspections are conducted by the same LLNL Safety Team members that provide the technical support services on a regular duty assignment basis. Low hazard facilities are similarly inspected but on a much less frequent schedule. There are no other Appraisals/inspections of the facilities by technical health and safety personnel employed by LLNL.
- o See Concerns OA.2-1 and QV.1-1.

CONCERN: (OS.1-1) (H2/C2) LLNL has not implemented an effective independent oversight program for health and safety-related activities.

FINDING:

- o The LLNL OSHA Log 200, the basic source document maintained for recording occupationally related injuries and illnesses, is maintained by the Industrial Safety component of the Hazards Control Division. This document includes requirements for recording injury or illness severity by days of lost or restricted work activity. Entries into the log were incorrectly coded in 0.2 percent of the entries. Consequently, some erroneous data have been forwarded to DOE/DOL. Informal systems for verifying accuracy do exist and errors are usually caught in review of statistical summary reports; however, this does not meet the intent of DOE directives, OSHA standards, or accepted management practices.

CONCERN: (OS.1-2) (H3/C1) LLNL administrative procedures for recording occupationally related illnesses do not ensure that all data reported to DOE/DOL are correct.

OS.2 PROCEDURES AND DOCUMENTATION

PERFORMANCE OBJECTIVE: Procedures and documentation should provide appropriate direction, record generation, and support for the occupational safety program.

FINDINGS:

- The LLNL Health and Safety Manual, requires operational safety procedures (OSPs) to be prepared for operations involving specified hazards. However, implementation of this requirement has been inconsistent:
  - There were no OSPs for inflating single and multi-piece rimmed wheels as required by 29 CFR 1910.177.
  - There were no OSPs for ensuring wheel component acceptability as required by 29 CFR 1910.177.
  - Asbestos-related maintenance and construction work was being performed without an OSP.
- See Concern OA.5-3.

CONCERN: (OS.2-1) (H2/C1) Some hazardous activities are performed without written Operational Safety Procedures even though these are required by LLNL and/or mandatory requirements.

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:

- Construction personnel were observed working repeatedly under multiple structural members which were suspended by a crane. Construction personnel were observed working intermittently under suspended loads at two other construction sites.
- Construction escort personnel were observed on two occasions during the Appraisal working inside construction areas without head protection as required by 29 CFR 1926.100.
- Improper storage of flammables was a common noncompliance item at construction sites.
- Fire protection practices at several construction sites were not in conformance with 29 CFR 1926.150 and 29 CFR 1926.151.
- The LLNL construction safety program does not address written hazard communication program requirements in accordance with 29 CFR 1926.59.
- Construction personnel were observed working without the benefit of either ground fault circuit interrupters (GFCIs) or an assured grounding conductor program as required by 29 CFR 1926.404.
- Contractual agreements with construction companies contain clauses requiring contractors to adhere to industry safety regulations. However, there is no documented procedure for penalizing contractors for failure to comply.
- LLNL has only one safety engineer assigned to approximately $140 million in construction projects.

CONCERN: (OS.4-1) (H1/C1) CAT. II

Plant Engineering controls over construction activities are not effective in ensuring that construction work conforms to OSHA requirements in 29 CFR 1926.

OS.5 COMPLIANCE WITH OCCUPATIONAL SAFETY STANDARDS

PERFORMANCE OBJECTIVE: Work places should be free of uncontrolled physical safety concerns and be in compliance with DOE-prescribed occupational safety standards.

FINDINGS:

- Portable ladders at the site were not maintained in accordance with 29 CFR 1910.25. Deficiencies noted included:
  - Missing or damaged safety feet,
  - Loose hardware and fittings,
  - Splinters, and
  - Decay and severe weathering.
- Current work practices involving the use of the lock and tag procedures did not conform to the requirements of 29 CFR 1910 or the LLNL Health and Safety Manual. Deficiencies noted included:
  - Failure to adequately secure tags in accordance with 29 CFR 1910,
  - Unreadable "Danger" or "Caution" wording due to fading, and
  - Inappropriate use of both "Caution" and "Danger" tags.
- Electrical installations and modifications received insufficient review to ensure that they would conform to the National Electrical Code and to 29 CFR 1910. Deficiencies noted included:
  - Standard outlets were frequently used in locations near sinks where GFCIs were required and some GFCIs were found to be nonfunctional.
  - Nonhardened wiring was frequently used in permanent installation of experimental and building equipment.
  - Rigid electrical conduit was frequently used to support cable installations in older buildings such as Bldg. 511. This practice is contrary to the National Electrical Code.
  - Temporary wiring was observed to have been used where permanent wiring was required by the National Electrical Code.
- Fire extinguishers are not being visually inspected in accordance with OSHA requirements. Deficiencies noted included:
  - A number of fire extinguishers were observed during the Appraisal as not being mounted, not having signage, and/or being blocked.

- LLNL Safety Team action plans were observed to require visual inspection of fire extinguishers semiannually.

- Fire extinguishers were visually inspected semiannually in some areas rather than monthly as required by 29 CFR 1910.157.

o LLNL controls covering portable power tools and extension cords were not effective in ensuring that power cords and extension cords were in good condition. Deficiencies noted included:

  - Many shop-made cords with multiple outlets were present, both in operating/maintenance areas and at construction sites.

  - A significant number of flexible power cords from tools and equipment, and extension cords were found to be cut or frayed through to the conductors.

o Hoists in Bldg. 332 did not conform to documented requirements for inspection and certification. Deficiencies noted included:

  - Hoisting devices in Bldg. 332 were not receiving documented monthly inspections as required by 29 CFR 1910.179.

  - There was not yet a documented program for inspection and preventive maintenance of powered platforms, and hoisting and rigging devices in Bldg. 332.

CONCERN: (OS.5-1) (H1/C1) The LLNL practices for ladder inspections, electrical installation and modifications, fire extinguisher inspections, portable power tool and cord inspections, and hoist inspections have not been effective in meeting DOE-prescribed occupational safety standards.

4.5.17 Fire Protection

4.5.17.1 Overview

This Appraisal concentrated on all seven Performance Objectives in the Fire Protection area. Buildings visited at the main site include Bldgs. 111, 113, 114, 115, 116, 117, 131, 191 (HEAF), 194, 221, 222, 223, 224, 227, 231, 233, 251, 281, 292, 321, 313, 323, 324, 331, 332, 334, 412, 419, 436, 490, 492, 511, 513, 514, 520, 612, 614, 620, and several tents and trailers. Buildings visited at Site 300 during this Appraisal included Bldgs. 801, 817, 865, 870, 871, 872, 873, 874, and 875. The Appraisal included interviews with the Fire Protection Engineering Group in Hazards Control Health and Safety Division, Hazards Control Fire Safety Division, Plant Maintenance and Operations Division, and facility managers. A review of the associated DOE and nationally recognized fire protection standards was also conducted during the Appraisal.

The fire protection program at LLNL could be substantially improved. There is no apparent management structure which directly encompasses and is accountable for the entire fire protection area. Several different groups at LLNL are involved with the fire protection concerns, but there is no one group or persons to oversee these groups to assure that all the fire protection and associated life safety concerns are addressed consistently and effectively. Under the present situation, one group can adversely affect the other groups without realizing this is happening.

The Fire Protection Engineering Group in Hazards Control Health and Safety Division is chartered with an oversight function for assuring adequate fire protection is designed and installed. The efforts of this group are directed by the Operational Safety Division LLNL Safety Team Leader. A possible conflict of interest arises in this situation because most of the funding for the group and associated LLNL Safety Teams comes from the organizations for which they provide the oversight.

LLNL Hazards Control Fire Safety Division maintains a three-person, full-time, paid Fire Department at Site 300. The training and equipment for the Site 300 department appear to be in basic compliance with the requirements of the National Fire Protection Association (NFPA). However, the department is considered to be inadequately staffed for emergency response situations involving interior structural fire fighting. This conclusion is based on the DOE interpretation of NFPA-1500, A-6.2.1, which requires five people to be available to fight an interior structural fire. Presently the crew must stage outside the structure, and not enter until backup personnel arrive. An exemption to this rule was requested. It takes approximately 15 to 20 minutes before a full crew is available at Site 300 (main area) and another 10 to 15 minutes for the crew to reach the remote areas of Site 300.

NFPA and Occupational Safety and Health Administration (OSHA) requirements are not being met in several areas at HEAF (Bldg. 191) and Site 300. The primary areas of concern are the unapproved fire alarm system and the associated employee notification system.

Automatic notification of the buildings occupants is required in various areas at these facilities and at present does not occur. In addition, the existing

notification system does not meet the requirements of NFPA for voice notification or evacuation systems. Presently the fire alarm system is being upgraded using components that are not listed or approved for fire alarm service by a nationally recognized testing laboratory.

The effect of incorporating nonlisted or unapproved components is unclear, with the exception that it jeopardizes the system's reliability and creates potential interface problems when connecting it with other equipment from different manufacturers. Planning is also underway to update the fire alarm notification/evacuation system, based on the results of a recently completed 6-month trial study in three existing facilities.

4.5.17.2 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 divided among three main groups, who do not interact on a regular basis:
  - The Fire Protection Engineering Group of Hazards Control Health and Safety Division has limited oversight responsibilities, conducts design reviews, issues design guidance, and inspects facilities, as directed by the Operational Safety Division LLNL Safety Team Leaders, for compliance with applicable codes.
  - Hazards Control Fire Safety Division (Fire Department) conducts quarterly inspections of all facilities, issues Hazardous Work Permits, handles all fire protection impairments, conducts the annual fire extinguisher inspection and servicing, and responds to all plant emergency situations other than security.
  - The Plant Maintenance and Operations Division is responsible for the maintenance and testing of the fire alarm systems, water supply systems, sprinkler systems, and voice paging/evacuation systems.
- There is no review of the fire protection maintenance program records or the procedures used by the Plant Maintenance and Operations Division by the Fire Protection Engineering Group or the Fire Safety Division.
- No organizational element exists to meld the different organizations involved in the design, testing, and maintenance of fire systems into a cohesive group. Results and findings of the different organizations involved in fire protection are not routed to the other groups on a regular basis, nor is any one group looking at the entire picture to ensure that the requirements are met.
- To meet the bimonthly alarm testing requirement, the Fire Safety Division does quarterly testing, and the Plant Maintenance and Operations Division does semiannual testing. The two groups do not share the feedback with each other.
- Deficiencies noted during the Fire Safety Division's inspections have not been recorded and tracked on the Hazards Control Department computer tracking system, "HIRAC."
- See Section FR.2.

CONCERN: (FP.1-1) (H2/C1)

Because the fire protection program is divided among three separate groups, a unified fire protection program does not exist at the main site or Site 300 to meet the requirements of DOE 5480.7 and industry standard practices.

FP.2 LIFE PROTECTION

PERFORMANCE OBJECTIVE: All facilities on site should provide adequate life safety provisions against the effects of fire.

FINDINGS:

- Life safety features are not completely addressed in the entire LLNL complex:
  - Open stairwells were found in Bldgs. 873 and 874 at Site 300 and in Bldg. 114 at the main site.
  - An air compressor is installed over an open grating leading directly into the exit stairwell in Bldg. 865 at Site 300.
  - Doors leading onto the exit access corridors are not equipped with automatic closures or are blocked open in violation of the Life Safety Code and the Uniform Building Code.
  - The fire alarm notification systems at LLNL do not conform to the Life Safety Code and NFPA-72F.
  - East stairwell of Bldg. 874 at Site 300 has transformer and electrical panels located inside the enclosure in violation of the Life Safety Code.
- Exemptions to the exit requirement of DOE Explosive Safety Manual have been granted for Bldgs. 809, 827C, 827D, and 827E at Site 300. The reasons for the exemption were based on cost, with no apparent consideration for the Life Safety Code or the LLNL Health and Safety Manual.
- The DOE Explosive Safety Manual, Life Safety Code, Uniform Building Code, and the LLNL Health and Safety Manual are not in agreement on the exiting and travel distance requirements for explosive handling areas.
- The Conceptual Design Report for HEAF indicated that the Life Safety Code would be followed for exiting requirements, but the facility was designed according to the less stringent requirements of the DOE Explosive Safety Manual.

CONCERN: (FP.2-1) (H2/C1) The Life Safety Code analysis does not appear to have been followed precisely sitewide, to address the deviations from the existing requirements of the Life Safety Code, DOE Explosive Safety Manual, Uniform Building Code, and the LLNL Health and Safety Manual.

FP.3 PUBLIC PROTECTION

PERFORMANCE OBJECTIVE: All facilities on site should provide adequate protection to prevent any added threat to the public as the result of an onsite fire causing the release of hazardous materials beyond the site (or facility) boundary.

FINDINGS:

- There is no Final Safety Analysis Report (FSAR) for the entire site and no up-to-date FSARs for Bldgs. 251, 331, and 332 covering the possible fire scenarios for many of the buildings or the area.

- The FSAR for HEAF does not address the fire protection or life safety features built into the facility in sufficient detail. It could not be determined from this document which systems are critical and what they are expected to do. There is no indication as to which walls are to be maintained as fire walls, where horizontal exits exist, or what is expected of the smoke removal system.

CONCERN: See Concerns TS.2-2 and OA.7-1.

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:

- o Bldg. 1705 houses the central computer for the Air Release Advisory Capability (ARAC) group receiving data and developing programs for releases from 70 U.S. (including Alaska, Hawaii, and Guam) DOE and DOD nuclear installations. It is also used to provide data in the event a commercial nuclear plant has a problem. This is the only facility of its kind in the United States.
- o Bldg. 1705 has automatic sprinklers and smoke detectors. It has no gaseous fire suppression system in the cable runs below the computer floor.
- o Bldg. 1705 is exposed to fire damage by several unsprinklered combustible trailers on three sides approximately 30 feet distant.

CONCERN: (FP.4-1) (H1/C2) The loss by fire in the cable run areas or from severe exposure from Trailers 1701, 1702, or 1703 could result in the shutdown of a facility (Bldg. 1705).

FP.5 PROPERTY PROTECTION

PERFORMANCE OBJECTIVE: A maximum credible fire, as defined in DOE 5480.7, Section 6f, should not result in an unacceptable property loss.

FINDINGS:

- The Factory Mutual Research Corporation in its fire protection survey report dated July 1987 made 29 recommendations for supervision of valves, electric supply reliability, water supply reliability at Site 300, automatic sprinkler protection, and fixed automatic gaseous suppression for loss potential over $1 million. Many have been completed. Others have been outdated by either replacement of facilities or elimination of hazard. Many have not been completed, primarily those involving isolation of highly valued computers (valued from $5 to $27 million) by 1-hour fire walls and installation of fixed automatic gaseous fire suppression systems, valve supervision and alarms.

- Cold weather valves controlling automatic sprinkler system water supplies to exterior portions of Bldgs. 871, 873, and 874 were found closed at Site 300. These valves are closed each fall and reopened in the spring. No special precautions are taken during the winter period when the valves are in the closed position (loss potential less than $1 million).

- The majority of the sprinklered buildings at Site 300 have portions of the automatic sprinkler systems which appear to be subject to freezing.

- Heat tape and/or heaters were noted on the automatic sprinkler system riser for the majority of the Site 300 buildings. This form of heating is not monitored for faults and does not protect all areas which are subject to freezing.

- Although many of the newer buildings meet Factory Mutual requirements, the large number of buildings with basic deficiencies in protection results in the site, as a whole, not meeting Factory Mutual requirements.

CONCERN: (FP.5-1) (H2/C2) The recommendations contained in the Factory Mutual Research Corporation (FMRC) report are not being implemented in a timely manner. DOE has not granted exemptions from the FMRC report.

CONCERN: (FP.5-2) (H2/C2) The automatic sprinkler systems at Site 300 are not fully operational, and others cannot be considered reliable during subfreezing weather.

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.

FINDING:

- LLNL Hazards Control Fire Safety Division maintains a three-person, full-time, paid Fire Department at Site 300. The training and equipment for the Site 300 Department appear to be in basic compliance with the requirements of the National Fire Protection Association (NFPA). However, the department is considered to be inadequately staffed for emergency response situations involving interior structural fire fighting. This conclusion is based on the DOE interpretation of NFPA-1500, A-6.2.1, which requires five people to be available to fight an interior structural fire. Presently the crew must stage outside the structure, and not enter until backup personnel arrive. An exemption to this rule was requested. It takes approximately 15 to 20 minutes before a full crew is available at Site 300 (main area) and another 10 to 15 minutes for the crew to reach the remote areas of Site 300.

CONCERN: (FP.6-1) (H2/C1) Because the Site 300 Fire Department is not fully staffed, potential interior fire fighting activities are limited.

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 work request Whiz Tag System used at LLNL to allow for modification and installation of equipment and building modifications does not involve review by the Fire Protection Engineering Group. Approximately 35,000 Whiz Tag System work requests were issued in 1989.
- The Fire Protection Engineering Group reviews and comments on proposed designs, but does not have the authority to enforce comments made. Plans have been signed off by Hazards Control without all fire safety issues being resolved.
- The Fire Protection Engineering Group is not involved in the acceptance of new installations other than by specific request.
- A new fire alarm system is being designed and installed at LLNL, which is not currently Underwriters Laboratories (UL) listed or Factory Mutual approved as required by DOE 5480.4, DOE 6430.1A, or the National Fire Codes.
- HEAF was designed, constructed, and accepted without the Life Safety Code-required automatic evacuation system and the exterior water flow alarm required by NFPA-13.
- The allowable quantities and use of flammable liquids in the laboratory areas of HEAF are not clearly identified to assure compliance with NFPA-45 (Standard on Fire Protection for Laboratories Using Chemicals) and NFPA-30 (Flammable and Combustible Liquids Code).
- The hydraulically designed automatic sprinkler systems in HEAF and the Advanced Test Accelerator (ATA) did not use the hose stream requirements outlined in DOE 6430.1.
- See Sections FR.2 and MA.4, and Concerns MA.2-1 and QV.1-1.

CONCERN: (FP.7-1) (H2/C1) Design review and planning are incomplete for new construction and building modifications involving fire protection and life safety.

FINDINGS:

- Pressure gauges for the automatic sprinkler risers were found missing on the following buildings: Bldgs. 817A, 871, 873, 874, 875, and 876.
- Smoke detectors are not tested for sensitivity as required by the Occupational Safety and Health Act (OSHA) in 29 CFR 1910.164c4.

- o Batteries for control panels with battery backup are not load tested in accordance with the NFPA requirements or industry standard good practices.

- o The two automatic balanced pressure foam systems located at the ATA are no longer serviced by the installing company. The status of these systems was unclear to plant personnel at the time of the Appraisal.

- o Water flow alarm testing is not conducted in accordance with Factory Mutual recommended practices. Current practice meets the minimum requirements of NFPA but is not in conformance with the Improved Risk Criteria of Factory Mutual.

- o The valves controlling fire protection water supplies are not inspected in accordance with the Factory Mutual recommended practices.

- o See Section TS.4.

CONCERN: (FP.7-2) (H2/C1) The preventive maintenance, inspection, and testing of fire systems and fire alarm systems is not in compliance with DOE 5480.7 and DOE 6430.1A.

FINDINGS:

- o Water flow testing in the ATA area indicated the water supplies available are inadequate to meet the hydraulic design requirements per NFPA-13 for the automatic sprinkler systems as installed. The deficiencies in the water supply to this area were noted by Factory Mutual in 1987. A new pump and associated suction tank were recommended at that time.

- o The oil systems at the ATA are being drained and additional sprinkler protection has been installed, thus reducing the potential of a serious fire. However, numerous other recommendations were listed in a Fire Protection Survey conducted by Factory Mutual Engineering in 1987 to help limit the loss potential; these recommendations have not been completely implemented. SAN is requesting temporary exemption to the Factory Mutual recommendations based on the nonoperational status of the facility. To date these exemptions have not been granted.

CONCERN: (FP.7-3) (H1/C1) The deficiencies noted by Factory Mutual for Site 300 have not been addressed in a timely manner.

FINDINGS:

- o At the main site and Site 300, automatic sprinkler valves are not checked monthly in accordance with the DOE-required Factory Mutual recommended practices. These valves are locked open, have partial electronic supervision, and valve closures are controlled by the Fire Department impairment program.

- Valves located on the underground distribution system supplying fire protection water are not checked monthly, do not have electronic supervision, are not locked open, and are not controlled by the Fire Department impairment program.

- The main control valve for the automatic sprinkler system protecting the office area of HEAF is located inside the fire area without provisions for exterior access.

- See Section AX-6.

CONCERN: (FP.7-4) (H1/C1) The fire protection water supplies are considered insufficient per NFPA-13 and Factory Mutual Research Corporation (FMRC) Data Sheet 2-8N and unreliable at Site 300 due to deficiencies in the flow and pressure available, and in the valve inspection program. Deficiencies in the valve inspection program and the limited accessibility to the fire protection control valves make the water supplies at LLNL unreliable.

FINDING:

- The sitewide fire alarm system is not UL listed or Factory Mutual approved. The system uses unlisted components and does not provide automatic notification to the building occupants of HEAF:

  - The fire alarms system has not been designed and installed in compliance with NFPA-72D (Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems).

  - The sitewide fire alarm system is based on a design developed by LLNL.

CONCERN: (FP.7-5) (H2/C1) CAT. II The sitewide fire alarm system is deficient in meeting requirements (NFPA-72D) for the use of listed or approved fire alarm equipment and does not provide for automatic notification to building occupants.

4.5.18 Medical Services

4.5.18.1 Overview

This Appraisal addressed all five Performance Objectives in the Medical Services area. The program conducted by the LLNL Health Services Department contains all of the elements required of a full service, comprehensive, contemporary occupational medical facility. The program is broad in scope and of high quality. The staff is well qualified and trained. Management communicates and interacts effectively with other health and safety professionals, DOE, and community resources. Current demands for service are being met.

The medical facility is spacious, modern, and well equipped. It was designed with special emphasis on emergency response capability. Multiple casualties could be held and managed for 72 hours in the event of failure or saturation of community resources as might occur in a severe earthquake or other serious event. A satellite medical unit, located at Site 300, is staffed by a trained and experienced Mobile Intensive Care Nurse (MICN).

The Medical Director has MD and MPH degrees and is certified as a specialist in Occupational Medicine by the American Board of Preventive Medicine. The staff consists of 4 MDs, a psychologist Ph.D., 10 registered nurses, 3 nurse practitioners, and support personnel. Retraining and continuing education are encouraged, promoted, and provided in house and offsite. Training is well documented. The Medical Director reports to an Associate Director and participates in his regular staff meetings.

Clinical programs provide medical care for emergencies and temporary care and counseling for personal illness. Work injuries are treated on site or referred to competent specialists as appropriate. A broad range of comprehensive physical examinations are performed. Results are discussed. If risk factors or health problems exist, remedial action is advised. Accurate and complete records are made and are carefully maintained. An Employee Assistance Program (EAP) of broad scope is available to employees and their dependents. Many activities and programs are conducted in health education, illness and injury prevention, and health promotion. Medical Services plays a significant role in the substance abuse program. The policy regarding substance abuse is well documented and communicated. Emergency capability, response, and planning are excellent and well documented. Drills are conducted at least annually using diverse scenarios.

Procedures, practices, and programs are well documented and communicated. Timely reviews and revisions occur. A library is maintained with relevant reference material such as journals, books, orders, and manuals of policies, practices, and procedures. Copies of a recently written Operating Procedures Manual are distributed throughout the facility. This is a problem-oriented document, well organized and indexed; it provides instructions for response to most events that could be anticipated.

In recent (September 1989 and February 1990) reviews (audits) of the medical program arranged by the Medical Director, DOE judged the program to be excellent. Recommendations were made to enhance the EAP and Wellness programs, to computerize medical and exposure data, and to augment and

restructure the staff. Additional FTEs will relieve some of the staff from routine demands and permit them to use their talents for program development and management and to plan for future needs.

Several Noteworthy Practices were observed, including the "Mole Patrol" (Melanoma Clinic), the Operating Practices Manual, and Biohazard Surveillance Program.

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 applicable to their operations.

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.

NOTEWORTHY PRACTICE: LLNL Emergency Preparedness has encouraged LLNL employees to volunteer to participate in first aid, medical support teams and in two SELF HELP Programs. These volunteers are providing a real humanitarian service to the LLNL employees by devoting considerable time and effort in training, retraining and participating in site drills, facility drills and annual exercises. The SELF HELP Emergency Plan provides facility employees with the necessary information and instructions to react to all phases of emergency response emergencies. New employees are provided with facility safety practices.

EP.5 EMERGENCY FACILITIES, EQUIPMENT, AND RESOURCES

PERFORMANCE OBJECTIVE: Emergency facilities, equipment, and resources should adequately support site/facility emergency operations.

NOTEWORTHY PRACTICE: The LLNL Fire Department has an excellent, well-designed mobile incident response command vehicle which has all the capabilities equipment and resources to include documents that address and support an on screen command post operation. This vehicle has a SCBA cylinder re-filing capability on both sides of the vehicle, carries protective clothing and equipment, first-aid materials and special designed casks to remove toxic chemical leaking containers.

NOTEWORTHY PRACTICE: Each facility and zone has their own individual emergency lockers position outside each facility. These lockers contain sufficient materials, resources and equipment to support any LLNL credible emergency situation.

CS.1 ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: All operations with fissionable material should be conducted to provide effective nuclear criticality control during all activities.

NOTEWORTHY PRACTICE: The Criticality and Safety Analysis Group has developed and implemented a manual to assure consistency and quality in criticality safety audits. It is titled Criticality Safety Audits-LLNL Team Manual, and includes an appendix volume containing reference documents.

This manual provides the audit team with the applicable DOE Orders and ANSI/ANS standards and gives guidance for a thorough criticality audit which follows a four step process:

1. Before the audit,
2. During the audit,
3. After the audit, and
4. Tracking status of recommendations.

Each step consists of several tasks which are provided in detailed descriptions.

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.

NOTEWORTHY PRACTICES: LLNL has the "R-Program Safety and Health Plan" which is a comprehensive state-of-the-art workplace surveillance program including both technical and medical aspects. The potential for a significant exposure to a toxic metallic containing compounds without prescribed exposure limits was the basis for instituting the Health and Safety Plan. Engineering and administrative controls were incorporated into the Plan to assure maximum protection for employees at the ALARA level. Personal exposure samples are collected along with area samples in an effort to develop a thorough understanding of the potential workplace exposure conditions. Along with the personal samples, bioassay samples are collected on a scheduled basis. The results are incorporated into an on-line data management system which is tied to the program management in three buildings, industrial hygienists in Hazards Control, and physicians in Occupational Medicine. The individual staff disciplines evaluate the data and develop plans to assess the significance of the reported exposure data. Corrective actions including changes to the Plan are made to enhance the level of protection for assigned personnel.

OS.3 MANAGEMENT OF SAFETY CONCERNS

PERFORMANCE OBJECTIVE: Physical and/or other environmental stresses arising in the workplace should be identified, evaluated, and controlled.

NOTEWORTHY PRACTICE: The portion of the Preplacement Testing Pilot Program dealing with the use of photographs and video tapes is considered a Noteworthy Practice. LLNL has initiated a Preplacement Testing Pilot Program targeted toward jobs which have been identified as clearly having a high incidence in overexertion injuries. In addition to the program components of a job analysis, incorporation of ergonomic controls, and preplacement testing, the program utilizes photographs and videotapes to help keep Medical informed on the duties associated with an individual job. In this way, the medical staff can gain insights into jobs which they do not have the time or resources to obtain directly. The Human Resources Department also plans to use the photographs and videotapes in the recruiting and hiring process. Applicants will have an opportunity to see the work environment and what the job entails before deciding whether to accept the job.

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.

NOTEWORTHY PRACTICE: LLNL Health Services Department has developed a high quality Operating Procedures Manual which is placed at various locations throughout LLNL. The document is problem-oriented, well organized and indexed, and provides complete instructions for response to most occurrences that could be anticipated. An outstanding reference, it serves also as a training tool.

MS.3 MEDICAL TREATMENT

PERFORMANCE OBJECTIVE: Medical treatment should be available and provided by qualified, competent staff, and adequate facilities should be available.

NOTEWORTHY PRACTICE: LLNL Health Services Department conducts a Melanoma Clinic "Mole Patrol," staffed by a dermatologist. Employees are encouraged by an active outreach program to come in for evaluation and advice regarding suspicious moles. Early diagnosis and treatment is the goal. Statistical studies are planned.

NOTEWORTHY PRACTICE: LLNL Health Services Department conducts a Biohazard Medical Surveillance Program. In addition to periodic examinations, appropriate immunizations are provided to employees potentially exposed to body fluids, and a preplacement serum specimen is obtained and stored (frozen) for future reference if needed.

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

Concerns Number	Potential Hazard Level	Compliance Level
OA.1-1	3	2
OA.1-2	2	2
OA.1-3	2	2
OA.1-4	3	2
OA.1-5	1	2
OA.1-6	2	1
OA.1-7	1	1
OA.2-1	2	2
OA.3-1	2	2
OA.4-1	3	2
OA.5-1	2	1
OA.5-2	2	1
OA.5-3	2	2
OA.5-4	2	2
OA.5-5	2	2
OA.6-1	3	2
OA.6-2	3	2
OA.7-1	2	1
OA.7-2	2	2
OA.8-1	2	2
QV.1-1	2	1
QV.1-2	2	1
QV.4-1	2	1
OP.1-1	2	2
OP.1-2	2	1
OP.1-3	3	2
OP.2-1	2	2
OP.3-1	2	2
OP.3-2	1	2
OP.3-3	1	2
OP.3-4	1	2
OP.3-5	2	2
OP.4-1	2	1
OP.5-1	2	2
OP.5-2	2	2
OP.6-1	2	2
OP.8-1	2	2
OP.8-2	2	1
MA.1-1	3	2
MA.1-2	3	2
MA.1-3	2	2
MA.1-4	2	2
MA.1-5	2	2

*Designates a Category II Concern

Concerns Number	Potential Hazard Level	Compliance Level
MA.2-1*	1	2
MA.2-2	3	2
MA.2-3	3	2
MA.2-4	2	2
MA.3-1	2	2
MA.3-2	3	2
MA.4-1	3	2
MA.5-1	2	2
MA.5-2	2	2
MA.6-1	3	2
MA.7-1	3	2
MA.8-1	2	2
TC.1-1	2	2
TC.4-1	2	2
AX.1-1	2	2
AX.3-1	2	2
AX.6-1	2	2
EP.1-1	2	1
EP.2-1	2	1
EP.2-2	2	1
EP.3-1	2	1
EP.3-2	2	1
EP.3-3	2	1
EP.4-1	2	1
EP.5-1	2	2
EP.6-1	2	1
EP.7-1	2	2
TS.2-1	2	2
TS.2-2	2	1
TS.2-3	2	1
TS.2-4	2	1
TS.3-1	2	2
TS.3-2	2	2
TS.5-1	2	2
PT.1-1	1	1
PT.3-1	2	1
PT.3-2	2	1
PT.3-3	2	1
PT.4-1	2	1
PT.6-1*	2	1
PT.6-2*	2	1
CS.3-1	3	2
CS.5-1	2	2

*Designates a Category II Concern

Concerns Number	Potential Hazard Level	Compliance Level
SS.1-1	2	2
SS.3-1	2	2
SS.3-2	2	1
SS.4-1	2	1
SS.4-2	3	1
SS.4-3	2	1
SS.4-4	2	2
FR.1-1	2	1
FR.3-1	2	2
FR.4-1	3	1
FR.4-2	2	1
FR.5-1	2	1
FR.6-1	2	2
RP.1-1	2	1
RP.1-2	2	2
RP.2-1	2	1
RP.2-2	3	2
RP.3-1	2	2
RP.3-2	1	1
RP.6-1	2	2
RP.6-2	2	1
RP.7-1	2	1
RP.7-2	2	2
RP.8-1	2	2
RP.9-1	1	1
RP.10-1	2	2
RP.10-2	2	1
RP.11-1	2	2
RP.12-1	3	2
IH.1-1	2	2
IH.1-2	2	2
IH.1-3	2	1
IH.1-4	2	2
IH.2-1	2	1
IH.3-1	2	1
IH.3-2	2	2
IH.4-1	2	2
IH.5-1	2	2
IH.5-2	2	2
IH.6-1	2	2
OS.1-1	2	2
OS.1-2	3	1
OS.2-1	2	1
OS.4-1*	1	1
OS.5-1	1	1

*Designates a Category II Concern

Concerns Number	Potential Hazard Level	Compliance Level
FP.1-1	2	1
FP.2-1	2	1
FP.4-1	1	2
FP.5-1	2	2
FP.5-2	2	2
FP.6-1	2	1
FP.7-1	2	1
FP.7-2	2	1
FP.7-3	1	1
FP.7-4	1	1
FP.7-5*	2	1

*Designates a Category II Concern

4.8.2 Tabulation of Concerns

4.5.1 Organization and Administration

CONCERN: (OA.1-1) (H3/C2) Accountability for safety responsibility is not clearly defined because of the lack of upper-level management control documentation.

CONCERN: (OA.1-2) (H2/C2) LLNL has failed to maintain clear lines of safety responsibility and independence of safety overview.

CONCERN: (OA.1-3) (H2/C2) All management personnel and staff interviewed at Site 300 do not have the same understanding of the line of their safety responsibilities.

CONCERN: (OA.1-4) (H3/C2) Mission/function statements that define the assigned organizational purpose and how this purpose is to be accomplished do not exist for all organizational units.

CONCERN: (OA.1-5) (H1/C2) The Resident Manager does not have sufficient direct authority or resources to fulfill his safety responsibilities.

CONCERN: (OA.1-6) (H2/C1) For Site 300, it is frequently not possible, as required by DOE 5480.1B and DOE 5482.1B, to trace a single line of safety responsibility from the LLNL Director to the staff performing the task.

CONCERN: (OA.1-7) (H1/C1) There is no LLNL system in place to ensure that DOE policies and requirements are addressed by the cognizant personnel and that compliance with the requirements is currently maintained. As a result, LLNL operations are being conducted in significant noncompliance with DOE Orders.

CONCERN: (OA.2-1) (H2/C2) Conflicts of interest between responsibilities for program and safety exist at LLNL.

CONCERN: (OA.3-1) (H2/C2) LLNL does not require and does not have written and promulgated sitewide safety goals, nor do all departmental elements have specific, measurable safety goals which can be tracked.

CONCERN: (OA.4-1) (H3/C2) The University of California demonstrates little corporate commitment to safe operations at LLNL.

CONCERN: (OA.5-1) (H2/C1) The performance of corrective actions and the prevention of recurrence through addressing basic causes and related generic problems does not meet the Corrective Action requirements of DOE 5700.6B.

CONCERN: (OA.5-2) (H2/C1) The UOR program at LLNL does not conform to the policy and objectives of the Unusual Occurrence Reporting System, DOE 5000.3, Sections 7.a.(5) and 7.b.(2) and (3).

CONCERN: (OA.5-3) (H2/C2) Complete and accurate information necessary for safe operation is not systematically and consistently being developed and promulgated to employees.

CONCERN: (OA.5-4) (H2/C2) The audit program does not provide needed management information on the conduct of activities undertaken to comply with procedural requirements as required by DOE 5700.6B.

CONCERN: (OA.5-5) (H2/C2) A sitewide system for analysis and trending of operational data and consequent corrective action has not been developed and implemented by LLNL.

CONCERN: (OA.6-1) (H3/C2) Means to ensure that job descriptions and qualifications reflect LLNL needs, and that personnel performance is measured in a consistent way, have not been established at LLNL.

CONCERN: (OA.6-2) (H3/C2) Specific position/job descriptions, which delineate specific safety responsibilities, do not exist for all management personnel.

CONCERN: (OA.7-1) (H2/C1) LLNL is not in compliance with DOE 5481.1B and SAN MD 5481.1A for the preparation of safety analysis documents for all facilities.

CONCERN: (OA.7-2) (H2/C2) Current key safety documents are not available and controlled in accordance with recommended standards such as ANSI/ASME NQA-1 as indicated in DOE 5700.6B.

CONCERN: (OA.8-1) (H2/C2) The LLNL fitness-for-duty program is deficient with respect to its application to prospective employees, employees in sensitive positions, visitors, and subcontractor employees.

4.5.2 Quality Verification

CONCERN: (QV.1-1) (H2/C1) The LLNL quality assurance program does not meet the requirements of DOE 5700.6B for independent verification of activities that affect quality and for the selective application of the quality assurance elements in the recognized standard ANSI/ASME NQA-1.

CONCERN: (QV.1-2) (H2/C1) Quality assurance (QA) requirements are not being implemented to meet DOE 5700.6B and the LLNL Quality Assurance Manual requirements for QA elements such as auditing, staff training, and developing and implementing quality practices.

CONCERN: (QV.4-1) (H2/C1) There is no sitewide LLNL calibration policy for measuring and test equipment as required by DOE 5700.6B and ANSI/ASME NQA-1.

4.5.3 Operations

CONCERN: (OP.1-1) (H2/C2) LLNL main site management does not maintain a continuous, in-depth involvement in Site 300 operations and safety issues.

CONCERN: (OP.1-2) (H2/C1) Formal administrative controls for operations are not consistent in the way they are provided, applied, enforced, and monitored throughout LLNL; nor do they conform completely to the format specified in SAN MD 5481.1A.

CONCERN: (OP.1-3) (H3/C2) There is no sitewide requirement to address safety performance as part of the annual performance appraisal within the operating divisions at LLNL.

CONCERN: (OP.2-1) (H2/C2) No document includes procedures and guidelines covering the maintenance of skills of operators assigned to the various Site 300 facilities.

CONCERN: (OP.3-1) (H2/C2) Documentation does not demonstrate that the policies and procedures governing operations at Site 300 and the High Explosives Applications Facility (HEAF, Bldg. 191) facilities are strictly adhered to.

CONCERN: (OP.3-2) (H1/C2) Existing procedures and equipment do not effectively guide or support the Site 300 operations staff when unusual or abnormal situations are encountered.

CONCERN: (OP.3-3) (H1/C2) Not all policies defining activities that require Facility Safety or Operational Safety Procedures may be sufficiently specific to cover all hazardous operations at Site 300.

CONCERN: (OP.3-4) (H1/C2) The safe conduct of routinely performed, normal operations at Site 300 is not always ensured or guided by formal mechanisms such as written checklists.

CONCERN: (OP.3-5) (H2/C2) The LLNL program to improve the criteria for mandating the use of approved procedures in Bldg. 331 is not yet implemented.

CONCERN: (OP.4-1) (H2/C1) Health and Safety Manual Supplement 26.13, General Lock and Tag Procedure, revised June 27, 1984, does not comply with the provisions of 29 CFR 1910.147 for use of locks and tags.

CONCERN: (OP.5-1) (H2/C2) Not all explosives operations strictly comply with the provisions of DOE/EV/06194, DOE Explosive Safety Manual, with respect to items such as electrical line routing, personnel access controls, and ignition sources.

CONCERN: (OP.5-2) (H2/C2) One storage cubicle in Bldg. 229 did not have a barrier to suppress missiles from escaping the magazine, as recommended by a Department of Defense Explosives Safety Inspection Team in 1985.

CONCERN: (OP.6-1) (H2/C2) Safety-related information (unusual occurrence reports, lessons learned, and documented safety meetings) does not reach the operating staffs in a consistent or effective manner at LLNL.

CONCERN: (OP.8-1) (H2/C2) A policy governing the approval and posting of operating aids in control rooms does not exist.

CONCERN: (OP.8-2) (H2/C1) LLNL has no requirement for the inclusion of human factors engineering in the design, layout, and operations of facilities, as required by DOE 6430.1A, Section 1300-12 for nonreactor nuclear facilities.

4.5.4 Maintenance

CONCERN: (MA.1-1) (H3/C2) Organizational documentation needed for an effective maintenance program is not complete since not all equipment is covered and maintenance is not systematically controlled in accordance with technical manuals.

CONCERN: (MA.1-2) (H3/C2) Conformance to DOE 4330.4 is not fully in effect and is not currently a contractual requirement.

CONCERN: (MA.1-3) (H2/C2) The heavy reliance on the skills of personnel to ensure proper maintenance and the assurance of continuity of talents is not sufficiently balanced by formally documented procedures.

CONCERN: (MA.1-4) (H2/C2) The plant and utilities, particularly the older portions, have deteriorated to the extent that a major recovery effort is necessary.

CONCERN: (MA.1-5) (H2/C2) No policy is in place to ensure that basic maintenance requirements are given the required emphasis and priority with respect to programmatic activities.

CONCERN: (MA.2-1) (H1/C2) CAT. II In general, the Whiz Tag System does not contain guidance, criteria, and controls to ensure safe conduct of maintenance of plant systems and facilities nor control of safety system design features.

CONCERN: (MA.2-2) (H3/C2) Maintenance procedures do not provide detailed guidance for maintenance activities.

CONCERN: (MA.2-3) (H3/C2) In some areas, building-specific responsibility for identifying and correcting preservation and maintenance problems is not clearly assigned and does not effectively support building systems such as water, gas, and electric utilities.

CONCERN: (MA.2-4) (H2/C2) A policy establishing basic guidelines for maintenance and calibration of key programmatic equipment and instrumentation is lacking.

CONCERN: (MA.3-1) (H2/C2) The LLNL main maintenance shop, Bldg. 511, is in a poor state of repair.

CONCERN: (MA.3-2) (H3/C2) There is no mechanism to ensure that all machine tools are included in the centralized machine tool maintenance program.

CONCERN: (MA.4-1) (H3/C2) Informal maintenance procedures impact maintenance planning and work control.

CONCERN: (MA.5-1) (H2/C2) A high level of corrective maintenance to buildings and utilities is not evident at LLNL.

CONCERN: (MA.5-2) (H2/C2) Older experimental systems do not receive the required level of corrective maintenance to ensure safe and efficient operations.

CONCERN: (MA.6-1) (H3/C2) Preventive maintenance activities have not been optimized with vendor recommendations or with locally generated, component-specific procedures or checklists.

CONCERN: (MA.7-1) (H3/C2) A predictive maintenance program is not fully in place, and overall planning, scheduling, and budgeting have not been completed in sufficient detail to evaluate the planned program and its associated goals.

CONCERN: (MA.8-1) (H2/C2) At essentially all program areas examined, formal maintenance procedures for programmatic equipment are not employed.

4.5.5 Training and Certification

CONCERN: (TC.1-1) (H2/C2) Training at LLNL is not supported by corporate policy and standards and is not formally established consistent with good practice and DOE expectations.

CONCERN: (TC.4-1) (H2/C2) LLNL has not maintained radiological protection retraining requirements as specified in DOE 5480.11 or in accordance with good industry practice.

4.5.6 Auxiliary Systems

CONCERN: (AX.1-1) (H2/C2) Auxiliary systems at the explosive testing facilities are poorly designed and maintained.

CONCERN: (AX.3-1) (H2/C2) The Administrative Memo, "Director's Statement on Waste Minimization," issued March 8, 1989, has not been aggressively enforced.

CONCERN: (AX.6-1) (H2/C2) The availability testing of emergency generators does not verify operability of the system because there is no assurance that diesel fuel quality has not degraded, and a checklist is not completed by the test conductors as the test proceeds.

4.5.7 Emergency Preparedness

CONCERN: (EP.1-1) (H2/C1) The LLNL Emergency Plan is not in compliance with DOE 5500.3 or draft DOE 5500.3A, Chapter III, Sections 1b and c.

CONCERN: (EP.2-1) (H2/C1) The LLNL Emergency Plan is not in accordance with DOE 5500.3 or draft DOE 5500.3A, Chapter III, Planning and Preparedness (i.e., Hazards Identification, Updating Hazards, Analysis Requirements, Accident or Event Characteristics).

CONCERN: (EP.2-2) (H2/C1) LLNL Emergency Plan Implementing Procedures are not in accordance with the requirements of DOE 5500.3 or draft DOE 5500.3A which address the facility emergency operations.

CONCERN: (EP.3-1) (H2/C1) Emergency Response Training Programs have not been developed for all LLNL Facility Managers and Technical Coordinators and do not ensure adequate documentation of the program in accordance with DOE 5500.3 or draft DOE 5500.3A, Chapter III., Section 1.

CONCERN: (EP.3-2) (H2/C1) LLNL Emergency Response Training is not in compliance with DOE 5500.3, draft DOE 5500.3A, and the DOE Training Accreditation Program (TAP).

CONCERN: (EP.3-3) (H2/C1) The Emergency Public Information Program is not in accordance with DOE 5500.3 or draft DOE 5500.3A, Chapter III., Public Information, in that timely release of public information was not made to simulated offsite agencies.

CONCERN: (EP.4-1) (H2/C1) The LLNL Emergency Preparedness drill and exercise program does not comply with requirements of DOE 5500.3, that all facility drills are not documented.

CONCERN: (EP.5-1) (H2/C2) The equipment, materials, resources, and documentation requirements of draft DOE 5500.3A are not used to ensure that all required items are available for emergencies in the LLNL Emergency Operations Center.

CONCERN: (EP.6-1) (H2/C1) LLNL does not have the necessary coordination meetings by the State and local emergency management agencies to obtain approval of the LLNL Emergency Plan, Emergency Action Levels and Emergency Classification Systems, as required in DOE 5500.3.

CONCERN: (EP.7-1) (H2/C2) The LLNL Emergency Plan does not meet the requirements of draft DOE 5500.3A, Chapter II, Hazards Assessment, in providing a detailed listing of hazards and accidents analyzed in the Safety Analysis Report.

4.5.8 Technical Support

CONCERN: (TS.2-1) (H2/C2) The review system for LLNL safety procedures does not ensure auditability of reviews or performance of independent technical peer reviews within the originating organization.

CONCERN: (TS.2-2) (H2/C1) LLNL has not made a determination whether existing safety analysis documentation adequately identifies the risks associated with all of its operating facilities that can be reasonably expected to have potential for major onsite or offsite impacts to people or the environment, as required by DOE 5481.1B, Chapter II, Section 4.

CONCERN: (TS.2-3) (H2/C1) Not all LLNL facilities that require Safety Analysis Reports have them in place, and existing Safety Analysis Reports and Safety Analysis Documents do not adequately define Operational Safety Requirements, designate equipment important to safety, or reflect complete safety analyses as required by DOE 5480.5, DOE 5481.1B, and LLNL Safety Analysis Report guidance.

CONCERN: (TS.2-4) (H2/C1) Not all LLNL facilities have Operational Safety Requirements (OSRs) in compliance with DOE 5480.5 requirements and SAN MD 5481.1A guidance. Those OSRs that do exist are deficient in content and format.

CONCERN: (TS.3-1) (H2/C2) There is no definitive guidance within LLNL to ensure consistency of approach and quality for Operational Readiness Reviews.

CONCERN: (TS.3-2) (H2/C2) Facility and schematic drawings do not completely conform to the requirements of LLNL Plant Engineering Policy and Operations Manual in regard to approval and showing of correct "as-built" status.

CONCERN: (TS.5-1) (H2/C2) Ventilation exhaust streams which might contain hazardous materials are not all monitored or sampled to quantify releases, and the lack of monitoring/sampling has not been justified by documented analyses.

4.5.9 Packaging and Transportation

CONCERN: (PT.1-1) (H1/C1) The hazardous materials transportation program is fragmented, uncoordinated, inconsistent, ineffective, and not in compliance with DOE Orders.

CONCERN: (PT.3-1) (H2/C1) The audit and appraisal program is insufficient in both frequency and depth to ensure that the quality assurance (QA) requirements of DOE 5480.3 and DOE 5700.6B are met.

CONCERN: (PT.3-2) (H2/C1) The system for corrective action and followup on packaging and transportation audits and appraisals does not comply with DOE Orders.

CONCERN: (PT.3-3) (H2/C1) The hazardous materials container procurement and inspection program does not provide assurance that containers will meet DOE Orders and Department of Transportation (DOT) regulations.

CONCERN: (PT.4-1) (H2/C1) There is no comprehensive and consistent sitewide program for ensuring that packaging, identification, and transportation of hazardous materials (on site, between sites, offsite) meet Department of Transportation (DOT) and Environmental Protection Agency (EPA) regulations, as required by DOE 5480.3, Section 7.

CONCERN: (PT.6-1) (H2/C1) CAT. II LLNL does not have a system for handling, identifying, and transporting packages of hazardous materials, in compliance with the safety policies and criteria prescribed in DOE 1540.1, DOE 5480.1, and DOE 5480.3, and in State and Federal regulations.

CONCERN: (PT.6-2) (H2/C1) CAT. II Shipping manifests do not consistently meet the Department of Transportation (DOT) and Environmental Protection Agency (EPA) regulations in that they do not provide the required information in the specified format.

4.5.10 Nuclear Criticality Safety

CONCERN: (CS.3-1) (H3/C2) The criticality safety evaluations performed by the Criticality Safety and Analysis Group do not always include a formal documentation of the review process.

CONCERN: (CS.5-1) (H2/C2) The sound levels of the criticality alarm system in Bldg. 332 do not conform with the recommendations of ANSI/ANS 8.3-1986.

4.5.11 Security/Safety Interface

CONCERN: (SS.1-1) (H2/C2) There exist several mechanisms by which facilities and equipment may be modified without receiving a Security/Safety review to the same codes, standards and criteria afforded the original design.

CONCERN: (SS.3-1) (H2/C2) The Protective Force Division Emergency Plan does not clearly establish lines of authority and responsibility under all applicable conditions.

CONCERN: (SS.3-2) (H2/C1) Safety limits have not been established as required by DOE 5480.16 for the use of security weapons and equipment near safety systems and hazardous material.

CONCERN: (SS.4-1) (H2/C1) The protective force training program and its implementation are not in compliance with Special Order 86-04, Security Emergency Response Team (S.E.R.T.), revised January 22, 1987, and DOE 5480.16.

CONCERN: (SS.4-2) (H3/C1) The protective force training records are not auditable, and therefore, do not provide demonstrated evidence of officer qualification in accordance with DOE 5480.16.

CONCERN: (SS.4-3) (H2/C1) The LLNL physical fitness training program for protective force officers is not in compliance with 10 CFR 1046.11.(d).

CONCERN: (SS.4-4) (H2/C2) Protective force officers do not receive training in the specific safety rules and hazards associated with some facilities and processes at LLNL.

4.5.13 Site/Facility Safety Review

CONCERN: (FR.1-1) (H2/C1) There is no fully functioning Safety Review Committee or collection of committees providing independent safety oversight for LLNL operations as required by DOE 5482.1B.

CONCERN: (FR.3-1) (H2/C2) The conduct of the Facility Safety Procedure and Operational Safety Procedure review and approval process at LLNL is not consistent with the health and safety hazard presented by the process being considered.

CONCERN: (FR.4-1) (H3/C1) The annual appraisal guidance provided in the Health and Safety Manual is not in compliance with DOE 5480.5.

CONCERN: (FR.4-2) (H2/C1) The LLNL Site Independent Review and Appraisal System is not in compliance with the requirements of DOE 5480.5, DOE 5480.1B, and generally accepted industrial practices.

CONCERN: (FR.5-1) (H2/C1) A formal triennial review of the safety review system for LLNL operations is not conducted as required by DOE 5482.1B and DOE 5480.5.

CONCERN: (FR.6-1) (H2/C2) LLNL site management has not implemented a safety program that ensures the timely followup and closure of all safety items.

4.5.14 Radiological Protection

CONCERN: (RP.1-1) (H2/C1) There is an insufficient number of operational and administrative procedures to provide guidance in the detailed implementation of programs and to control interactions among the various radiation protection groups.

CONCERN: (RP.1-2) (H2/C2)	Administrative and operational procedures are not consistently developed, reviewed, and approved.
CONCERN: (RP.2-1) (H2/C1)	Audit plans of radiological activities do not ensure that all elements are addressed, including those specified in DOE 5482.1B, Section 9.d., and DOE 5480.11, Section 9.r.
CONCERN: (RP.2-2) (H3/C2)	There is very little independence in internal radiation protection audit programs.
CONCERN: (RP.3-1) (H2/C2)	The radiation work permit does not provide information to the worker on the radiological environment of the workplace.
CONCERN: (RP.3-2) (H1/C1)	Radwaste containers and some controlled areas are not properly posted in accordance with DOE 5480.11.
CONCERN: (RP.6-1) (H2/C2)	LLNL practices such as wearing half-face masks and permitting high hood airflow velocities may not properly control potential internal radiation exposures.
CONCERN: (RP.6-2) (H2/C1)	Emergency respirator protection equipment is not being properly inspected in accordance with ANSI Z88.2.
CONCERN: (RP.7-1) (H2/C1)	The bioassay sampling frequency and type, in combination with the air monitoring program, may not detect internal exposures to all radionuclides at the levels specified in the DOE draft Performance Standards for Internal Dosimetry Programs.
CONCERN: (RP.7-2) (H2/C2)	The LLNL internal radiation dosimetry program does not meet the requirements of ANSI N13.30 for quality assurance and quality control.
CONCERN: (RP.8-1) (H2/C2)	The calibration and maintenance for some of the fixed and portable instrumentation do not satisfy all requirements in ANSI Standards and good industry practices.
CONCERN: (RP.9-1) (H1/C1)	The air monitoring systems may not reliably provide the information needed for an effective internal dose control program.
CONCERN: (RP.10-1) (H2/C2)	Some work practices in a radiation environment do not ensure proper radiation control.
CONCERN: (RP.10-2) (H2/C1)	Swipe counting procedures may allow the release of equipment above the smearable release limit specified in DOE 5480.11.

CONCERN: (RP.11-1) (H2/C2) The ALARA principles were not incorporated during the handling and processing of the samples.

CONCERN: (RP.12-1) (H3/C2) Occupational radiation exposure records are not collected, stored, and retained in accordance with a uniform procedure or system.

4.5.15 Industrial Hygiene

CONCERN: (IH.1-1) (H2/C2) Industrial hygiene professional support to the Health and Safety Teams has not been sufficient to ensure effective identification and control of potential health hazards in the workplace.

CONCERN: (IH.1-2) (H2/C2) A significant number of Health and Safety Technicians have not been provided sufficient industrial hygiene training to ensure consistent implementation of the industrial hygiene program.

CONCERN: (IH.1-3) (H2/C1) Health and Safety Technicians are not sufficiently involved in routine operational research activities to minimize potential hazards or monitor the effectiveness of controls.

CONCERN: (IH.1-4) (H2/C2) LLNL does not have controls or effective procedures in place to facilitate consistent interpretation and implementation of the industrial hygiene program across organizational units.

CONCERN: (IH.2-1) (H2/C1) LLNL has not consistently implemented operational safety procedures to ensure that potential employee exposures to chemical and physical agents are maintained at levels consistent with the ALARA goals for the main site or with DOE 5480.10.

CONCERN: (IH.3-1) (H2/C1) LLNL has not implemented a uniform health hazard evaluation, control, and tracking program for potential sitewide health hazards.

CONCERN: (IH.3-2) (H2/C2) Operations at LLNL involving potential exposure to toxic agents and chemical carcinogens [i.e., metals (Be), solvents, and amine-based curing agents] are not evaluated in light of current personal protective equipment guidelines.

CONCERN: (IH.4-1) (H2/C2) The main site has not developed criteria for continuous performance-based indicators for high hazard exhaust ventilation systems.

CONCERN: (IH.5-1) (H2/C2) The LLNL implementation of a comprehensive asbestos control program is not consistent with internal LLNL guidelines and requirements of the ALARA program.

CONCERN: (IH.5-2) (H2/C2) LLNL has not completed a sitewide review of respirator usage, as recommended in the prescribed DOE standard, ANSI Z88.2.

CONCERN: (IH.6-1) (H2/C2)

LLNL has not fully implemented all elements of the OSHA Hazard Communication Standard, 29 CFR 1910.1200, particularly those aspects of the Standard related to availability of Materials Safety Data Sheet (MSDS) labeling requirements, and maintenance of chemical inventory.

4.5.16 Occupational Safety

CONCERN: (OS.1-1) (H2/C2)

LLNL has not implemented an effective independent oversight program for health and safety-related activities.

CONCERN: (OS.1-2) (H3/C1)

LLNL administrative procedures for recording occupationally related illnesses do not ensure that all data reported to DOE/DOL are correct.

CONCERN: (OS.2-1) (H2/C1)

Some hazardous activities are performed without written Operational Safety Procedures even though these are required by LLNL and/or mandatory requirements.

CONCERN: (OS.4-1) (H1/C1) CAT. II

Plant Engineering controls over construction activities are not effective in ensuring that construction work conforms to OSHA requirements in 29 CFR 1926.

CONCERN: (OS.5-1) (H1/C1)

The LLNL practices for ladder inspections, electrical installation and modifications, fire extinguisher inspections, portable power tool and cord inspections, and hoist inspections have not been effective in meeting DOE-prescribed occupational safety standards.

4.5.17 Fire Protection

CONCERN: (FP.1-1) (H2/C1)

Because the fire protection program is divided among three separate groups, a unified fire protection program does not exist at the main site or Site 300 to meet the requirements of DOE 5480.7 and industry standard practices.

CONCERN: (FP.2-1) (H2/C1)

The Life Safety Code analysis does not appear to have been followed precisely sitewide, to address the deviations from the existing requirements of the Life Safety Code, DOE Explosive Safety Manual, Uniform Building Code, and the LLNL Health and Safety Manual.

CONCERN: (FP.4-1) (H1/C2)

The loss by fire in the cable run areas or from severe exposure from Trailers 1701, 1702, or 1703 could result in the shutdown of a facility (Bldg. 1705).

CONCERN: (FP.5-1) (H2/C2)

The recommendations contained in the Factory Mutual Research Corporation (FMRC) report are not being implemented in a timely manner. DOE has not granted exemptions from the FMRC report.

CONCERN: (FP.5-2) (H2/C2)	The automatic sprinkler systems at Site 300 are not fully operational, and others cannot be considered reliable during subfreezing weather.
CONCERN: (FP.6-1) (H2/C1)	Because the Site 300 Fire Department is not fully staffed, potential interior fire fighting activities are limited.
CONCERN: (FP.7-1) (H2/C1)	Design review and planning are incomplete for new construction and building modifications involving fire protection and life safety.
CONCERN: (FP.7-2) (H2/C1)	The preventive maintenance, inspection, and testing of fire systems and fire alarm systems is not in compliance with DOE 5480.7 and DOE 6430.1A.
CONCERN: (FP.7-3) (H1/C1)	The deficiencies noted by Factory Mutual for Site 300 have not been addressed in a timely manner.
CONCERN: (FP.7-4) (H1/C1)	The fire protection water supplies are considered insufficient per NFPA-13 and Factory Mutual Research Corporation (FMRC) Data Sheet 2-8N and unreliable at Site 300 due to deficiencies in the flow and pressure available, and in the valve inspection program. Deficiencies in the valve inspection program and the limited accessibility to the fire protection control valves make the water supplies at LLNL unreliable.
CONCERN: (FP.7-5) (H2/C1) CAT. II	The sitewide fire alarm system is deficient in meeting requirements (NFPA-72D) for the use of listed or approved fire alarm equipment and does not provide for automatic notification to building occupants.

4.9 TEAM COMPOSITION AND AREAS OF RESPONSIBILITY TIGER TEAM ASSESSMENT - SAFETY AND HEALTH SUBTEAMS

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Packaging and Transportation	William Brobst The Transport Environment
Nuclear Criticality Safety	Adolf Garcia Argonne National Laboratory-West
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5.0 OCCUPATIONAL SAFETY AND HEALTH ACT COMPLIANCE ASSESSMENT

5.1 PURPOSE

The purpose of this Appraisal was to assess the effectiveness of OSHA compliance in health and safety programs at LLNL through the evaluation of activities at selected facilities.

5.2 SCOPE

Facilities were selected for inspection based on review of available safety records; analysis of an LLNL-generated, sitewide hazard classification document; number of employees; and professional judgment. A total of 25 buildings and 6 construction sites, in various stages of completion, were selected for inspection. Those areas inspected represented a general cross section of LLNL operations. Maintenance shops, craft shops, laboratories, research facilities, and general office areas were all included. Additionally, the general services area of Site 300 was inspected.

5.3 APPROACH

As part of the Tiger Team assessment of LLNL, an OSHA compliance inspection was performed by health and safety consultants. Facility inspections were performed in the same manner as OSHA would conduct a safety and health compliance review. OSHA's General Industry Standards (29 CFR 1910) and Construction Industry Standards (29 CFR 1926) were used as criteria for compliance. This Section summarizes the results. The full report of the OSHA assessment is in Appendix F.

5.4 MAJOR ISSUES AND CONCERNS

The inspection found 247 inconsistencies with OSHA standards: 208 noncompliance items were found from the General Industry Standards; and 39 inconsistencies with the Construction Industry Standards were noted. No "Imminent Danger" situations were found; the majority of items would be categorized as "Other-Than-Serious." OSHA defines "Other-Than-Serious" as a situation in which the safety and health of the employee would be affected, but not one in which death or serious physical harm would result.

While the vast majority of electrical outlets and boxes were properly wired, many electrical hazards were noted: cut or frayed flexible power cords and extension cords; nonfunctional ground fault circuit interrupters; and extensive use of temporary wiring, using flexible cords, in place of protected wiring.

The Hazard Communication Program's effectiveness relied heavily on first-line supervisory enthusiasm for the program. The supervisors have responsibility for providing safety information, including Materials Safety Data Sheets (MSDSs), to their employees; however, in all but one instance, employees interviewed could not provide information in their own words about the chemicals with which they worked daily. In addition, MSDSs were not consistently available or accessible; numerous unlabeled or partially labeled chemical containers were noted.

A common noncompliance item at construction sites was the improper storage of flammables. Numerous instances of insufficient fire protection were also noted. Taken together, improper storage of flammables and insufficient fire protection, has the potential for an extremely dangerous situation.

There was confusion as to the appropriate warning tag for use in the Lockout/Tagout program. A significant number of tags were inappropriate for this use. Both "caution" and "danger" tags and labels were used interchangeably, and therefore inappropriately.

These concerns are addressed in more detail in Appendix F, along with the location of each cited deficiency and the potential hazard and corresponding OSHA standard.

6.0 MANAGEMENT ASSESSMENT

6.1 PURPOSE

The Management Subteam conducted a management assessment of ES&H programs and their implementation at LLNL. The objectives of the assessment were: (1) to evaluate the effectiveness of existing management systems in terms of assuring environmental compliance, and the safety and health of workers and the general public; and (2) to identify probable root causes for any repetitive ES&H findings and concerns.

6.2 SCOPE

The scope of the assessment covered ES&H strategic planning and implementation, management practices and policies, organization and management, resource allocations, communications, self-assessment and audit, management control systems, and DOE oversight. DOE and LLNL management configurations were reviewed to ascertain the existing lines of authority, responsibility, and accountability for ES&H. In this review, the Management Subteam looked at specific organizational assignments of responsibility and accountability for ES&H and examined the ES&H interfaces between DOE Headquarters, SAN, the University of California (UC), LLNL, Federal, State, and local regulators, and the public. Specific information was also sought on the adequacy of ES&H resources, communication of ES&H objectives, and DOE oversight.

The Management Subteam examined a number of key management areas including planning, organization, self-assessment systems, LLNL and SAN management culture, internal and external communications, training and professional development, ES&H tracking and follow-up mechanisms, resource development and allocation systems, the LLNL budget system, and individual performance appraisal systems. Documents reviewed included: DOE Orders, SAN Management Directives, the DOE contract, the LLNL Institutional Plan, subcontract agreements, policies, procedures, mission and function statements, implementation plans, Management Agreements, standard operating procedures, audit, appraisal and surveillance reports, self-assessment reports, job descriptions, individual performance appraisals, and training materials and records.

6.3 APPROACH

The Management Subteam used a three-step process for examining the management of ES&H at LLNL. Initially, the Management Subteam developed an understanding of UC, LLNL and SAN senior management objectives and expectations for management of ES&H activities. This was followed by a review of supporting documentation describing the roles, policies, procedures, performance criteria, etc. for ES&H organizational elements, operations, and programs at LLNL. Finally, the Management Subteam developed an understanding of the perceptions of DOE Headquarters; SAN; LLNL; Federal, State and local regulators; local government officials; and community organizations concerning ES&H activities at LLNL; how current practices conform to senior management's ES&H objectives; and the adequacy of supporting documentation.

In each of the above steps, the findings of the Management Subteam were based on interviews with various levels of personnel from SAN and LLNL; UC representatives; DOE Headquarters staff; Federal, State and local government regulatory staff; local government officials; and the public. To further support the Management Subteam's assessment, frequent debriefings and consultations were held with the Environmental Subteam and the Safety and Health Subteams. The objective of these interactions was to uncover potential management issues that might be common to the findings of all Subteams. Preliminary data and conclusions were developed, checked, and validated through document reviews and followup discussions with managers and staff at SAN and LLNL.

6.4 MANAGEMENT ASSESSMENT SUMMARY

LLNL is a large, complex research laboratory that uses a management structure designed to be flexible, informal, and thereby capable of rapid response to the government's weapons design needs. This management structure embodies many of the principles of matrix management and has remained essentially unchanged since LLNL was founded in the 1950s. LLNL has earned a worldwide reputation for its numerous technical achievements and has been characterized as a national asset.

The importance of safety has evolved along with LLNL, because program leaders were highly sensitized to worker and public safety. It was recognized that unsafe operations would have an immediate and negative impact on LLNL's ability to do research. However, the same cannot be said for environmental concerns.

The Nation's concerns for the environment, as emphasized by the Secretary of Energy's public statements, call for a revolutionary not evolutionary response time for change in the culture or management philosophy at DOE facilities with respect to ES&H issues. The informal, collegial LLNL management approach is not well-suited for the present task. LLNL's unwritten policy suggests that "if you hire smart people, they will solve your problems." This attitude may be necessary, but it is not sufficient without a disciplined, formal LLNL management control structure. For example, the informal approach conflicts directly with the rigorous, disciplined approach necessary to assure sitewide ES&H compliance. Other organizational elements such as communications, quality assurance, operational document control (distinguished from classified document control), and resource planning are not treated uniformly, but are left for interpretation and implementation by each Associate Director. LLNL's development, size, diversity, and regulatory requirements have outgrown its ability to manage itself in a coherent, efficient manner using its traditional informal management approach.

Lack of sitewide strategic planning, management policies, and implementation plans reduces the effectiveness of LLNL's response to DOE directives and government regulations. In addition, the informality of the matrix management structure blurs lines of authority and accountability. These deficiencies and the lack of a sitewide assessment program make it impossible for the LLNL Director to know with assurance whether LLNL is in compliance with ES&H laws, regulations and Orders. In effect, the Director has no means available to assess the current status.

DOE's ability to oversee LLNL operations is hampered because DOE Headquarters has not clearly defined its expectations for SAN's role. This has created uncertainty in SAN's responsibilities, and decision authorities, hindered SAN's ability to function in an effective manner, and has resulted in the present confusion about the roles and functions of onsite DOE personnel. SAN and DOE Headquarters personnel have met recently to discuss SAN's role, but until the various responsibilities and decision authorities have been defined and agreed upon in writing, the uncertainty and confusion will remain.

6.5 MANAGEMENT FINDINGS

6.5.1 Organization and Management

FINDING M1: LLNL does not have a sitewide strategic plan with subordinate implementation plans to guide the accomplishment of ES&H objectives.

Summary

The manner in which LLNL's mission must be implemented has changed dramatically as a result of the recent DOE ES&H initiative. The elevated importance of ES&H relative to LLNL's traditional mission has not been formally addressed sitewide. LLNL has not developed a sitewide strategic plan which translates management's vision for incorporating ES&H implementation into LLNL's mission.

Discussion

LLNL has not developed a sitewide strategic plan which describes management's objectives and approach for addressing the ES&H initiative within the context of all LLNL activities. In the LLNL Institutional Plan (FY 89-94), the LLNL Director gave brief recognition to the Energy Secretary's ES&H initiative. While this is understandable since the Plan was submitted in mid-1989, during this assessment, it was not evident that a sitewide strategic planning process for addressing implementation of the ES&H initiative had begun. (See Concerns IH.1-4, IH.2-1, MA.1-5, and FP.7-1 in Section 4.5.)

Since a sitewide strategic plan, with its subordinate implementation plans, does not exist, it is impossible to assess LLNL's overall ES&H policies, goals, objectives, milestones, priorities and level of commitment. However, ES&H problems in individual programs and facilities are generally acknowledged and understood. While the ES&H strategic plan may be developed by the recently established ES&H Council or the Associate Director of Administration and Operations, responsibility for sitewide ES&H strategic planning remains undefined.

FINDING M2: LLNL does not have clear, formal lines of decision authority to assure effective, sitewide management of ES&H activities.

Summary

Formal (i.e., documented and communicated) lines of decision authority for management of ES&H activities do not exist at LLNL. Existing decision authorities to manage ES&H activities in programs, support, and the Administration and Operations Directorates are informal and unclear. This has led to inconsistent identification, prioritization, and resolution of ES&H problems throughout LLNL.

Discussion

Unclear, informal lines of ES&H decision authority have led to inconsistent management of ES&H activities throughout LLNL operations. Discussions with various levels of staff (involved in the decision-making process to identify

and resolve ES&H problems) repeatedly revealed that they were unsure of who had the authority to identify and correct ES&H problems. (See Concerns OA.1-1, OA.1-2, OA.1-5, MA.1-5, MA.2-3, and SS.3-1 in Section 4.5.) Position descriptions which should explain the responsibilities and authorities of LLNL management and staff are incomplete or nonexistent.

The blurred lines of ES&H decision authority are further confused by the multiple lines of ES&H decision authority which exist along programmatic, support, and administrative lines, and combinations of all three. For example, lines of safety responsibility from individual workers up the chain of command are unclear and frequently perceived to follow all three lines. (See Concerns OA.1-2, OA.1-3, and OA.1-6 in Section 4.5.) A similar situation exists with respect to environmental activities. For example, a low-level waste (LLW) "generator can obtain assistance in LLW characterization from HWMD and the Building Health Physicist; however, there are no specific requirements regarding this involvement. The Building Health and Safety Technician may also be involved in the characterization process but his role is not explicitly defined." (See Assessment Findings RAD/CF-6 and WM/CF-3 in Section 3.5.)

FINDING M3: LLNL's policies and plans for sitewide Quality Assurance do not assure achievement of ES&H objectives and requirements.

Summary

Effective sitewide Quality Assurance (QA) policies and plans are necessary to assure compliance with DOE Orders and ES&H regulatory requirements, as well as achievement of research and development program goals. The LLNL sitewide QA program does not meet these objectives. Several variations of internal QA surveillance and audit programs exist within LLNL - some strong, most weak. The sitewide QA function in the Administration and Operations Directorate is inadequate in scope and magnitude to provide sufficient QA guidance and assessment of the LLNL ES&H programs. These conclusions reflect a management philosophy and organizational culture that does not place high value on the fundamental tenets of QA as a major management control tool.

Discussion

The QA policy at LLNL states: "It is the policy of the Laboratory that all programs and line organizations use QA to assist in providing confidence that objectives will be achieved with due consideration for health, safety and environmental concerns..." (LLNL Quality Assurance Manual, September 1985). This policy statement is not supported by sufficiently detailed implementation guidance to assure that LLNL will develop QA plans and procedures necessary to comply uniformly with relevant DOE Orders and ES&H regulatory requirements, and achieve research and development program goals. The absence of adequate QA plans and procedures has resulted in many Safety and Health Subteam concerns. (See, for example, Concerns OA.5-4, OA.7-2, QV.1-1, and QV.1-2 in Section 4.5.)

As a result, internal QA surveillance and audit programs exist for some LLNL programs (e.g., SIS and U-AVLIS) but are not consistently defined for most other activities. The Assurance Office within the Administration and Operations Directorate does not require sitewide independent QA review of LLNL

activities. Furthermore, LLNL does not selectively apply elements from nationally recognized consensus QA standards. (See Concerns QV.1-1 and QV.1-2 in Section 4.5.)

FINDING M4: The many disparate functions assigned to the Associate Director for Administration and Operations dilute his attention to ES&H and reduce his effectiveness as an advocate for ES&H who is substantially independent of program responsibilities.

Summary and Discussion

While line management organizations bear the responsibility for execution of most ES&H activities, there are many critical ES&H implementation, support and assessment functions assigned to the Associate Director (AD) for Administration and Operations. This AD also has management responsibility for many other LLNL support functions, such as procurement, safeguards and security, telephones, personnel, and maintenance. Over 30 percent of the LLNL staff is administratively assigned to the Administration and Operations Directorate. The multitude, magnitude and diversity of these responsibilities, and the consideration they demand, can have no other result than to detract from the attention that he should devote to ES&H matters and to materially reduce his effectiveness as the only senior manager, substantially independent of program responsibilities, advocating ES&H objectives.

5.2 ES&H Policies

FINDING M5: LLNL operating policies and procedures, which relate to ES&H activities, are generally not complete, current or accurate.

Summary

LLNL operating policies and procedures, which relate to ES&H activities, have widespread deficiencies. DOE Orders are not consistently incorporated into such policies and procedures; there is no sitewide policy or procedural basis for the conduct of operations; the LLNL Environmental Handbook is incomplete; and the guidelines for safety documentation are unclear and not applied uniformly.

Discussion

There is no formal system to ensure that DOE ES&H requirements are incorporated into LLNL policies and procedures and that these policies and procedures are kept up-to-date. (See Concerns OA.1-7 and OA.7-2 in Section 4.5.)

A conduct of operations policy defines a disciplined approach for assuring that the necessary controls for safe and reliable operations are in place. LLNL does not have a sitewide policy for conduct of operations and did not act upon the November 1989 DOE directive that INPO (Institute of Nuclear Power Operations)-like policies be instituted, thereby creating a missed opportunity for LLNL to demonstrate a proactive, aggressive approach to improving ES&H performance. Formal administrative controls for operations are not consistent in the way they are provided, applied, enforced and monitored throughout LLNL. (See Concern OP.1-2 in Section 4.5.)

Environmental concerns and regulatory oversight have been part of LLNL activities for several years. Nevertheless, the LLNL Environmental Handbook is still incomplete, and there are no policies and procedures for guidance in many crucial ES&H activities. (See Concerns PT.1-1, PT.6-1, OS.2-1, RP.1-1, and RP.1-2 in Section 4.5.)

The LLNL Health and Safety Manual does not provide complete or clear guidance on required safety documentation necessary for safe operations. The requirements for documentation such as Operational Safety Procedures (OSPs), Facility Safety Procedures (FSPs), and Safety Analysis Reports (SARs) are ambiguous and consequently there is much non-uniformity in application. (See Concerns OA.5-3, OP.1-2, and TS.2-4 in Section 4.5.)

There are major problems with safety analysis documentation. There is no requirement for maintaining currency in SARs and many are out-of-date. For many facilities, SARs or Safety Analysis Documents (SADs) do not exist, despite LLNL and DOE requirements for them. The basis for continuing to operate in view of the absence of analytical support is weak and generally not documented. (See Concerns OA.7-1, TS.2-2, and TS.2-3 in Section 4.5.)

6.5.3 Communication of ES&H Objectives

FINDING M6: LLNL does not utilize formal document control procedures for operational documents to ensure that ES&H requirements are communicated to all levels of LLNL.

Summary

LLNL does not utilize formal document control procedures to assure that documents such as ES&H regulations, DOE Orders, directives, policies, procedures, standards and instructions are transmitted, tracked, maintained, comprehended and implemented through all levels of LLNL.

Discussion

LLNL is contractually bound to comply with DOE ES&H requirements as defined, principally, in the DOE Orders. In order to achieve such compliance, it is critical that LLNL receive, and expeditiously translate, these requirements into implementing LLNL policies, practices and procedures [e. g., ES&H manuals, Facility Safety Procedures (FSPs), Operational Safety Procedures (OSPs)]. This entire collection of documents should form a "nested set" and be maintained, controlled, and "flowed down" to all appropriate operating levels.

However, evidence suggests that there is not a logical and consistent flow of ES&H documents. (See Assessment Finding QA/CF-3 in Section 3.5.) Currently, there are many different methods used for creating, distributing and maintaining documents across LLNL, some of which are quite informal. There is no sitewide QA-type control over these documents. (See Assessment Findings A/CF-4, A/CF-3, and RAD/CF-2 in Section 3.5.) Thus, there are no formal processes for: assuring proper dissemination, assessment of impacts on operations, confirming consistent comprehension, keeping documents current, and assuring implementation. For example, such important documents as the LLNL Health and Safety Manual and the Site 300 Safety and Operational Manual are not controlled. (See Concern OA.7-2 in Section 4.5.) A number of the FSPs and OSPs are incomplete, not current or missing (see Concerns OA.7-1, TS.2-4, and PT.6-1 in Section 4.5, and Assessment Finding A/CF-3 in Section 3.5); as-built drawings for facilities could not be readily found (see Concerns OA.7-2 and T.3-2 in Section 4.5); there is no formal document control of technical manuals in the maintenance area (see Concern MA.1-1 in Section 4.5); and there is no centralized system to ensure that occupational radiation exposure records are properly stored, retained, and protected. (See Concern RP.12-2 in Section 4.5.) On the other hand, some controlled documentation was found in Plant Engineering.

Furthermore, DOE Orders are received from various sources (e.g., DOE Headquarters, SAN, and other DOE laboratories) and are not centrally controlled. The Environmental Protection Department Manager has only a partial set of the Orders and the implementing SAN Management Directives (MDs), while SAN Division managers have sets of Orders and MDs in varying degrees of completeness.

FINDING M7: LLNL management has not effectively and proactively communicated personal ES&H responsibility and accountability to each employee.

Summary

Although LLNL management has issued formal statements that ES&H performance will be given "top priority," its failure to take the necessary steps to effectively impart that important message throughout all levels of LLNL communicates a very different message. No sitewide systems are in place or planned to revise position descriptions and employee performance appraisals to incorporate specific ES&H objectives, responsibilities, accountabilities, and performance criteria; nor is there evidence of other employee incentives for stimulating enhanced ES&H performance.

Discussion

The LLNL Environmental Policy Statement, issued by the LLNL Director on December 19, 1989, states: **"Environment, health and safety will have top priority."**

This statement is strong evidence that LLNL management has recognized the importance of complying with DOE's ES&H objectives. However, the necessary steps have not been taken to effectively communicate this important message to staff throughout all levels of LLNL.

In most organizations, employee incentives, such as salary actions, promotions, and special recognition, are well-accepted techniques for communicating management objectives and influencing employee behavior to support the objectives. LLNL management has made no significant effort to adopt these techniques for communicating its ES&H objectives, nor, apparently, is it planning to do so.

There is no consistent sitewide system for incorporating specific ES&H objectives, responsibilities and accountabilities in position descriptions. (See Concern OA.6-1 in Section 4.5.) Position descriptions remain quite informal. In most instances, they do not exist at all. Where they do exist, they are frequently generic (as in posting announcements), incomplete and are seldom updated. (See Concern OA.6-2 in Section 4.5.) For example, there are no position descriptions which include specific ES&H elements for the Director or nearly all of the 15 Associate Directors who comprise upper management at LLNL. In some instances, as in the Environmental Protection Department (EPD) and in the Assurance Offices of several Program Directorates, where staff is expressly hired to perform ES&H responsibilities, position descriptions include specific ES&H elements. However, for managers and staff in the program areas of LLNL, such elements generally are not included.

There does not appear to be any sitewide requirement for, or uniform approach to, inclusion of specific ES&H performance criteria in the performance appraisals of managers and staff. (See Concerns OA.6-1 and OP.1-3 in Section 4.5.) There is no formal annual appraisal program for upper management or for any of the key staff. The 1989 Performance Appraisal Guidelines, dated May 17, 1989, merely require that evaluation of supervisors and managers include a review of whether they ensure "a safe workplace." The guidelines reference an

attached "Employee Performance" policy which is dated July 1979 and is silent with respect to ES&H. Although these documents provide a LLNL guide for employee appraisal plans, each Department and Division is free to establish its own plan. As a result, there is neither uniformity in format or content of these plans, nor any mechanism to keep track of the different approaches. No audit of the performance appraisal program has been conducted at LLNL since 1982.

Except for a few award programs which recognize improved safety, no formal employee incentive program, directed at stimulating improved performance of ES&H objectives, was identified.

Interviews revealed a commonly held attitude among LLNL staff that strict compliance with ES&H requirements, at the expense of program objectives, could result in adverse actions, such as transfers, unfavorable salary actions and fewer promotion opportunities. An additional disincentive to enhanced ES&H performance is a LLNL culture which views ES&H positions as having "lower class citizenship," when compared to those positions which carry out the research and development programs. This attitude has been reinforced by the unwillingness of LLNL's Technical Salary Committee to remedy an inequitable situation where the health and safety technicians receive substantially lower salaries than their peer group, the mechanical technicians, for essentially equivalent work. A tendency to label environmental support staff, particularly from EPD, as "misfits and meddlers" was also noted.

LLNL management's failure to have a plan or schedule to formalize position descriptions and employee performance appraisals to address ES&H performance, together with the absence of other employee incentives in this area, communicates a very different message than the one contained in the Director's Policy Statement of December 19, 1989. Discussions with senior management disclosed that, in general, they are sympathetic to, but not enthusiastic about, the need for formal improvement. The prevailing attitude appears to be that the soundest approach in this area, as in all LLNL areas, is to hire good people, pay them well, take care of them, and they will do the right thing.

FINDING M8: LLNL does not have a responsive, open, and proactive outreach program to improve its credibility with the community.

Summary

Although LLNL interacts with the public in a number of ways, it has not formulated an effective proactive outreach program to improve its credibility with the community. Failure of LLNL to become more sensitive to community concerns increases the risk that public activism will disrupt and delay ES&H and program activities.

Discussion

The Secretary of Energy has stated that the goal of his 10 initiatives is "to restore credibility to the Department of Energy..."

The LLNL Environmental Policy Statement provides that "Interactions with the general public will be characterized by openness and integrity."

Credible public outreach is an integral part of the implementation of ES&H objectives. Public concern and activism can delay or forestall LLNL's environmental as well as its programmatic activities. It can also occupy and divert LLNL's limited ES&H resources.

The outreach activities of LLNL are centered in the Public Affairs Office, which focuses primarily on the media and general LLNL activities, and in the Office of the Community Relations Coordinator, located in EPD, which focuses only on environmental activities. Last year, the Public Affairs Office commissioned a research project to develop a strategic plan to assess methods of communicating LLNL's policy of public openness to the key audiences and communities where LLNL has a potential impact. The project report is expected to be completed in April 1990. The Community Relations Coordinator conducts ongoing meetings with community groups, including local chapters of several national organizations. It has also produced a Community Relations Plan for the Ground Water Project to provide interaction with interested groups during the Remedial Investigation/Feasibility Study and Remedial Action at the Livermore Superfund Site.

While these efforts are encouraging, interviews conducted with LLNL employees and a representative sample of community groups, disclose that LLNL does not have an image of substantial credibility in the local community. There are long-held perceptions of LLNL as "confrontational," "defensive," "insulated," and "unwilling to deal with people who don't agree with them." Although these perceptions appear to be rooted principally in economic issues and the security-classified nature of many of LLNL's operations, there is an overall skepticism regarding LLNL's interest in community concerns. In general, the community does not consider LLNL to be a major environmental polluter or a dangerous neighbor. However, persistence of an attitude of "suspicion" of LLNL activities in general, has the potential for adversely coloring public reaction to even minor ES&H issues and incidents, and thereby inhibiting the improvement of credibility in this area.

The recent recommendation by the LLNL Director to indefinitely defer construction and operation of a controversial hazardous waste incinerator on the site acknowledged that vigorous public opposition to the plan was a "psychological consideration" which "may prove to be as important...as any technological or economic factor." Although this decision was greeted by some of the public as an indication that LLNL is becoming more responsive to community concerns, the preponderant view is that the plan was dropped only after public groups waged a hard campaign, including 10,000 opposing signatures, and because DOE was "on LLNL's back."

LLNL has not implemented an overall plan for community outreach which fully involves the public at early stages of environmentally sensitive projects, which releases and disseminates information (both favorable and unfavorable) on a regular and timely basis, and which proactively seeks out opportunities to explain ongoing and proposed operations, including the status of environmental problems and their proposed solutions.

6.5.4 Resources

FINDING M9: LLNL does not have an integrated ES&H resource implementation plan which addresses sitewide resource planning, resource development and resource allocation.

Summary

The recent DOE ES&H initiative has created a demand for resources: staff, experience, skill mix and sitewide training, which cannot be satisfied by existing LLNL capabilities. Currently, LLNL ES&H resource planning, development and allocation can best be described as reactive and short-term. LLNL does not have: sufficient qualified and trained staff to respond to current ES&H requirements, a sitewide approach to training and retraining, the necessary training staff, and a disciplined approach for allocating ES&H resources on a prioritized basis.

Discussion

LLNL has not developed a sitewide strategic plan, with subordinate implementation plans, for responding to the recent DOE ES&H initiative. (See Management Finding M1.) The 1988 ES&H Long Range Plan is not a useful planning document, in light of DOE's ES&H initiatives; principally because the Plan does not address ES&H activities within the context of LLNL's overall mission and priorities. However, on January 23, 1990, the LLNL Director initiated several elements of a sitewide ES&H implementation plan: identification of facility problems, a development and implementation plan to correct facility problems, and development and implementation of plans to institutionalize the self-assessment and corrective action processes which address the root causes of current conditions. The elements of the LLNL Director's initiative, to be developed within 30 days, were still incomplete as of March 31, 1990. This recent initiative is a small part of a thorough ES&H needs identification and prioritization which could serve as the foundation for a disciplined, long-term approach to ES&H resource implementation planning.

The lack of an ES&H resource implementation plan makes it impossible to define a sitewide resource planning, development and allocation process. It also precludes the establishment of a disciplined sitewide approach (founded on needs and priorities) dealing with areas such as staffing, training/retraining, certification/recertification, information systems, and resource allocation.

LLNL has an insufficient number of qualified staff to address its ES&H responsibilities. The Environmental Protection Department (EPD) is key to the success of LLNL's implementation of ES&H objectives. EPD has responsibility for sitewide environmental guidance, regulatory affairs, hazardous waste management and environmental restoration. The need to respond to the DOE ES&H initiative has outstripped the resources of EPD, resulting in a serious shortage of qualified staff.

The impact of this shortage of qualified ES&H staff is manifested in a number of ways. For example, EPD responsibility for interfacing between the site waste generators and EPD's Hazardous Waste Division rests with EPD's five

Hazardous Waste Field Technicians (HWFT). Each HWFT is assigned numerous responsibilities for as many as 10 buildings including the Tritium and Plutonium Facilities. As a result of these various assignments, the HWFTs cannot fulfill their responsibilities. Instead, HWFTs individually establish their own priorities, rely on the waste generators to carry out low priority HWFT responsibilities, and postpone less important activities. This defeats the concept of the HWFT approach to uniform hazardous waste management assistance and implementation. The Second Significant Finding of the Environmental Subteam ("Adequate systems are not in place to sufficiently assure that radioactive and hazardous wastes are being accurately and completely characterized and handled.") is related to this problem.

EPD has responded to staff shortfalls by attempting to fill 52 new positions (37 professional and 15 others) based on their perception of needs. However, these staffing requirements are not based on a thorough sitewide needs analysis. For example, only a few of the main site facilities have a detailed set of HWFT requirements.

EPD has attempted to meet its staffing requirements through both internal LLNL transfers and external new hires. Both approaches have had limited success. LLNL staff do not look favorably upon careers in EPD because they believe the assignment lacks sufficient professional dignity. External new hiring is limited because candidates are being screened based on professional standards more applicable for program staff (e.g., physicists, mathematicians). The high cost of housing may further aggravate LLNL's efforts to attract new staff.

The absence of a sitewide ES&H resource implementation plan which addresses staff development has resulted in an undisciplined approach to training. The LLNL Director stated his support for well-trained staff in 1988. However, his vision has not been translated into sitewide action. (See Concern TC.1-1 in Section 4.5.) Training responsibilities rest on individual organizational elements within LLNL. As a result of this decentralization and the lack of corporate training standards, there is no sitewide training strategy nor is training applied uniformly in the staff development process. Staff members are encouraged to request training courses rather than directed to do so by their supervisors through a formal career development process such as annual staff performance appraisals. Many findings of the Environmental Subteam and Safety and Health Subteams can be attributed to the lack of a strong coherent sitewide training plan. For example, the Environmental Subteam found "...no formal training program for members of the [environmental] emergency response organization..." (see Assessment Finding RAD/CF-4 in Section 3.5), and the Safety and Health Subteam's Second Root Cause was "Weaknesses in [environmental] training...have resulted in widespread noncompliance."

The majority of training at LLNL can be categorized as informal, undocumented on-the-job training conducted by facility or program staff, and formal demand-driven training without the benefit of post-training effectiveness evaluations. Formal demand training is based on a staff member's initiation or supervisor's request for training. In addition, training is often reactive. A notable example is the Hazardous Waste Handling Practices Course (HWHP, EP-006). The HWHP training has been required for all hazardous waste handlers by Federal regulation (40 CFR 265.16), and the California Hazardous Waste Regulations (Title 22, Part 67105), for a number of years and was

acknowledged in LLNL's 1988 ES&H Long-Range Plan. However, it was not until late 1989 that LLNL fully implemented the course, and since then, it has been attended by about 1800 staff over the past few months.

Another problem arising from the lack of a current strategic plan and its subordinate resource allocation plan is the absence of a disciplined sitewide approach for reprioritization of support to meet ES&H needs. The Safety and Health Subteam had findings that can be linked to the absence of a disciplined sitewide resource planning and resource allocation process. For example, the Subteam found "The Resident Manager (of Site 300) does not have...resources to fulfill his safety responsibilities." (See Concern OA.1-5 in Section 4.5.)

Currently, program managers are independently determining their ES&H needs and reallocating resources rather than forecasting and budgeting for the ES&H effort. The lack of sitewide planning can permit the managers of well-funded programs to redirect substantial resources to meet ES&H needs by supporting overhead staff directly (see Appendix G) or by contracting for the services. By contrast, managers of poorly supported programs or those with declining budgets must make difficult compromises between program and ES&H objectives.

6.5.5 ES&H Self-Assessment

FINDING M10: LLNL does not have an effective sitewide, independent self-assessment program.

Summary

An essential element of a credible ES&H program is a proactive, aggressive, independent self-assessment program. Such a program would involve reviews by experts from non-involved parts of LLNL, other DOE installations, and the private sector. Management would place high priority on these reviews and would act promptly on the resultant findings. Overall, LLNL does not have such a program. While some LLNL organizational elements have conducted independent appraisals in varying degrees, those appraisals were often limited in scope, depth, and frequency.

Discussion

A number of areas have been identified where LLNL has not actively sought the advice of outside groups or made effective use of in-house expertise in an independent assessment role. Many other large organizations address this as part of an independent audit program defined in a corporate QA plan. However, the LLNL self-assessment program does not have the traditional elements normally found in such programs. Furthermore, LLNL has not recognized the need for independence as a critical element of self-assessment. (See Concerns OA.5-4, QV.1-1, QV.1-2, and OS.1-1 in Section 4.5.)

Several independent reviews (by, for example SAIC and Kaiser) were conducted in recent months. While these reviews were useful, they were primarily stimulated by the announced Tiger Team visit, rather than as part of an ongoing LLNL program.

One potentially important form of independent assessment that is not being effectively utilized is UC's Health, Safety and Environment Advisory Committee. Review of this Committee's activities indicates that it provides almost no advice on ES&H strategy issues and only spotty coverage of specific ES&H topics. Representation on this Committee from the environmental community is totally absent. Although the Committee is intended to have a balanced representation of UC and non-UC people, 70 percent of the current roster are UC-affiliated. (See Concern OA.4-1 in Section 4.5.)

Interviews with managers and staff revealed that LLNL typically does not consider lessons learned from the private sector or DOE production plants as being relevant to LLNL operations because "LLNL is a research and development LLNL." Consequently, opportunities to strengthen LLNL operations using information from these sources are missed.

The Hazards Control Department and Environmental Protection Division perform assessments of ES&H activities. However, these assessments are not independent because these groups also provide direct support to the programs or facilities they assess. For example, Hazards Control Safety Team Members are responsible for conducting safety assessments of the same programs or facility activities for which they provide technical safety advice. Such a

conflict of interest is inappropriate in an independent self-assessment program. (See Concern OA.2-1 in Section 4.5.)

FINDING M11: LLNL line management self-assessment of its performance is informal, ineffective and reactive; and, therefore does not provide assurance that ES&H objectives are being met.

Summary

A credible management self-assessment program provides a key management control to assure that objectives are being achieved. Fundamental elements of such a program for ES&H include safety goals, performance indicators, deficiency trend analyses, corrective action-tracking, and application of root cause analyses and lessons-learned [from incidents and unusual occurrence reports (UORs)] to related work. A large number of findings relating to non-compliance with DOE Orders were discovered during this assessment. This confirmed that LLNL does not have a formal, effective line management self-assessment program that provides assurance its ES&H objectives are being met.

Discussion

Elements of an ES&H management self-assessment program can be placed into four broad categories: management commitment, formalized process, followup, and lessons learned.

Lack of strong management commitment was evident in a variety of ways. There was no sitewide requirement for identification of safety goals and, in most areas, they did not exist. (See Concern OA.3-1 in Section 4.5.) There was no LLNL requirement for readiness reviews prior to operation of new or modified facilities. SAN conducts readiness reviews for selected situations; however, LLNL does not have a process to assure adequate preparation for these reviews, or to review operations that fall below SAN thresholds. (See Concern TS.3-1 in Section 4.5.) There are no regular walkthroughs of critical facilities by top management, and Site 300 is seldom visited by senior LLNL officials. There was no evidence that ideas from employees to improve ES&H performance were being aggressively sought.

Absence of formality in self-assessment activities was most clearly demonstrated by lack of an appraisal program specifically aimed at measuring compliance with ES&H-related DOE Orders in LLNL operations. (See Concern OA.1-7 in Section 4.5.) This is a key contributing factor to the large number of non-compliance findings resulting from this assessment.

Followup and corrective action programs were weak. Corrective actions from Technical Safety Appraisals at LLNL and other audit activities were frequently late or not done at all. The UOR program did not include the requirement to identify root causes and provide such information to management for application to related activities. (See Concerns OA.5-1, OA.5-2, PT.3-2, FR.6-1, FP.5-1, and FP.7-3 in Section 4.5.) The corrective action-tracking system at LLNL was not comprehensive and was not used as a management tool by top management. There was no sitewide requirement for identification of ES&H performance indicators or for trend analyses of ES&H deficiencies, although the Hazards Control Department tracks traditional safety indicators. (See Concern OA.5-5 in Section 4.5.)

There was no evidence of a systematic program to review experiences from comparable activities in the private sector and other DOE installations, and to seek lessons learned that might be constructively applied at LLNL. UORs from other DOE sites are not regularly distributed to LLNL staff who could derive benefit from them. There was no evidence of a process to review Technical Safety Appraisals or environmental surveys from other sites for ideas that could be used to strengthen LLNL ES&H programs. (See Concern OP.6-1 in Section 4.5.)

6.5.6 DOE Oversight

FINDING M12: SAN's plan for implementing its ES&H responsibilities is not well understood, not supported by Management Agreements with DOE Headquarters, and does not prescribe adequate resources for full implementation.

Summary

SAN has established a plan for implementing its ES&H responsibilities through decision authorities that flow from DOE Headquarters to SAN. However, the plan is not well understood by SAN managers, and is not yet supported by Management Agreements or Memoranda of Understanding (MOUs) between DOE Headquarters and SAN. In addition, effective implementation of the plan will require significant organizational learning by SAN and basic cultural changes within DOE Headquarters, SAN and LLNL.

Discussion

SAN has developed a plan for line management responsibility and decision authority to assure that all programmatic activities at LLNL are conducted in full compliance with the ES&H initiatives of the Secretary of Energy.

The plan is presented in SAN's ES&H and QA Plan which was transmitted to LLNL in February 1990. The plan assumes that SAN will have direct, line management responsibility, including, but not limited to, oversight responsibility, for all ES&H activities and related program activities at LLNL. This is supported by a flow diagram which portrays SAN's line responsibilities and decision authorities for ES&H and QA. The text of the plan, however, discusses these responsibilities and authorities as if they apply to all program activities, not just ES&H activities. This ambiguity is compounded by the fact that, although SAN Managers for weapons programs play different programmatic roles than their counterparts in other programs, the mission and function statements for the approved reorganization do not reflect these differences. In addition, Senior Managers at SAN have presented different perspectives to the Management Subteam on the future programmatic roles of SAN's managers.

Elements of SAN's plan for decision authority have been presented to DOE Headquarters, but a Management Agreement or MOU to implement the plan, in part or total, has not been developed. Nor has DOE Headquarters developed an alternative set of guidelines for establishing SAN's role in the management and oversight of DOE programs assigned to LLNL. Until the ambiguities regarding its line and program responsibilities are resolved, SAN cannot be fully effective in its planned oversight role.

Another concern is that SAN does not have the necessary resources to implement its planned ES&H responsibilities and decision authorities. The envisioned plan constitutes a significant expansion of SAN's historical role in the management of DOE programs at LLNL and would require enhanced programmatic involvement by SAN to facilitate its ES&H responsibility. This, in turn, would require significant organizational learning on its part, including but not necessarily limited to, an increased understanding of LLNL programs, a general upgrading of technical expertise through the addition and retention of highly qualified staff, and increased line and program management skills.

Also, it will require basic cultural changes within SAN, DOE Headquarters, and LLNL to assure full and mutual respect among the technical and managerial counterparts.

FINDING M13: SAN's plan for increased onsite presence needs further development in the areas of onsite decision authority, ES&H management and related program involvement, resource development and allocation, and day-to-day interactions with LLNL counterparts.

Summary

SAN has developed a plan to increase its onsite presence at LLNL in order to enhance its day-to-day oversight of LLNL operations. The plan does not, however, delineate specific decision authorities that are vested in the SAN onsite managers and staff. In addition, it does not present a consistent approach to onsite residence of programmatic staff and does not provide a plan for upgrading technical excellence through the acquisition of highly qualified staff. Finally, the plan does not address the nature and frequency of SAN's intended working interactions with LLNL counterparts.

Discussion

In response to the Secretary's initiatives about DOE's responsibilities for assuring ES&H compliance, SAN has developed a plan for increased onsite presence at LLNL. SAN's stated objective is to enhance its awareness of, and thereby its potential impact on, the day-to-day operations at LLNL. Based on this plan, SAN has announced its intention to increase its onsite work force from about 10 to about 40 in the areas of program oversight and ES&H management.

SAN has not yet established its position regarding onsite decision authority, either within SAN or between SAN and LLNL. For example, as initially presented to the Management Subteam, the Senior Manager on site would not have authority to direct LLNL work, would not have "stop-work" authority delegated from the SAN Manager and would not have supervisory authority over many of SAN's onsite technical staff. Furthermore, since at least three Assistant Managers based in Oakland would retain responsibility for assigned LLNL programs, many programmatic issues that arise onsite may have to go to the SAN Manager's Office for resolution. Later it was learned that SAN is reexamining all of these issues with the explicit intent of increasing the decision authority and management responsibility of the "DOE Site Manager" and making him a Contracting Officer.

An additional concern is that SAN has not yet developed a consistent approach for onsite management and oversight related to individual programs. For example, the Environmental Restoration and Waste Management Division has planned for onsite residence of all managers and staff, except for those few personnel who are primarily involved in programs at other laboratories. A similar situation prevails for the AVLIS Programs Division and LLNL Operations Division. On the other hand, the Weapons Development Division has no plans for onsite residence of the technical staff who are directly responsible for oversight of the weapons programs, in spite of the fact that these programs constitute about one-third of the total LLNL budget.

Another concern is that SAN is not sufficiently staffed, in quantity or technical depth, to ensure that increased onsite presence will provide added value to its day-to-day oversight functions. Many of the planned key onsite positions are now vacant and, although there are expectations and commitments to fill these open slots, there is little assurance that the necessary technical expertise can be acquired and retained. Also, current staff ceilings may be too low.

Finally, it does not appear that SAN has yet selected, from a range of potentially viable options, the manner in which it will conduct its day-to-day interactions with LLNL managers and staff. This is essential for maintaining a proper balance between SAN being able to verify the adequacy of LLNL's management, technical and operational aspects of each program and not impeding the work effort or diminishing the overall quality of LLNL's performance.

FINDING M14: SAN's program for conducting formal assessments of LLNL's ES&H performance does not provide for independent assessment.

Summary

SAN responsibility and accountability for conducting formal assessments of LLNL's ES&H activities is assigned to SAN managers who also have line responsibility for assuring implementation of those same ES&H programs. This constitutes a conflict of interest which is not mitigated by an independent assessment program.

Discussion

In the SAN organization, responsibility and accountability for conducting formal assessments (i.e., appraisals, audits, surveillances, and walkthroughs) of ES&H activities at LLNL is assigned to the same organizational unit that is responsible for assuring full implementation of DOE's ES&H programs. This is true whether the ES&H implementation function is assigned to a "programmatic" organization, e.g., the Environmental Restoration and Waste Management Division and the AVLIS Programs Division, or to an "institutional" organization such as LLNL Operations Division. It is also true whether the SAN ES&H staff that support these implementation and assessment activities are "matrixed in" or administratively assigned to the responsible organization.

This dual ES&H responsibility creates a situation in which those SAN managers who are responsible for conducting formal assessments of LLNL's ES&H activities have a strong, vested interest in the outcome of these assessments. Consequently, these SAN managers are placed in potential conflict of interest situations. A SAN program of independent assessment could mitigate these situations. However, it is SAN's interpretation that DOE policy no longer requires such an independent assessment function at SAN.

The only form of independent ES&H assessment within SAN is the Office of Internal Independent Oversight which reports directly to the SAN Manager. However, in contrast to the common perceptions of most SAN Division Managers, this Office has been chartered only to evaluate the adequacy and effectiveness of SAN's ES&H activities and not to provide independent assessments, even on a random basis, of LLNL's ES&H performance.

FINDING M15: SAN's management system for directing the incorporation of DOE Orders into LLNL's policies and procedures is out-of-date and does not assure that DOE's guidance is fully understood or that LLNL's response is timely and credible.

Summary

SAN's primary management mechanism for implementing DOE Orders is its Management Directives (MDs). These MDs, however, are out-of-date and, although new MD procedures are being implemented, they do not contain adequate provisions for ensuring timely and accurate transmittal of DOE guidance to LLNL or timely and credible responses by LLNL.

Discussion

The heart of SAN's management system for implementing DOE Orders is its MDs. These MDs are critical because they are the primary instruments for SAN to transmit Orders to LLNL with necessary and sufficient augmentation to assure relevance to the management and operations of LLNL. Many of these MDs are also critical because they carry the weight of the contract between UC and DOE.

At present, the MD system needs extensive updating. New procedures for accomplishing this, as well as for handling future responses to new or modified DOE Orders, have been developed by SAN, but they have not been implemented or tested yet.

The new MD procedures do not have formal mechanisms for ensuring timely and credible responses to the intent and purposes of the Orders. There is no formal mechanism to establish priorities and schedules for responsive action by a designated lead Division within SAN. In addition, there is no formal tracking mechanism to monitor progress and highlight matters requiring the attention of the SAN Manager, if and when required. Furthermore, there are no formal mechanisms for incorporating reviews by managers and staff that are independent of those SAN divisions directly involved in preparing the necessary action.

Another concern about the new MD procedures is the absence of formal mechanisms for ensuring timely and credible responses by LLNL to DOE directives and associated guidance. In particular, there is no single focal point within LLNL for receipt and handling of these directives and guidance or for coordinating and tracking LLNL's responses. In addition, there is no single focal point within SAN for tracking LLNL's actions and then coordinating SAN's review of the results.

FINDING M16: The management and operating contract between the University of California and DOE does not have adequate provisions or incentives for ES&H performance.

Summary

The contract between the University of California (UC) and DOE has been essentially unchanged for about 40 years. Consequently, it does not reflect the Secretary's views about the importance of ES&H objectives relative to

program objectives. In addition, it has no explicit incentives for UC to assure full compliance with ES&H requirements.

Discussion

The contract between UC and DOE for management and operation of LLNL has remained essentially unchanged since its inception. The purpose of the contract was to form a partnership between DOE and the University to accomplish atomic weapons research and development. The contract contains articles that address public and worker health, as well as nuclear safety, radiation protection and clean air, but the scope of work places paramount importance on research and development, and the achievement of programmatic objectives.

The contract has served the Nation well for nearly 40 years. Throughout this period, LLNL has maintained an outstanding record of research leadership, programmatic accomplishment, and weapons safety. The contract has not, however, kept pace with evolving views on the relative importance of environmental protection. A 5-year extension of the contract was signed in 1987, but the terms and conditions regarding ES&H issues were not changed. Thus, the relative importance of ES&H objectives versus programmatic objectives remains unaddressed, and the contract does not reflect or reinforce one of the basic tenets of the Secretary's ES&H initiatives.

6.6 NOTEWORTHY PRACTICES

No Noteworthy Practices were identified during this Assessment.

6.7 TEAM COMPOSITION AND AREAS OF RESPONSIBILITY TIGER TEAM ASSESSMENT - MANAGEMENT SUBTEAM

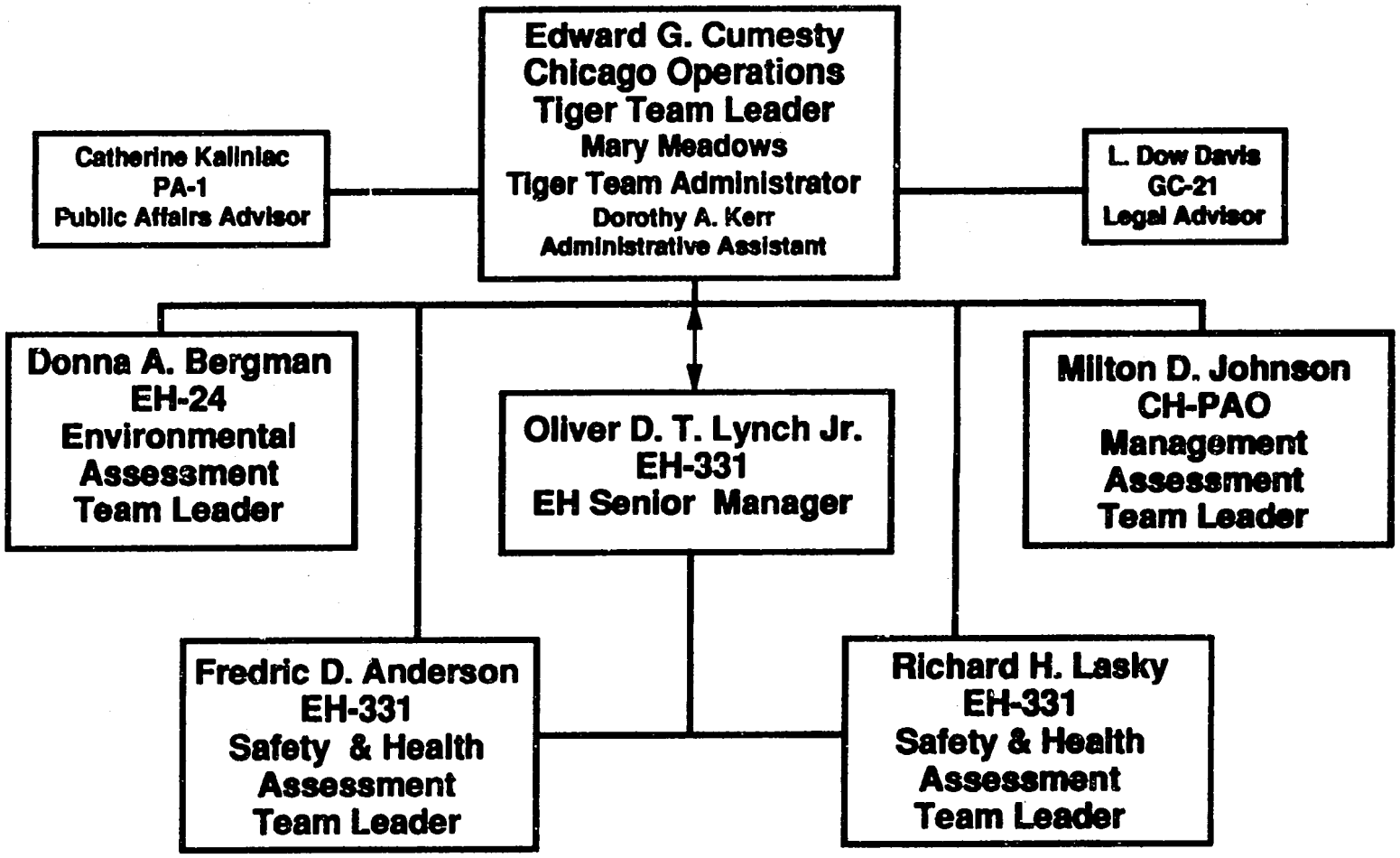
Areas of Responsibility	Name/Organization
Subteam Leader	Milton D. Johnson U. S. Department of Energy Chicago Operations Office Princeton Area Office
Management/Organization	Kenneth C. Brog Battelle Office of Waste Technology Development, Nuclear Systems Group
Administrative Assistant	Dorothy Ann Kerr U. S. Department of Energy Chicago Operations Office Princeton Area Office
Management/Environmental	Marvin J. Laster Independent Consultant
Management/Safety and Health	Lester K. Price U. S. Department of Energy Oak Ridge Operations Office
Management/Environmental	Louis A. Rancitelli Battelle Nuclear Systems Group Special Projects Office
Management/Safety and Health	Richard A. Robinson Battelle Office of Waste Technology Development, Nuclear Systems Group
Budget and Finance	Edward H. Winkler Princeton Plasma Physics LLNL Princeton University

APPENDIX A

TIGER TEAM ASSESSMENT PERSONNEL AND BIOGRAPHICAL SKETCHES

APPENDIX A-1

Biographical Sketches of
Tiger Team Assessment Team Leader
and Team Leader Staff
Lawrence Livermore National Laboratory



HQ Support
Special Projects, EH-24

SAN Support
Scott Samuelson
Ed Keheley
Richard Nolan

LLNL Support
John Clatworthy
Olga Jones

DP Liason
Roy W. Lee, DP-222

Figure A-1. Tiger Team Organization

NAME: Edward G. Cumesty

AREA OF RESP: Tiger Team Leader

ASSOCIATION: U.S. Department of Energy

EXPERIENCE: 21 years

- o Deputy Manager, Chicago Operations Office
  - Executive responsibilities for a 600 person operation with scientific, engineering and business management capabilities.
  - Responsible for institutional management of national laboratories and technical and business support to programs.
- o Assistant Manager for Laboratory Management, Chicago Operations Office
  - Senior management responsibility for the five Chicago Area Offices and DOE institutional interests at Ames Laboratory.
- o Director, Policy Division, Procurement Directorate, DOE HQ
  - Directed the development of new procurement and financial assistance policies and maintained the regulatory base for DOE business functions.
  - Wrote, and defended to the FAR Council, the final version of FAR 17.6 on the management and operating contract concept.
- o Director, Major Systems Acquisition Division, Procurement Directorate, DOE HQ
  - Responsible for the DOE Source Evaluation Board process used for all competitive contracts above $5 million.
  - Responsible for the Procurement Directorate role in DOE implementation of OMB Circular A-109 on the management of major systems acquisition projects.
- o U.S. Navy
  - Supply Corps Officer

EDUCATION: A.B. Economics, Rutgers University
M.S. Management, Frostburg State University

NAME: L. Dow Davis

AREA OF RESP: Legal Advisor

ASSOCIATION: DOE Office of General Counsel, Headquarters

EXPERIENCE: 17 years

- o DOE litigation attorney for NEPA, defense projects, nuclear waste and radiation injury lawsuits.
- o Counsel for defense, energy, and veterans matters to Senator Don Nickles of Oklahoma.
- o NRC Licensing attorney for nuclear powerplants.
- o Captain, United States Naval Reserve, Office of the Secretary of the Navy, Office of the Secretary of Defense and Office of the Chief of Naval Operations.

EDUCATION: B.A. Political Science, University of Oklahoma
J.D. Georgetown University Law Center

NAME: Mary Meadows

AREA OF RESP: Tiger Team Administrator

ASSOCIATION: U.S. Department of Energy Headquarters, Office of Safety Appraisals

EXPERIENCE:

o U.S. Department of Energy

- Appraisal Specialist, Office of Safety Appraisals. Participated in planning and conducting Tiger Team Assessments, Technical Safety Appraisals, Management Appraisals, Nuclear Safety Program Appraisals, Design Reviews, and Comprehensive Appraisals since 1981.
- Staff Assistant, Office of Environmental Compliance and Overview.
- Staff Assistant, Office of Bio-Medical and Environmental Research, USAEC, ERDA.
- Staff Assistant, Office of the Commissioner, USAEC.
- Administrative Assistant, Office of the Assistant General Manager for Research and Development, USAEC.

o Other Related Experience

- Administrative and conference planning positions within the USAEC, ERDA, and DOE.

EDUCATION: Numerous work-related courses and workshops at various colleges and training centers

OTHER: Member, U.S. Delegation to Disarmament Conference, Geneva, Switzerland, USAEC
Recipient of Federal Government Awards for superior performance

NAME: Dale A. Moul

AREA OF RESP: Report Technical Manager

ASSOCIATION: Battelle-Columbus Operations

EXPERIENCE: 20 years

- o Battelle-Columbus Operations
  - Participated in TSAs for Paducah Gaseous Diffusion Plant, Idaho Chemical Processing Plant, High Flux Beam Reactor, and Rocky Flats Plant, and Feed Materials Production Center; and Tiger Team for Nevada Test Site.
  - Associate Section Manager, Systems Safety and Security Unit: Manages personnel involved in performing safeguards, security and safety reviews of DOE weapons complex and NRC nuclear facilities. Participates in technical aspects of selected work efforts involving physical security, safety/ safeguards interactions, and emergency readiness.
  - Program Manager, DOE Office of Security Evaluations support contract for inspections and evaluations of safeguards and security of DOE facilities.
  - Member, Nuclear Weapons Modernization Task Force, Safeguards and Security Subcommittee.
- o NUSAC, Inc./Wackenhut Advanced Technologies Corporation
  - Manager/Director, Special Projects: Led and participated in support projects for private industry, the nuclear industry, and government involving emergency preparedness, safety/safeguards issues, emergency response training, and legal aspects of regulatory issues.
- o U.S. Army - Six years of experience involving counterintelligence and physical security assignments. Led teams of inspectors and investigators that performed penetration inspections and counterintelligence/security audits of military installations.

EDUCATION: B.S. Social Science, Michigan State University
J.D. Law, University of Maryland

OTHER: Member, Virginia State Bar Association
Certified Protection Professional, American Society for Industrial Security (ASIS)
Member, Institute of Nuclear Materials Management
Member, Standing Committee on Disaster Manager, ASIS

APPENDIX A-2

Biographical Sketches of Team Members
Tiger Team Assessment
Environmental Subteam
Lawrence Livermore National Laboratory

NAME: Donna A. Bergman

AREA OF RESP: Environmental Subteam Leader

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

EXPERIENCE: 14 years

- o Department of Energy
  - Environmental Audit Team Leader for Assessment of Environmental Conditions at the Rocky Flats Plant, Environmental Team Leader for Nevada Test Site and Lawrence Livermore National Laboratory Tiger Teams. Environmental Survey Team Leader for 13 DOE facilities for Phases II and III of the Environmental Survey Prioritization and preparation of the Final Survey Summary Report.
  - Asst. Team Leader for the Environmental Surveys of 13 DOE facilities. Included planning activities in preparation for the on-site Survey, team management during the on-site Survey, guidance in report preparation, and sampling and analysis responsibilities.
  - Environmental Compliance Coordinator between Idaho Operations Office and DOE HQ, and Oak Ridge Operations Office and DOE HQ for purposes of environmental compliance and oversight in regards to applicable environmental requirements.

- o Department of Commerce, Economic Development Administration
  - Senior Environmental Protection Specialist responsible for the development and implementation of environmental policy and directives. Provided guidance to regional officers for interpretation of environmental regulations as they related to economic development strategies.

- o Department of the Interior, Bureau of Land Management
  - Natural Resource Specialist/Planning Coordinator responsible for providing guidance, assistance, and quality control for multiple-use planning. Served as Team Leader for the preparation of comprehensive multiple-use plans.

- o Department of Agriculture, Soil Conservation Service
  - Soil Conservationist

EDUCATION: B.S. Plant Resources Management, University of Maryland
Graduate Studies in Environmental Planning, University of Virginia

NAME: David S. Shafer

AREA OF RESP: Assistant Team Leader

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

EXPERIENCE: 7 years

- o Department of Energy
  - Environmental Audit Assistant Team Leader for Tiger Team Assessments at the Portsmouth Gaseous Diffusion Plant and at Lawrence Livermore National Laboratory. Assistant Team Leader for Environmental Survey Prioritization for preparation of the Final Environmental Survey Summary Report.
- o National Park Service
  - Fire ecology and paleoecology research at the Indiana Dunes National Lakeshore as part of the Great Lakes Fire Ecology Project.
  - Natural Resource Management Specialist at Great Basin National Park (formerly Lehman Caves National Monument).
  - Assistant Seasonal Supervisory Ranger, Wind Cave National Park.
- o Teaching and Research
  - Colgate University, Hamilton, NY: Geology Instructor for courses in geomorphology and glacial geology, and introductory geology.
  - University of Arizona: conducted research on Quaternary paleoecology, paleoclimates, and geomorphology of the Southwest U.S. and Mexico.
    Taught Laboratory courses in geomorphology and stratigraphy.
  - University of Tennessee: conducted research on Pleistocene geomorphology and ecology in the southern Appalachian Mountains. Taught lab courses in environmental/engineering geology and introductory geology.
  - Field Instructor at the Hancock Desert Field Station, Oregon Museum of Science and Industry.

EDUCATION: B.S. Geography and Geology, Oregon State University
M.S. Geology, University of Tennessee
Ph.D. Geosciences, University of Arizona

NAME: Thomas L. Anderson

AREA OF RESP: NEPA

ASSOCIATION: Pacific Northwest Laboratory (PNL)/Battelle Memorial Institute

EXPERIENCE: 17 years

- o Currently assigned to U.S. Dept. of Energy (DOE), Office of NEPA Project Assistance for review and processing of DOE National Environmental Policy Act (NEPA) documentation for approval by the Assistant Secretary for Environment Safety and Health.

- o Performed DOE "Tiger Team" survey at the Nevada Test Site to evaluate the adequacy of existing National Environmental Protection Act (NEPA) documentation.

- o Senior level project management and leadership for a diverse group of Battelle projects including:

  - Preparation of "Environment, Safety, and Health Needs of the U.S. Department of Energy" (DOE/EH-0079);
  - RCRA/CERCLA compliance at the Hanford Site;
  - Siting of a Low Level Radioactive disposal facility in Illinois;
  - Environmental compliance support for the High Level Waste Salt Repository Project;
  - Management of all environmental contractors providing input to the Civilian Radioactive Waste Management Programs's Secondary (Crystalline) Repository Project;
  - Design/execution of a detailed surface and subsurface characterization of a radiologically contaminated site; and
  - Site selections and impact assessments for power plants, highways, dams, waste treatment facilities, mines, pipelines, and nuclear enrichment facilities for a variety of Federal, State, and local agencies and industrial clients.

EDUCATION: B.S. Botany, Ohio State University

NAME: Richard A. Barringer

AREA OF RESP: NEPA

ASSOCIATION: Oak Ridge National Laboratory (ORNL)/JAYCOR

EXPERIENCE: 5 years

- o Oak Ridge National Laboratory (ORNL)/JAYCOR
  - Performed DOE "Tiger Team" surveys at the Pinellas Plant and Savannah River Site to evaluate the adequacy of existing National Environmental Protection Act (NEPA) documentation.
- o LABAT-ANDERSON Incorporated
  - Provided technical analysis of private contractor-prepared Defense Facilities Decommissioning Program and Formerly Utilized Sites Remedial Action Program RI/FS work plan documents including evaluation of hydrogeological survey accuracy and compliance with Environmental Protection Agency (EPA) guidelines and NEPA.
  - Reviewed and evaluated Nuclear Regulatory Commission policy guidance documents concerning groundwater protection standards and alternate concentration limit application and review procedures for active/inactive DOE uranium mill tailing sites.
  - Prepared EPA Uncontrolled Hazardous Waste Site Ranking System environmental evaluations for Department of Defense military installations in support of nominations to the National Priority List and subsequent eligibility for the DOD remedial action program.
  - Prepared an Environmental Impact Statement (EIS) evaluating the potential consequences of Wild & Scenic River designation of the Mokelumne River in California for the U.S. Forest Service, Eldorado and Stanislaus National Forests.
  - Prepared an EIS detailing the environmental consequences of vegetation treatment (manual, mechanical, biological, thermal, and chemical) in 13 Western States for the Bureau of Land Management.

EDUCATION: B.S. Geological Sciences, Old Dominion University
M.S. Geological Sciences, Old Dominion University
USDA Graduate School, National Environmental Policy Act

NAME: Ralph Basinski

AREA OF RESP: Waste Management

ASSOCIATION: NUS Corporation

EXPERIENCE: 24 years

o NUS Corporation

- Participated in 8 environmental surveys, 1 RCRA Audit and 3 Tiger Team Assessments of USDOE facilities.
- Provides technical assistance supporting DOE's RCRA, CERCLA, CWA, CAA, and TSCA, programs reviewing regulatory development of proposed and final environmental regulations for impact on DOE facilities.
- Prepares and reviews RCRA Park B Permits, and Clean Air Act Permits.
- Prepares and presents environmental training courses to Tiger Team Waste Management Specialists, and environmental awareness courses to facility operating staffs, focusing on RCRA but including CAA and CWA requirements.
- Provides regulatory assistance and interpretations to NUS personnel and to industrial clients.
- Conducts environmental assessments and due diligence reviews for industrial clients.

o LTV Steel

- Reviewed environmental regulators on federal and state level to develop comments and determine compliance needs for LTV Plants.
- Prepared NPDES permit applications.
- Assisted plants in compliance activities.
- Established environmental chemistry analytical laboratory.

EDUCATION: B.S. University of Pittsburgh

NAME: Joseph A. Boros

AREA OF RESP: Surface Water

ASSOCIATION: NUS Corporation

EXPERIENCE: 38 years

- o NUS Corporation
  - Participated in 2 Tiger Team Assessments.
  - Served as Surface Water Specialist on 8 DOE Environmental Surveys.
  - Worked as Site Coordinator for prioritization efforts involving 3 DOE sites; assisted on 4 other DOE sites.
  - Led field investigation crews through on-site assessments for EPA at 60 iron and steel making facilities, and 25 molding and casting shops.
  - Participated in the writing of EPA Development Documents in support of rule making for regulating discharges from the iron and steel making and foundry industries.
  - Conducted environmental assessments for two automobile manufacturing plants and two plate glass manufacturing shops.
  - Managed an engineering research laboratory in support of FWQA investigations aimed at eliminating pollution from acid mine drainage in coal fields.
  - Supported chemical engineering projects for a variety of clients including utilities, non-ferrous metal plants, refineries and chemical manufacturers.
- o LTV Steel Corporation (and its predecessor, Jones and Laughlin Steel Corporation)
  - Supervised the environmental laboratory working on projects at all mills, mines, quarries and finishing plants.
  - Performed treatability tests and recommended optional treatment systems for control of pollution from mills and mines.
  - Developed basic designs for sedimentation processes, acid mine drainage treatment plants, pickle liquor neutralization processes, oil recovery and reuse systems, and phenol solvent extraction units.
  - Established air and water monitoring programs for 3 major integrated steel plants in 3 widely-separated cities.
  - Worked with state and federal regulatory agencies through permit applications and negotiations.

EDUCATION: A.B. Mathematics, Duquesne University
B.S. Chemistry, Grove City College

NAME: S. Charles Caruso

AREA OF RESP: Toxic and Chemical Materials/Quality Assurance

ASSOCIATION: NUS Corporation

EXPERIENCE: 35 years

o NUS Corporation

- Participated in 4 Environmental Surveys and 3 Tiger Team Assessments
- Prepared part of audit checklists of the Clean Air Act regulations for USDOE
- Prepares SARA Section 313 Chemical Release Inventory Reports for Chemical Plants
- Reviews and validates monitoring data from Superfund sites and Air Force Bases
- Prepares sampling and analysis plans for remedial investigations and field studies

o Carnegie Mellon University

- Managed an environmental research group
- Directed a study to control NO_x emissions from industrial processes
- Supervised and participated in an acid rain study
- Supervised studies concerned with the development of biological treatment processes for industrial wastewaters
- Directed a survey of industrial wastewaters for priority pollutants
- Supervised the evaluation of processes for control of air pollutants from coke, iron and steel making plants
- Evaluated and developed physical/chemical processes for control of pollutants in industrial wastewaters
- Developed analytical methods for the determination of specific pollutants in industrial wastewaters and air emissions
- Planned and participated in water quality surveys of rivers and lakes
- Conducted studies on the source of organoleptic compounds in drinking water
- Served as an advisor to an industrial committee of analytical chemists and assisted in the preparation of a QA/QC manual
- Conducted a study to evaluate waste oils for toxic materials

EDUCATION: B.A. Chemistry, Alfied University
Ph.D. Chemistry, University of Pittsburgh

NAME: Lisa M. Drinkhall

AREA OF RESP: Administrative Support

ASSOCIATION: NUS Corporation

EXPERIENCE: 8 years

o NUS Corporation

- Department Secretary for the Chemistry/Toxicology Department. Responsible for secretarial and administrative support for the Manager of Department and 9 professionals. List of responsibilities include:
- Tabulation of laboratory analytical results for data validation
- Review quality control of analytical data
- Input and process data validation information for active projects on computers (Lotus 1-2-3)
- Lead typing responsibility for the department to include: Memoranda, letters, small reports on Xerox Memorywriter; project reports prepared on PC word processing software (Officewriter)
- Compose memos and letters for department manager and professional staff
- Coordinate xeroxing and binding of reports, memorandum and correspondence
- Answer telephones, screen calls, answer inquiries for department manager and staff; provide phone coverage for up to 3 additional departments as needed (60 staff)
- Set up and maintain correspondence and project files
- Responsible for mail and package shipment and internal distribution
- Make travel arrangements for manager and professional staff; maintain travel itineraries for department and handle travel advance requests
- Set up meetings for professional staff including conference room preparation, luncheons, travel arrangements and accommodating special needs for visiting clients

TIGER TEAM EXPERIENCE: Served as the Environmental Team Administrator for the DOE Tiger Team Assessment at Nevada Test Site in Mercury, Nevada. Responsibilities included:

o Coordinating of the environmental portion of the Tiger Team report
o Typing of the actual report on WordPerfect 5.0
o Coordination of schedules, tables, etc. for the report
o Answering of telephones for Environmental Team. Provide backup coverage for Safety and Health Team, and Management Team
o Provide supplies for Teams, distribution of telefaxes to various Team members

EDUCATION: West Allegheny Senior High School
General Studies, Graduation - 1983

OTHER: DOE Special Environmental Team Training (1 day)
Quality Education Classes (2 weeks)

NAME: Tommy F. Eckle

AREA OF RESP: Air

ASSOCIATION: NUS Corporation

EXPERIENCE: 34 years

- o NUS Corporation
  - Participated in one Tiger Team Assessment
  - Served as Air Specialist on 6 DOE Environmental Surveys (11 Sites)
  - Served as Site Coordinator in the Prioritization of the DOE Environmental Survey Findings
- o US Steel Corporation
  - Performed air-dispersion modeling to demonstrate effectiveness of emission-control alternatives
  - Developed inventories of air-pollutant sources at integrated steel mills
  - Developed and conducted a road-dust emission-sampling program at a major steel mill
  - Coordinated installation of an ambient-air monitoring station for prevention of significant deterioration purposes

EDUCATION: B.S. Chemistry, West Virginia Institute of Technology

NAME: James K. Gilliam

AREA OF RESP: NEPA

ASSOCIATION: U.S. Dept. of Energy, Office of NEPA Project Assistance

EXPERIENCE: 16 years

- o U.S. Department of Energy, Office of NEPA Project Assistance
  - Review and processing of Department of Energy (DOE) National Environmental Policy Act (NEPA) documentation for approval by the Assistant Secretary for Environment, Safety and Health.
  - Performed DOE "Tiger Team" surveys at the PANTEX and Kansas City Plants to evaluate the adequacy of National Environmental Protection Act (NEPA) documentation.
- o U.S. Dept. of the Interior, Minerals Management Service
  - Preparation of NEPA documentation for off-shore oil/gas leasing.
- o U.S. Dept. of the Interior, Bureau of Land Management
  - Federal field inspection with emergency spill response responsibilities for the Trans-Alaska Pipeline System. Preparation of NEPA documentation for Alaskan North Slope oil/gas leasing.
- o U.S. Dept. of the Interior, Office of Surface Mining
  - Federal field inspection of coal strip mines.
- o U.S. Dept. of the Interior, Fish and Wildlife Service
  - Preparation of environmental studies for Alaskan North Slope oil and gas leasing including wetland protection at Prudhoe Bay, Alaska.
- o U.S. Dept. of Defense, Army Corps of Engineers
  - Preparation of NEPA documentation for Corps/Corps permitted actions.
- o Commonwealth Associates, Inc.
  - Preparation of environmental permitting reports for pipelines, power lines, power plants, and strip mines.

EDUCATION: B.S. Biology, University of Illinois
M.S. Zoology, Eastern Illinois University

NAME: Cynthia G. Heckman

AREA OF RESP: NEPA

ASSOCIATION: Oak Ridge National Laboratory (ORNL)/Martin Marietta Energy Systems, Inc.

EXPERIENCE: 5 years

- o Performed DOE "Tiger Team" surveys at the Rocky Flats, FMPC/Fernald, PANTEX, Kansas City, and Savannah River facilities to evaluate the adequacy of existing National Environmental Protection Act (NEPA) documentation.

- o Assisted in the development of the NEPA Compliance Audit Protocol used on "Tiger Team" assessments.

- o Responsible for the maintenance and updating of the Department of Energy (DOE) National Environmental Policy Act (NEPA) Memoranda-to-File database and Environmental Guidance Program Reference Books on 14 major environmental statues.

- o Duties with the Environmental Technology Division of the MAXIMA Corporation included:

  - Provided support to Oak Ridge National Laboratory programs with specific review of applicable environmental laws and regulations;
  - Technical analyses and management of databases related to the protection of environmental quality, public health, and occupational health and safety; and
  - Reviewed spill cleanup technologies using foams and other retardants on floating hazardous chemicals for the U.S. Coast Guard.

EDUCATION: B.A. Biology, Thomas More College
M.S. Biology, University of Kentucky

NAME: Amy E. Hubbard

AREA OF RESP: Inactive Waste Sites

ASSOCIATION: NUS Corporation

EXPERIENCE: 12 years

- o NUS Corporation
  - Team Member for one Tiger Team.
  - Hydrogeology Team Member for three Environmental Surveys.
  - Prepared CERCLA public health and environmental assessments and assessed contaminant fate and transport for more than 20 hazardous waste disposal sites.
  - Experience in groundwater monitoring network planning and installation, and collection/ interpretation of hydrogeologic data.
- o Westinghouse Electric Corporation
  - Project supervisor for 13 active and inactive facilities requiring remediation.
- o Gannett Fleming Environmental Engineers
  - Assisted in preparation of 10 EISs for wastewater treatment and transportation projects.
  - Supervised collection of geotechnical data for various engineering projects.
- o Delaware County Planning Department
  - Prepared environmental assessments for major land development projects.
  - Reviewed development plans for compliance with local laws and for potential for adverse impacts.

EDUCATION: B.A. Geology, Franklin and Marshall College
M.R.P. Environmental Planning, University of Pennsylvania

NAME: Steven Masciulli

AREA OF RESP: Radiation/Quality Assurance/Waste Management

ASSOCIATION: Vertechs Inc.

EXPERIENCE: 15 years

- o Vertechs Inc., Senior Specialist, responsible for health physics, dose assessments, emergency planning, audits, appraisals and computer applications.

- o Cygna Group, Division Manager and Senior Technical Specialist, responsible for health physics, emergency planning, quality assurance and computer applications.

  - Performed numerous investigations, audits and appraisals of applied health physics and radiological environmental and effluent monitoring programs, including DOE Tiger Team or Nevada Test Site.
  - Developed and ran database and technical computer programs for off-site dose assessment, radiological effluent monitoring, control room habitability, and shielding analysis.
  - Developed emergency plans, wrote scenarios, and acted as a controller for numerous drills and exercises.
  - Supervised radiological environmental monitoring laboratory.

- o New York Power Authority

  - Senior Radiological Appraisal Specialist, responsible for developing and implementing appraisal program for health physics and radiological effluent and environmental monitoring programs.
  - Supervisory Radiological Engineer, supervised a group of radiological engineers responsible coordination, development, and implementation of health physics and environmental programs.
  - Radiological Engineer

- o Consolidated Edison Company of New York Inc., Nuclear Environmental Monitoring Engineer

- o General Dynamics Corporation, Electric Boat Division, Radiation Control Engineer

EDUCATION: B.S. Radiological Sciences, Lowell Technological Institute
M.S. Applied Science, New York University

OTHER: Certified Health Physicist (comprehensive and power reactor specialty)

NAME: Mary S. Robison

AREA OF RESP: Groundwater/Soil

ASSOCIATION: NUS Corporation

EXPERIENCE: 30 years

- o NUS Corporation
  - Served as Groundwater Specialist on 7 DOE Environmental Surveys (12 sites).
  - Acted as assistant to site coordinator on DOE prioritization of Environmental Survey results for the Rocky Flats Plant, Colorado, and Oak Ridge Y-12 Plant, Tennessee, facilities.
  - Involved with assessment checklist development for the DOE/OEV Tiger Team Environmental Assessment.
  - Supervised field investigation of Superfund site contaminated with radioactive waste.
  - Performed aquifer testing at Superfund sites in Region I.
  - Planned and conducted environmental baseline sampling for an industrial client.
  - Served as client liaison and project manager for radiological environmental monitoring programs at nuclear power plants.
  - Planned hydrogeological investigation to support RCRA Part B permit application for an industrial client.
  - Identified potential groundwater contaminant sources and solid waste management units for an industrial client.
- o Teledyne Isotopes
  - Managed analytical services in radiometric dating and stable isotope ratio measurements for clients in the petroleum and mining industries.

EDUCATION: B.S. Chemistry, Marian College
M.S. Biochemistry, Medical College of Georgia
Ph.D. Geochemistry, University of Pittsburgh

NAME: Lorene L. Sigal

AREA OF RESP: NEPA

ASSOCIATION: Oak Ridge National Laboratory (ORNL)

EXPERIENCE: 10 years

- Performed DOE "Tiger Team" surveys at the Rocky Flats, FMPC/Fernald, Mound, Nevada Test Site, and Pinellas facilities to evaluate the adequacy of existing National Environmental Protection Act (NEPA) documentation.
- Preparation of terrestrial ecology sections of 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.
- Technical assistance to the DOE Office of NEPA Project Assistance. Development of the draft DOE NEPA Compliance Guide and the Doe NEPA Compliance Audit Protocol.
- Preparation of the DOE Regulatory Compliance Guide for Prevention of Significant Deterioration under the Clean Air Act.
- Team Leader for the ORNL environmental compliance assessments for the U.S. Air Force under their Environmental Compliance and Management Program (ECAMP).

EDUCATION: Ph.D. Botany and Microbiology, Arizona State University

NAME: Marilyn E. Stone

AREA OF RESP: Special Assistant

ASSOCIATION: U.S. Department of Energy Headquarters
Office of Environmental Guidance and Compliance, Environmental Compliance Division

EXPERIENCE: 11 years

- o U.S. Department of Energy
  - Facility Coordinator for the San Francisco Operations Office, focusing on environmental compliance issues and activities at Lawrence Livermore and other SAN facilities.
- o U.S. Environmental Protection Agency
  - Section Chief in the Superfund Program, focusing on RCRA/CERCLA integration issues and policies concerning compliance with other laws at Superfund cleanups.
  - Project manager in the Office of Policy and Program Management, Program Evaluation Division, responsible for conducting internal evaluation of EPA programs and implementation problems.
  - Staff in the Office of Toxic Substances, responsible for developing regulations for existing chemicals under the Toxic Substances Control Act.

EDUCATION: B.S. Biology, Tufts University
M.P.H. Public Health, Boston University School of Medicine

NAME: Philip R. Winsborough

AREA OF RESP: Waste Management

ASSOCIATION: NUS Corporation

EXPERIENCE: 16 years

- o NUS Corporation
  - Project manager Hydrology/RCRA program concentrating on RCRA remedial investigations, closures and groundwater investigations
  - RCRA specialist for the DOE Special Assignment Environmental Team at four DOE facilities.
  - Groundwater specialist for DOE Special Assignment Environmental Team one DOE facility
- o Texas Water Commission
  - Staff Geologist with the Hazardous and Solid Waste Enforcement Division reviewed compliance with RCRA and state regulations by industries
  - Reviewed inspections for compliance, wrote enforcement and compliance orders
  - Reviewed groundwater models of contaminant transport
  - Expert witness in RCRA public hearing on hazardous waste facility permit
- o Paulus, Sokolowski and Sartor
  - Project Manager, Hydrogeology Section leader
  - Technical lead for groundwater investigations, remedial investigations, pre-purchase assessments of real estate, and contaminant surveys of industrial plants
- o Espey, Huston and Associates
  - Staff Geologist and Project Manager
  - Performed groundwater assessments in support of surface mining, deep well injection, water supply, RCRA and state regulations, and conducted Environmental Impact Assessments

EDUCATION: B.A. Geology, University of Texas at Austin
Graduate Studies in Hydrogeology, Villanova University

NAME: J. David Yesso

AREA OF RESP: Technical Coordinator

ASSOCIATION: NUS Corporation

EXPERIENCE: 19 years

- o NUS Corporation
  - Technical coordinator and radiation specialist for the Tiger Team Assessment of the Nevada Test Site, the assessment of Environmental conditions at the Rocky Flats Plant as part of the DOE Special Assignment Environmental Team, and for Environmental Surveys at seven DOE facilities
  - Conducted audits of utility chemistry programs
  - Provided consulting services to the nuclear utility industry in radiochemistry and laboratory quality assurance
  - Developed and directed the NUS Chemistry Training Center
- o Battelle, Columbus Laboratories
  - Group Leader for Radiochemistry
  - Managed nuclear facility's radiological laboratory
  - Project Manager for program to characterize wastes from the Three Mile Island Unit 2 cleanup
  - Technical consultant on program to calibrate and redesign utility radiation monitoring system
  - Project Manager or technical lead on research projects related to various aspects of the nuclear fuel cycle
- o University of Pittsburgh, Department of Physics and Chemistry
  - Conducted research on the mechanisms of neutron damage to metals
  - Researched the interactions of heavy ions with matter
  - Responsible for design and development of accelerator ion sources

EDUCATION: B.S. Chemistry, University of Pittsburgh
Ph.D. Nuclear Chemistry, University of Pittsburgh

APPENDIX A-3

Biographical Sketches of Team Members
Tiger Team Assessment
Safety and Health Subteam
Lawrence Livermore National Laboratory

NAME: Oliver D. T. Lynch, Jr.

AREA OF RESP: EH Senior Manager

ASSOCIATION: U.S. Department of Energy Headquarters, Office of Safety Appraisals

EXPERIENCE: 26 years

- o U.S. Department of Energy, Germantown, Maryland
  - Director, Safety Inspections Division, OSA
- o 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
- o International Atomic Energy Agency
  - Technical Working Group Leader, Vienna, Austria
  - Instructor, Cairo, Egypt
- o General Dynamics, Electric Boat Division, Groton, Connecticut
  - Chief, Radiological Control Health Engineering
- o U.S. Atomic Energy Commission, Las Vegas, Nevada
  - Radiological Specialist
- o San Diego State University, San Diego, California
  - Assistant Radiological Safety Officer

EDUCATION: B.S. Applied Physics, San Diego State University
M.S. Nuclear Physics, San Diego State University

OTHER: Member, Health Physics Society
Member, American Forestry Association
Sigma Pi Sigma
Author, Textbooks and Training Manuals, Small Craft Safety, Operations, and Navigation

NAME: Fredric D. Anderson

AREA OF RESP: Health and Safety Subteam Leader - Main Site LLNL

ASSOCIATION: U.S. Department of Energy Headquarters

EXPERIENCE: 36 years

- o Team Leader - Office of Safety Appraisals, Department of Energy

- o Private Consultant - Nuclear Safety of Power/Research Reactors
  - Technical Specifications
  - Prudency Reviews for Public Utility Commission Hearings
  - Preparation and Review of Safety Analysis Reports
  - Verification and Readiness Reviews of Power Plants for Licensing
  - Emergency Planning and Rad Protection Programs

- o U.S. Nuclear Regulatory Commission
  - Senior Reactor Engineer: Technical Specifications/Westinghouse Power Plants
  - Senior Nuclear Engineer: Regulatory Requirements/Siting Policy and Practices

- o U.S. Atomic Energy Commission
  - Lead Reactor Engineer: Operating Reactor Project Leader/Radiation Physics Specialist
  - Nuclear Engineer: Special Safety Concerns for Power Reactors; SNAP/ROVER/PLUTO Safety Reviews

- o Atomics International
  - Senior Research Engineer: Manager of SNAP Reactor Safety Programs (Experimental and Analytical)
  - Research Engineer: Shield Analyst for OMR and SGR Programs (Experimental and Analytical): Waste Disposal Systems and Hot Cells Design

- o U.S. Public Health Service
  - Commissioned Officer: Radiological Health Instructor and Editor of Publications; Operation Redwing Monitoring Team Member

- o N.C. State University - Physics Instructor

EDUCATION: B.S. Math/Physics, Purdue University
M.S. Engineering Physics, N.C. State University

OTHER: Marquis' Who's Who in the East
Leaders in American Science
Dictionary of International Biographies
Sigma Pi Sigma

NAME: Richard H. Lasky

AREA OF RESP: Health and Safety Subteam Leader - HEAF and Site 300

ASSOCIATION: U.S. Department of Energy Headquarters

EXPERIENCE: 16 years

- o U.S. Department of Energy
  - TSA Team Member, LBL, TSTA, ATR and Pantex
  - TSA Team Leader
- o U.S. Nuclear Regulatory Commission
  - Electrical Engineer, Instrumentation and Control Systems
  - Equipment Qualification and Test Engineer, Environmental Qualification Inspections
- o 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: Albert D. Morrongiello

AREA OF RESP: Assistant Team Leader - Main Site LLNL

ASSOCIATION: U.S. Department of Energy Headquarters

EXPERIENCE: 11 years

- o U.S. DOE - Assistant Team Leader in Safety Inspection Division
- o U.S. Nuclear Regulatory Commission - Resident Inspector
- o Environmental Protection Agency - Health Physicist

EDUCATION:
B.A. Chemistry, University of Rhode Island
M.S. Biology, University of Richmond
M.S. Professional Management, Florida Institute of Technology
Additional Studies at Rutgers University - Department of Radiation Science

NAME: Bal M. Mahajan

AREA OF RESP: Assistant Team Leader - HEAF and Site 300

ASSOCIATION: DOE/Headquarters, Office of Safety Appraisals

EXPERIENCE: 27 years

- o U.S. Department of Energy, Germantown, Maryland
  - Assistant Team Leader for Technical Safety Appraisals of DOE Facilities
  - Team Member on FMPC TSA
- o National Institute of Standards and Technology
  - Principal Investigator for Experimental and Theoretical Research in:
    Gas Absorption Kinetics, Evaluation of Indoor Air Quality and Air Cleaning Equipment
    Hydraulics of Water Supply and Drainage Systems.
    Natural Convective Heat and Mass Transfer
    Hazard Analysis and Technical Rationale for developing Test Protocols and Safety Performance Standards for various products and equipment
- o University of Maryland
  - Teaching: Power Plant Design and Operations, HVAC Systems, Heat Transfer, Thermodynamics, and Mechanics
  - Research: Fluid Jet Mixing, Pollution from Power Plants, and Emissivity of Gas Particle Mixtures

EDUCATION: B.S. Physical Sciences, Panjab University, India
M.S. Mechanical Engineering, University of Maryland
Ph.D. Mechanical Engineering, University of Maryland

OTHER: Professional Engineer, State of Maryland
Member of ASME, ASHRAE, ATM, and World Safety Organization

NAME: Ronald E. Alexander

AREA OF RESP: Occupational Safety

ASSOCIATION: Environmental Management Associates

EXPERIENCE: 20 years

- o Environmental Management Associates
  - Hazardous Material Management Consultant providing OSHA compliance assistance, hazardous waste assistance, environmental liability assessments, Safety Analysis Reports, permitting assistance, and Technical Safety Assessment assistance
- o 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 area

EDUCATION: B.S. Texas Tech University
Graduate Work - West Texas University

NAME: J. Kenneth Anderson

AREA OF RESP: Technical Support

ASSOCIATION: Private Consultant

EXPERIENCE: 38 years

- o Manager, Safety Assessment Office, Westinghouse Hanford
- o Manager, Nuclear Safety, Westinghouse Hanford
- o Executive Secretary and member, Westinghouse Hanford Safeguards (Nuclear Facility Safety Review) Council
- o Nuclear Facility (reactor and nonreactor) design analysis, operations analysis, and safety analysis at Hanford
- o Member of six DOE-HQ Technical Safety Appraisal Teams
- o Classification Officer (2.5 years), Westinghouse Hanford

EDUCATION: B.A. Physics, University of Utah
Graduate courses in physics, mathematics, and reactor design analysis, University of Idaho

NAME: George P. Bailey

AREA OF RESP: Emergency Preparedness

ASSOCIATION: Advanced Systems Technology, Inc.

EXPERIENCE: 25 years

- o Advanced Systems Technology, Inc.
  - Manager, Emergency Preparedness
- o Stone & Webster Engineering Corp.
  - Senior Emergency Planning Analyst
- o Public Service of Indiana - Marble Hill NGS
  - Senior Emergency Preparedness Licensing Engineer
- o Louisiana Power & Light - Waterford 3 SES
  - Site Emergency Planning Coordinator
- o Nuclear Energy Services, Inc.
  - Manager, Protective Services

EDUCATION:
University of Philippines
Texis 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 - Subcommittee on Siting, Licensing and Emergency Preparedness
AIF - Subcommittee on Safeguards
Society of Fire Protection Engineers

NAME: Lorin C. Brinkerhoff

AREA OF RESP: Organization and Administration

ASSOCIATION: Private Consultant

EXPERIENCE: 36 years

- o Nuclear Safety Technical Expert under contract to EG&G Idaho, Scientech, and Oak Ridge Associated Universities
- o Technical Safety Appraisal Team Leader, DOE, Office of Safety Appraisals
- o Reactor and Nuclear Facility Safety Specialist, AEC/ERDA/DOE
- o Senior Nuclear Engineer, Aerojet General Corporation, Nuclear Rocket Development Center (Nevada Test Site)
- o Reactor Foreman, Phillips Petroleum Co., Idaho Test Site
- o Graphite Research Analyst, Hanford Test Site, General Electric Company

EDUCATION: B.S. Chemical Engineering, University of Utah

OTHER: Past member of ANS-15 Standards Committee on Research Reactor Safety
Past Member of ANSI N-16 Standards Committee on Nuclear Criticality Safety
Listed in:
Who's Who in the East
Who's Who in the World

NAME: William A. Brobst

AREA OF RESP: Packaging and Transportation

ASSOCIATION: The Transport Environment, Inc., Kitty Hawk, NC

EXPERIENCE: 39 years

- o The Transport Environment, Inc. - President
  - Technical and management consulting in the field of hazardous materials transportation safety
- o Department of Energy - Director of Transportation Management
  - Developed and managed the agency program for R&D and risk management in energy/fuels transportation
  - Set policy and managed transportation operations
- o Atomic Energy Commission - Chief of Transportation
  - Developed and directed AEC's first centralized transportation management and R&D program
  - Set up a major package, vehicle, and safety system testing and risk analysis program
- o Department of Transportation - Deputy Director, Office of Hazardous Materials
  - Directed the DOT's technical program for hazardous materials safety regulatory development
- o U.S. Navy: Nuclear Weapons Officer
  - Radiological physics and dosimetry

EDUCATION: B.S. Chemistry, Northwestern University
Graduate work in Nuclear Engineering, University of Nevada and in Mathematics, University of Chicago

OTHER: Certified by American Board of Health Physics National Academy of Sciences' Committee on Transportation of Hazardous Materials (former Chairman)
Past Chairman of the Transport Advisory Group, IAEA DOE Independent Review Committee Member, TRU Waste Program

NAME: Woodson B. Daspit

AREA OF RESP: Auxiliary Systems

ASSOCIATION: W.B.D. Consulting Corporation

EXPERIENCE: 39 years

- o Consultant
  - Provide consulting services to DOE in the areas of reactor operations, auxiliary systems and technical support
  - Provide consulting services to Bechtel and Westinghouse on design of new low pressure, D_2O moderated production reactor
- o Du Pont, 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, heavy water technology, production reactor charge design, test reactor technical assistance, and production calculations (manual and automated)
  - Site Emergency Response Committee
  - Responsible for mechanical, electrical, and instrument assistance groups
  - Area Assistance: assigned in reactor building providing direct assistance to operating personnel, wrote incident reports, reviewed job plans, process improvements, etc
  - Shielding and Instrumentation Group Leader
  - Experimental Physics: startup of critical facility; construction checkouts; planning and performing experiments for application to production reactors
- o U.S. Naval Ordnance Test Station
  - High explosive research including use of very high speed photography

EDUCATION: B.S. Physics, Louisiana State University
M.S. Physics, Louisiana State University

OTHER: American Nuclear Society
Sigma Xi

NAME: Adolf S. Garcia

AREA OF RESP: Nuclear Criticality Safety

ASSOCIATION: Argonne National Laboratory

EXPERIENCE: 14 years

- o Criticality Safety Representative for the Reactor Experiments and Examinations Division
- o Served as the Nuclear Criticality Safety member of the Technical Safety Appraisal of the Savannah River Plant-Uranium Canyon and LLNL Plutonium Research Laboratory
- o Member of ANL Criticality Hazards Control Committee
- o Member of the ANL Nuclear Facility Safety Committee
- o Member of the Reactor Experiments and Examinations Division Safety Review Committee
- o Nuclear Criticality Safety and Fuels Management Engineer for the Hot Fuels Examination Facilities, ANL
- o Reactivity Worth of Material work with the Zero Power Plutonium Reactor, Applied Physics Division, ANL
- o Nuclear Material Safeguards and Security for the Hot Fuels Examination Facilities, ANL
- o Consultant to the U.S. DOE, Office of Nuclear Criticality Technology and Safety Project

EDUCATION: B.S. Physics and Nuclear Engineering, Louisiana State University
M.S. Nuclear Engineering, Louisiana State University

OTHER: Member of the Steering Committee of DOE's Nuclear Criticality Safety Analytical Methods Resource Center
Member of the Steering Committee of DOE's Nuclear Criticality Information System

NAME: Michael C. Garcia

AREA OF RESP: Industrial Hygiene

ASSOCIATION: DOE - Albuquerque Operations Office

EXPERIENCE: 15 years

- Industrial Hygienist, Department of Energy, Albuquerque Operations Office
- Manager, Health and Safety, General Electric Co., Aircraft Engine Group
- Industrial Hygienist, General Electric Co., Aircraft Engine Group
- Project Officer, NIOSH, Criteria Documents Development Branch
- Industrial Hygiene Chemical Technician, LANL, HSE-5
- Industrial Hygienist, U.S. Navy Reserve

EDUCATION: B.S. University of New Mexico
M.S. Central Missouri State

NAME: Joseph M. Garner

AREA OF RESP: Radiological Protection

ASSOCIATION: Private Consultant

EXPERIENCE: 43 years

- o Health Physics Private Consultant
- o Monsanto Research Corporation, Mound Laboratory
  - Provided field evaluations of in process radiation protection activities at the Rocky Flats Plant
  - Captain of US DOE Radiological Assistant Team and Broken Arrow Radiological Response
  - Supervised 25 to 35 health physics technicians and decontamination workers

EDUCATION: Lindsay Wilson Jr. College, 1939-41
University of Dayton, 1947-50

OTHER: Health Physics Society

NAME: Robert D. Gilmore

AREA OF RESP: Personnel Protection

ASSOCIATION: Environmental Health Sciences, Inc. (EHS)

EXPERIENCE: 15 years

- o President, EHS
  - Engineering and technical services firm specializing in environmental and safety sciences
- o Participated in TSAs at the FMPC, Y-12, PANTEX, Hanford, WDP, LLNL, SNL, ATR, RFP, GEND and Kansas City facilities
- o Hanford Environmental Health Foundation
  - Director of Operations and Planning: Providing comprehensive occupational and environmental health services including programs in occupational medicine, nursing, psychology, research, and environmental sciences
  - Department Manager: For industrial hygiene services, environmental monitoring, and analytical chemistry
- o Union Carbide Corporation
  - Corporate Staff: Headquarters staff providing technical direction and program guidance to multi-national operating components in health, safety, and environmental affairs
  - Manager of Industrial Hygiene Department: Oak Ridge Gaseous Diffusion Plant
- o U.S. Atomic Energy Commission/U.S. ERDA
  - Safety and Industrial Hygiene Engineer; Richland Operations Office

EDUCATION: B.S. Environmental Health, Chemistry; University of Washington
M.S. Industrial Hygiene, University of Washington

OTHER: Certified in Comprehensive Practice of Industrial Hygiene by the American Board of Industrial Hygiene

NAME: Charles Grua

AREA OF RESP: Quality Verifications

ASSOCIATION: U.S. Department of Energy Headquarters, Office of Quality Programs (OQA)

EXPERIENCE: 32 years

- o Quality Assurance Engineer, OQA/DOE
  - Participate as a team member or team leader in DOE QA Appraisals, TSA and Tiger Teams appraisals
- o Environmental Control Technology Specialist, ERDA/DOE
- o Program Manager, Department of Interior, Office of Coal Research
- o Acting Chief, Plant Engineering and Project Management Division, Department of Interior, Office of Saline Water
- o Resident Manager, Various Sites of Office of Saline Water, Department of Interior
- o Maintenance Engineer Section, National Institute of Health, Department of Health, Education, and Welfare
- o Honeywell Applications Engineering
- o Third Assistant Engineer, Lykes Brothers Steamship
- o U.S. Navy-Atlantic Fleet-Boiler and Machinery Officer

EDUCATION: B.S. Marine Engineering, U.S. Merchant Marine Academy

OTHER: American Society Mechanical Engineers
American Society for Quality Assurance

NAME: Pamela L. Gurwell

AREA OF RESP: Report Technical Manager

ASSOCIATION: Battelle-Northwest Division

EXPERIENCE: 7 years

- o Battelle-Northwest Division
  - Supervisor, Technical Communications
  - Editor-in-residence, Materials and Chemical Sciences Center
  - Technical editor for DOE Restart Readiness Review of High-Flux Isotope Reactor, Oak Ridge National Laboratory
  - Technical editor for DOE Safety Evaluations of N Reactor, PUREX, and Savannah River Reactors
  - Technical editor for Brookhaven TSA
  - Lead editor, public comment volume, Hanford Defense Waste Environmental Impact Statement and Surplus Production Reactor Decommissioning Environmental Impact Statement

EDUCATION: B.A. English, University of Rochester
M.A. English, University of Virginia

NAME: Henry P. Himpler, Jr.

AREA OF RESP: Quality Verification

ASSOCIATION: ARINC Research Corporation

EXPERIENCE: 34 years

- o Health and Safety Subteam Member - Mound Tiger Team
- o TSA Team Member - N Reactor, PFP, Hanford Tank Farm, NPR, SPR, BNL, and HFIR
- o Test and Evaluation Systems Engineering, Management and Design - Westinghouse Corp. and Raytheon Co.
- o QA Project Engineer and Project Manager - Westinghouse and General Electric Co.
- o Consultant to DOE in QA Program Planning and Auditing - ARINC Research Corporation
- o Consultant to U.S. Navy Weapon Systems/Project Management, Planning and Auditing - ARINC Research Corporation
- o Electronic Systems Design Engineering - Westinghouse Corporation

EDUCATION: B.S. Electrical Engineering, Johns Hopkins University
B.S. Industrial Technology, Rogers Williams College

NAME: Ernest W. Johnson

AREA OF RESP: Operations

ASSOCIATION: Private Consultant

EXPERIENCE: 25 years

- o Technical Expert under contract to Oak Ridge Associated Universities and EG&G Idaho
- o Participant on nine Technical Safety Appraisals, Rocky Flats Plant (707, 771, and 776/777), PANTEX, LANL TA-55, LLNL-332, FMPC, WVNS, and GEND
- o Consultant to DOE in Aerospace and Facility Nuclear Safety
- o Consultant to EG&G-MAT in numerous technical and programmatic areas
- o Part-time Instructor, University of Dayton
- o Monsanto Research Corporation, Mound Facility
  - Aerospace and Terrestrial Heat Source Design, Testing, and Safety Areas
  - Plutonium-238 and -239 technical studies for NRC and DOE
  - SAR and SARP generation for various plutonium-238 systems
  - Project Manager for numerous heat-source projects
  - Building Manager for plutonium facilities at Mound

EDUCATION: B.S. Chemistry/Mathematics, Wisconsin State College
M.S. Physical Chemistry, Iowa State University
Ph.D. Physical Chemistry, State University of Iowa

OTHER: American Chemical Society
American Society for Metals (ASM International)
Alpha Chi Sigma

NAME: Charles R. Jones

AREA OF RESP: Auxiliary Systems and Maintenance

ASSOCIATION: SCIENTECH Inc.

EXPERIENCE: 23 years

- o SCIENTECH Inc.
  - Senior Consultant: Provide senior level consulting for nuclear plant safety evaluations and reliability studies. Team coordinator for independent Criticality Safety Assessment at Rocky Flats Plant. Oversight of Savannah River Site Reactor Safety Improvement Program.
- o 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.
- o 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.
- o U.S. Navy, Nuclear Propulsion Mobile Training Team
  - Participated in team inspections of nuclear plants for Pacific Fleet Surface ships, auditing normal and emergency operations, chemistry and radiological controls, maintenance and administration.
- o Nuclear Powered Cruiser Bainbridge
  - Operating Officer
- o Nimitz Precommissioning Unit
  - Reactor Mechanical Assistant
- o USS Enterprise
  - Station Officer

EDUCATION: B.S. U.S. Naval Academy
O.E. MIT
M.S. Mechanical Engineering, MIT

OTHER: Member, American Nuclear Society Certified Nuclear Chief Engineer (Naval Reactors)

NAME: John W. Klingelhoefer

AREA OF RESP: Technical Editor

ASSOCIATION: Battelle - Columbus Operations

EXPERIENCE: 18 years

- o Battelle Columbus Operations
  - Projects Manager: Participated in TSAs for Hanford Tank Farm, Portsmouth Gaseous Diffusion Plant, and Lawrence Livermore National Laboratory; security Inspections for U.S. DOE weapons production facilities
  - Nuclear fuel cycle safety and security studies for U.S. NRC fuel production facilities and protection of spent fuel and high level waste in transit
- o Washington Public Power Supply System
  - Manager Safeguards: Safety and security systems design and integration, emergency preparedness planning and safeguards contingency planning
  - Responsible for personnel, administrative and physical protection of commercial nuclear reactors
- o NUSAC, Inc.
  - Senior Technical Associate: Developed design criteria and specifications for integrating safeguards and security systems for DOE and NRC facilities
- o Captain, Field Artillery
  - Commanded nuclear weapons detachment, responsible for all nuclear safety and security requirements

EDUCATION: B.S. Engineering, U.S. Military Academy

OTHER: Certified Protection Professional, American Society for Industrial Security
Member, IEEE Subcommittee on Physical Security

NAME: Wayne Harrison Knox

AREA OF RESP: Radiological Protection

ASSOCIATION: Advanced Systems Technology, Inc.

EXPERIENCE: 25 years

- Advanced Systems Technology, Inc.: Senior Health Physicist/Emergency Planner -- Provided special consultation to the NRC in the development of Regulatory Guide in health physics, the development inspection plans and the evaluation of emergency preparedness programs. Provided consultation to nuclear power plants in the development and implementation of health physics and emergency preparedness programs.

- Institute of Nuclear Power Operations -- Project Manager of Emergency Preparedness -- Developed guidelines for development and evaluation of emergency preparedness programs.

- Battelle Northwest -- Internal Radiation Safety Auditor -- Conducted radiation safety inspections.

- Westinghouse Hanford -- Operational Health Physics Analyst - developed radiation safety programs and evaluated safety conditions. Radiation Tech Supervisor - managed radiation safety program.

- U.S. Army Reserve -- Nuclear Medicine Scientist

- USAF -- Radiation & Optical Physics Project Manager

EDUCATION: B.S. Physics, Clark College
M.S. Nuclear Engineering/Health Physics, Georgia Institute of Technology

OTHER: Health Physics Society
American Nuclear Society
ANSI Certified Lead QA Auditor

NAME: Lewis S. Masson

AREA OF RESP: Maintenance

ASSOCIATION: SCIENTECH, Inc.

EXPERIENCE: 37 years

- o SCIENTECH, Inc.
  - Senior Associate: provide technical assistance to U.S. DOE and U.S. NRC in the fields of mechanical and nuclear engineering
- o EG&G Idaho, Inc.
  - Technical support to Office of Defense Energy Projects
  - Program Manager for the Fusion Engineering Program
  - Division Manager for the Loss-of-Fluids Test (LOFT) Engineering Support Division
- o Aerojet Nuclear Company
  - Manager, Special Reactor Projects, Design Engineering
- o General Electric Company
  - Manager, engineering activities for advanced nuclear propulsion systems
  - Project engineer during recovery of the damaged SL-1 reactor at INEL
  - Manager of test facilities and activities for Aircraft Nuclear Propulsion Program

EDUCATION: B.S. Mechanical Engineering, University of California, Berkeley
M.S. Nuclear Engineering, University of Idaho

OTHER: Member of America Nuclear Society and Fusion Energy Division Executive Committee

NAME: Charles W. McKnight

AREA OF RESP: Fire Protection

ASSOCIATION: Westinghouse Idaho Nuclear Company

EXPERIENCE: 9 years

- o Westinghouse Idaho Nuclear Company
  - Project Manager, Fire Protection Upgrade Projects: Responsible for coordinating all phases of a project to upgrade existing and install new fire protection equipment.
  - Senior Fire Protection Engineer: Conducted plant inspections for fire protection; developed preventive maintenance program for fire protection systems; provided fire protection and safety design input; and design new and test existing fire protection systems.
- o Factory Mutual Engineering, Bellevue, Washington
  - Loss Prevention Consultant: Conducted field inspection and analysis of various industries throughout the Pacific Northwest and Western Canada for protection against fire, flood, collapse, and earthquake.
- o HKM Associate Engineering, Billings, Montana
  - Assistant Engineer: Conducted dam safety studies; developed computer program for continuous center pivot irrigation; and designed drainage intercept system.

EDUCATION: B.S. Agriculture Engineering, Montana State University

OTHER: Member, NPSE, NFPA, and ICBO.
Registered Fire Protection Engineer, State of Montana

NAME: Leon H. Meyer

AREA OF RESP: Experimental Activities/Operations

ASSOCIATION: President, The LHM Corporation

EXPERIENCE: 37 years

- o Technical expert under contract to Oak Ridge Associated Universities and EG&G Idaho; served on 26 Technical Safety Appraisals for DOE/EH
- o Savannah River Plant, E.I. Du Pont de Nemours & Company, Aiken, SC
  - Program Manager: Responsibility for Safeguards and Security, Long-Range Planning, Budget Coordination, Quality Assurance, Environmental Control, Energy Conservation, and Away-from-Reactor Spent Fuel Storage
- o Atomic Energy Division, E. I. Du Pont de Nemours & Company
  - Program Manager, Technical Division: Responsibility for the Defense Waste Processing Facility and the LWR Fuel Reprocessing Design Project
- o Savannah River Laboratory, E. I. Du Pont de Nemours & Company, Aiken, SC, Assistant Director
- o Savannah River Laboratory, E. I. Du Pont de Nemours & Company, Aiken, SC, Director, Separations Chemistry and Engineering Section
- o Savannah River Laboratory, E. I. Du Pont de Nemours & Company, Aiken, SC, Research Manager, Separations Chemistry Division
- o Savannah River Laboratory, E. I. Du Pont de Nemours & Company, Aiken, SC
  - Research Supervisor, Separations Engineering Division: Responsibilities in areas of chemical separations; plutonium, uranium, and thorium processing; and tritium technology
  - Research Engineer, Separations Engineering Division

EDUCATION: B.S. Chemical Engineering, Georgia Institute of Technology
M.S. Chemistry, Georgia Institute of Technology
Ph.D. Physical Chemistry, University of Illinois

NAME: William E. Mott

AREA OF RESP: Operations

ASSOCIATION: Private Consultant

EXPERIENCE: 36 years

- o Private Consultant
  - Participated in DOE Technical Safety Appraisals of the Lawrence Berkeley Laboratory and the Naval Petroleum Reserve No. 1, and in a series of firearms safety appraisals at various DOE facilities
- o U.S. Department of Energy, Germantown, MD
  - Retired Annuitant: Served as technical safety expert to the Director, Office of Operational Safety, on oversight and appraisal activities relating to safeguards and security and the packaging and transportation of hazardous materials
  - Deputy and Senior Technical Advisor to the Director, Office of Operational Safety
  - Director, Division of Environmental and Safety Engineering
  - Director, Division of Public Safety
- o U.S. Energy Research and Development Administration, Germantown, MD
  - Director and Assistant Director for Nonnuclear Programs, Division of Environmental Control Technology.
- o U.S. Atomic Energy Commission, Germantown, MD
  - Assistant Director for Technical Programs, Division of Isotopes Development
- o Gulf Research and Development Company, Pittsburgh, PA
  - Research Scientist and Manger of Nuclear Applications

EDUCATION: B.S. Physics, College of Wooster
M.S. Physics, Carnegie-Mellon University
Ph.D. Physics, Carnegie-Mellon University

OTHER: Author or coauthor of 96 publications and reports
Eight patents
American Physical Society, American Nuclear Society, Sigma Xi, and Phi Beta Kappa

NAME: Andrew J. Pressesky

AREA OF RESP: Organization and Administration

ASSOCIATION: Private Consultant

EXPERIENCE: 43 years

- o Consultant to U.S. Department of Energy
  - Participated in Technical Safety Appraisals at Y-12 (ORNL), HFBR (BNL), EBR-II (ANL), ATR (EG&G), Strategic Petroleum Reserve and Feed Materials Production Center; design reviews for the N- Reactor, HFIR (ORNL) and SRP (SRL); management review of ORNL and followup of Y-12 and ATR appraisals
- o Consultant to Architect Engineer
  - Reviewed Nuclear Quality Assurance Program at company headquarters and at three commercial reactors under construction
- o Consultant and staff assistant to the American Nuclear Society Committee on the Source Term
- o U.S. Department of Energy (DOE)
  - Director, Office of Quality Assurance, Safety and Safeguards, Office of Assistant Secretary for Nuclear Energy
- o Milletron, Inc.
  - Vice President, Engineering
- o Westinghouse Electric Corporation
  - Manager, Scientific Support, Westinghouse Testing Reactor
- o Isotope Products, Ltd.
  - Technical Director
- o National Research Council of Canada
  - Manager, Critical Experiments Program

EDUCATION: B.E. Engineering Physics, University of Saskatchewan, Canada

NAME: Robert W. Tayloe, Jr.

AREA OF RESP: Emergency Preparedness/Training and Certification

ASSOCIATION: Battelle - Columbus Operations

EXPERIENCE: 10 years

- o Battelle, Principal Research Scientist
  - Criticality Safety and Training
  - Radiation Safety
  - Dosimetry
  - Participated in six Security Inspections and Evaluations of DOE Facilities
  - Participated in eight previous Technical Safety Appraisals
- o 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. in Nuclear Engineering, Ohio State University

OTHER: Lectured on "Safety in Handling UF_6," 1983-1985 for DOE Office of Nuclear Safety seminar on <u>Prevention of Significant Nuclear Events</u>
Professional Engineer, State of Ohio

NAME: Thomas L. Van Witbeck

AREA OF RESP: Site/Facility Safety Review and Security/Safety Interface

ASSOCIATION: TOMA Enterprises

EXPERIENCE: 30 years

- o TOMA Enterprises
  - General Manager: provide services to government and commercial nuclear industry in the areas of operations, maintenance, and safety
- o SCIENTECH, INC.
  - Provided project management and technical consulting services to government agencies and the utility industry
- o PLD Energy Services
  - Vice President: supported nuclear plant operations
- o Energy Incorporated
  - Vice President: provided maintenance management systems, plant operations and quality assurance services
  - Director: management and quality assurance audits and technical support of nuclear utilities
  - Group Manager: onsite team to assess the Three Mile Island accident
  - Principal Consultant: technical support of commercial reactors and DOE facilities and programs
- o Westinghouse Electric Corporation
  - Shift Supervisor/Supervisory Engineer: commercial nuclear plant start-up and testing
- o Oregon State University
  - Reactor operator and health physicist
- o U.S. Navy
  - Petty Officer in charge of water chemistry and radiological programs aboard USS Bainbridge DLGN25.
  - Instructor U.S. Navy Nuclear Power School

EDUCATION: U.S. Navy Engineering Laboratory Technician School
U.S. Navy Nuclear Power School
B.S. Nuclear Engineering, Oregon State University

OTHER: Registered Professional Engineer
Licensed Reactor Operator (OP-2315)

NAME: Richard W. Vinther

AREA OF RESP: Training and Certification

ASSOCIATION: Battelle-Northwest Division

EXPERIENCE: 13 years

- o Battelle-Northwest Division
  - NRC Certified Contract examiner for operator licensing program
- o UNC Nuclear Industries, Inc.
  - Certified reactor operator, N Reactor
  - Systems certification instructor for N Reactor
  - N Reactor lead simulator instructor
  - Supervised development and training programs for N Reactor
  - Conducted appraisal of training and certification activities for the TSA at Brookhaven National Laboratory (DOE)
  - Conducting evaluation of Savannah River Restart program for DOE-HQ

EDUCATION: B.A. Business Administration, University of Puget Sound

NAME: George E. Weldon

AREA OF RESP: Fire Protection

ASSOCIATION: Private Consultant

EXPERIENCE: 37 years

o Factory Mutual Research Corporation, Norwood Mass

- Served on Technical Safety Appraisals for FFTF, N Reactor, Savannah River Plant Production Reactors, Livermore Plutonium and Tritium Plants, Idaho Chemical Processing Plant and Plutonium Finishing Plant, Sandia Albuquerque, Allied Signal Kansas City, and Mound Laboratories.
- Manager of Special Hazards Section.
- Engineering Specialist, Special Hazards. Responsible for fire and explosion hazards connected with major industrial occupancies, chemical and nuclear facilities.
- Concurrent with all of the above, MAERP Reinsurance Association Engineering Manager for approximately the past 15 years.
- Chairman of NFPA Atomic Energy Committee for about 12 years and member since its inception.

EDUCATION: B.S. Chemistry with minors in Physics and Mathematics, Northeastern University

OTHER: Registered Professional Engineer (Fire Protection), Massachusetts

NAME: Bernard S. Zager, M.D.

AREA OF RESP: Medical Services

ASSOCIATION: Private Consultant

EXPERIENCE: 36 years

- o Medical Officer - Mobile Army Surgical Hospital (MASH), Korea
- o Private practice medicine and surgery
- o Chief Physician, Automotive Assembly Division, Ford Motor Company
- o Medical Director and Manager Health and Safety Operation, General Electric Company Nuclear Energy Operation
- o Consultant Occupational Medical Programs

EDUCATION: B.A. Wayne State University
M.D. Northwestern University
Intern and Resident, Detroit Grace Hospital

OTHER: Certified Occupational Medicine, American Board of Preventive Medicine
Fellow American College Occupational Medicine
Fellow American College Preventive Medicine

NAME: William J. Zielenbach

AREA OF RESP: Technical Support

ASSOCIATION: Battelle - Columbus Operations

EXPERIENCE: 33 years

o Battelle

- Technical Assurance Manager, D&D Battelle Columbus Nuclear Material Facilities
- Staff Scientist: Security Evaluations (3) and Technical Safety Appraisals (10) of DOE facilities; nuclear package QA
- Project Manager: Nuclear fuel cycle case studies and facility safety analysis
- Project Leader and Team Member: Various programs for design and operation of irradiation experiments for Materials Testing Reactor, Engineering Test Reactor, Battelle Research Reactor, Experimental Breeder Reactor-11, 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: B.S. Chemical Engineering, University of Pennsylvania
M.S. Nuclear Engineering, Ohio State University

OTHER: Member, American Nuclear Society

APPENDIX A-4

Biographical Sketches of Team Members
Tiger Team Assessment
Management Subteam
Lawrence Livermore National Laboratory

NAME: Milton D. Johnson

AREA OF RESP: Management Assessment - Subteam Leader

ASSOCIATION: U.S. Department of Energy, Princeton Area Office, Chicago Operations Office

EXPERIENCE: 20 years

- o Manager, Princeton Area Office (PAO)
  - Responsible for the oversight and execution of the DOE prime contract with Princeton University for the operation of the Princeton Plasma Physics Laboratory (PPPL). PPPL is a single purpose laboratory dedicated to magnetic fusion research employing about 900 FTE's with an annual budget of about $90M. The Area Office employs fourteen people whose expertise ranges from nuclear engineering, safety, conventional construction, and physics to finance and contract administration. The Area Office has primary responsibility for the environment and safety of the laboratory and management of construction projects.
- o Chief, Engineering and Physics Branch, PAO
  - Responsible for overseeing all technical functions associated with the operation of the fusion program at PPPL. Provided project/program coordination for the program office in DOE headquarters and the Chicago Operations Office.
- o Physicist, Office of Fusion Energy, HQ
  - Program Manager responsible for fusion research at major DOE laboratories and Universities. Also responsible for research in high field superconductor development for fusion energy.
- o Electrical Engineer
  - Electrical engineer with various positions in private industry designing electronics equipment, microwave and laser interferometers, high-current high voltage switches and far-infrared lasers.

EDUCATION: B.S. Electrical Engineering, University of Arizona
M.S. Electrical Engineering, University of Arizona
Ph.D. Engineering Plasma Physics,Cornell University

OTHER: Contracting Officer for DOE

NAME: Kenneth C. Brog

AREA OF RESP: Management Assessment

ASSOCIATION: Battelle Office of Waste Technology Development, Nuclear Systems Group

EXPERIENCE: 28 years

- o Battelle Memorial Institute
  - Participated in the Tiger Team Assessment of the Nevada Test Site as member of the Management Assessment subteam
  - Responsible for strategic planning and technical integration of the Repository Technology Development Program
  - Managed numerous research and development projects in solid state physics, materials science, and nuclear technology
  - Managed various contract research groups in the areas of nuclear technology, electronics and physical sciences
  - Responsible for strategic planning and coordination of organizational information resources at the Battelle Columbus Campus and linking these resources to programmatic or business objectives

EDUCATION: B.A. Physics and Mathematics, Albion College
M.S. Physics, Case Institute of Technology
Ph.D. Physics, Case Institute of Technology

NAME: Dorothy Ann Kerr

AREA OF RESP: Management, Administrative Assistant

ASSOCIATION: U. S. Department of Energy, Princeton Area office, Chicago Operations Office

EXPERIENCE: 34 years

- o U.S. Department of Energy, Princeton Area Office and predecessor agencies ERDA and AEC
  - Secretary to Area Manager, responsible for day-to-day interaction of the office staff, travel arrangements, voucher preparation, typing, filing, answering routine correspondence & telephone calls, scheduling meetings, estimating and preparation of office travel budget.
- o AEC-New Brunswick Laboratory - Clerk typist-typed various technical and financial reports, relief switchboard operator, shipped samples to general public for geiger counter research/experiments.
- o Herbert M. Tanzman - Secretary for a real estate and insurance company; typed real estate appraisals, insurance policies, legal documents, transmitted monthly billings, etc.

EDUCATION: St. Peter's High School, Diploma 1956
Various secretarial, travel, supervisory and administrative courses

NAME: Marvin J. Laster

AREA OF RESP: Management Assessment

ASSOCIATION: Independent Consultant

EXPERIENCE: 31 years

- o U.S. Atomic Energy Commission / U.S. ERDA / U.S. DOE
  - Assistant Chief Counsel, Chicago Operations Office, Brookhaven Area Office, Princeton Area Office, New York Support Office, Environmental Measurements Laboratory
  - Member, Accident Investigation Boards
  - Participant in annual laboratory appraisal programs
  - Litigation, claims, disputes

EDUCATION: B.A. Political Science, Brooklyn College
LL.B. New York University School of Law
PFPA Public and International Affairs, Princeton University

NAME: Lester K. Price

AREA OF RESP: Management Assessment

ASSOCIATION: U.S. Department of Energy, Oak Ridge Operations Office

EXPERIENCE: 24 years

- o Director, Technical Services Division, ORO
  - Program Manager for FUSRAP (Formerly Utilized Sites Remedial Action Program)
- o Oak Ridge Operations Office
  - Director, Energy Programs Division; program management, contract administration and facility operations responsibilities for R&D activities at the Oak Ridge National Laboratory
  - Chief, Fusion and Basic Sciences Branch; responsible for programs in fusion, nuclear physics, basic energy sciences and isotopes
- o DOE-Headquarters
  - Program manager for R&D in areas of fusion experimental projects, fusion technology development and space reactor technology
- o DOE-San Francisco Operations Office
  - Program management and contract administration for space reactor technology

EDUCATION: B.S. Nuclear Engineering, University of Tennessee
Oak Ridge School of Reactor Technology

NAME: Louis A. Rancitelli

AREA OF RESP: Management Assessment

ASSOCIATION: Battelle, Nuclear Systems Group, Special Projects Office

EXPERIENCE: 23 years

- o Manager, Battelle West Jefferson, Ohio Nuclear Facility
  - Responsible for compliance to DOE and NRC regulations related to nuclear materials storage, handling and transportation, waste characterization and disposal, criticality safety, health physics as well as state and federal regulations related to industrial safety and environmental protection
- o Manager, Battelle Earth and Planetary Chemistry Section
  - Conducted and managed staff engaged in studies related to the environmental impact of radionuclides resulting from commercial and defense reactor operations and weapons fallout
  - Conducted and managed programs to define 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 a uranium mine tailing study for the Nuclear Regulatory Commission (NRC) focused at defining the impact on the environment
  - Managed a NRC program to define the emission, transport and deposition of radionuclides from a low level radioactive waste site

EDUCATION: B.S. Chemical Engineering, Drexel Institute of Technology
Ph.D. Nuclear Science and Engineering, Cornell University

NAME: Richard A. Robinson

AREA OF RESP: Management Assessment

ASSOCIATION: Battelle Office of Waste Technology, Development, Nuclear Systems Group

EXPERIENCE: 24 years

- o Manager, Technology Development Department
  - Provides management and technical direction of engineering, geoscience, and performance assessment activities necessary to support the DOE nuclear waste repository program
  - Oversees DOE international cooperative projects
- o Manager, Engineering Technology Department
  - Provided management and technical direction of engineering and field-testing activities required for licensing, and concept development of nuclear waste repositories and waste packages
- o Manager, Engineering Design Department
  - Provided management and integration of a salt repository facility design
  - Planned, designed, constructed and operated DOE field testing facilities in the U.S., Canada, Sweden, and the Federal Republic of Germany
- o Project Manager, Nuclear Systems Section
  - Managed Nuclear Shipping Cask projects involving design, safety analysis and licensing for NRC and industry
  - Managed nuclear reactor loss-of-coolant accident analyses for NRC and industry
  - Conducted in-reactor experiments of nuclear fuels development, materials development, and reactor concept evaluation for AEC, NRC and the Air Force

EDUCATION: B.S.E. Mechanical Engineering, University of Michigan
M.S.E. Nuclear Engineering, University of Michigan
Postgraduate Studies, University of Michigan and University of California, Los Angeles

OTHER: Registered Professional Engineer
Listed in Who's Who of Midwest Scientists
Member, American Nuclear Society

NAME: Edward H. Winkler

AREA OF RESP: Management - Budget and Finance

ASSOCIATION: Princeton Plasma Physics Laboratory, Princeton University

EXPERIENCE: 17 years

- o Controller, Princeton Plasma Physics Laboratory
  - Responsibility for planning and analysis, accounting, and management information systems
- o Director, Finance, Government Communications Systems Division - GE Company
  - Chief Financial Officer for a $400+ million business producing communication equipment for DOD. Responsibility for a financial activities, including information systems and contracts administration.
- o Director, Financial Planning & Analysis, GE-Aerospace and Defense Group
  - Staff position responsible for the development of all financial plans, analysis of operations, and miscellaneous special studies.
- o RCA Corporation
  - Miscellaneous financial responsibilities in various commercial divisions from 1973-1984.

EDUCATION: B.A. Rutgers University
M.B.A. Drexel University
J.D. Delaware Law School

OTHER: Member, New Jersey Bar
Certified Public Accountant

APPENDIX B

ENVIRONMENTAL ASSESSMENT PLAN

FOR THE

DOE TIGER TEAM ASSESSMENT

AT THE

LAWRENCE LIVERMORE NATIONAL LABORATORY

FEBRUARY 1990

APPENDIX B
ASSESSMENT PLAN

DOE F 1325.8
(12-84)

United States Government

Department of Energy

memorandum

DATE: February 14, 1990

REPLY TO ATTN OF: EH-24

SUBJECT: Lawrence Livermore National Laboratory Tiger Team Assessment - Environmental Team Assessment Plan

TO: Donald W. Pearman, Jr.
Manager
San Francisco Operations Office

I have attached a copy of the Environmental Team Assessment Plan for the upcoming Tiger Team Assessment of the Lawrence Livermore National Laboratory. The document is being provided to inform you and the site contractors with the material that the Environmental Team will be covering during the assessment.

As you can see, the schedule is ambitious and demanding within the time constraints I have established for the assessment activities. It is our intent, however, to be flexible with the schedule while meeting the needs of the site and the team during the assessment process. We expect that changes will be necessary to fit our activities with the day-to-day activities at the site. Please review the schedule so that any changes that may be necessary can be made at the beginning of the assessment process on February 26, 1990.

At the Pre-Assessment site visit, we indicated that the Federal and State regulators are invited to participate as observers in the Tiger Team Assessment. Please send copies of the plan to the regulators who attended the Pre-Assessment meeting, and any others you believe are interested.

If you have any questions, please call me on (FTS) 972-2110, or Donna Bergman on (FTS) 896-8829.

Donna A. Bergman
for Ed Cumesty
Tiger Team Leader

Attachment

cc: Scott Samuelson, SAN
John Clatworthy, LLNL
Lawrence Weiner, EH-1
Donna Bergman, EH-24
Milton Johnson, Princeton
Oliver Lynch, EH-331

1.0 INTRODUCTION

On June 27, 1989, Secretary of Energy Watkins announced a 10-point Initiative to strengthen environmental protection and waste management activities in the 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 Livermore National Laboratory is to provide the Secretary with information on the current environmental regulatory compliance status and associated vulnerabilities of the facility, root causes for noncompliance, adequacy of DOE and site contractor environmental management programs, and response actions to address the identified problem areas.

The scope of the Lawrence Livermore National Laboratory environmental assessment is comprehensive, covering all environmental media and applicable Federal, State, and local regulations, requirements, and best management practices. The environmental disciplines to be addressed in this assessment include air, soil, surface water, hydrogeology, waste management, toxic and chemical materials, radiation, quality assurance, and inactive waste sites. The assessment also addresses National Environmental Policy Act (NEPA) requirements.

2.0 ENVIRONMENTAL ASSESSMENT IMPLEMENTATION

The environmental assessment of the Lawrence Livermore National Laboratory will be conducted by a Team managed by a Team Leader and as Assistant Team Leader from the Office of Environmental Audit (OEV) and technical specialists from other DOE offices, NUS Corporation, Vertechs Corporation, Pacific Northwest Laboratory, and Oak Ridge National Laboratory. The names and responsibilities are listed below:

Donna Bergman	DOE	Team Leader
David Shafer	DOE	Assistant Team Leader
J. David Yesso	NUS	Technical Coordinator/ Radiation
Charles Caruso	NUS	QA/Toxic & Chemical Materials
Amy Hubbard	NUS	Inactive Waste Sites and Releases
Lisa Drinkhall	NUS	Administrative Support
Ralph Basinski	NUS	Waste Management
Phil Winsborough	NUS	Waste Management
Tom Eckle	NUS	Air
Steve Masciulli	Vertechs	Radiation
Joseph Boros	NUS	Surface Water
Mary Robison	NUS	Groundwater/Soil
James Gilliam	DOE	NEPA
Tom Anderson	PNL	NEPA
Lorene Sigal	ORNL	NEPA
Cynthia Heckman	ORNL	NEPA
Richard Berringer	ORNL	NEPA

2.1 Pre-Assessment Activities

Pre-Assessment activities for the Lawrence Livermore National Laboratory (LLNL) environmental assessment included the issuance of an introduction and information request memorandum, a Pre-Assessment Site visit, and initial review of documentation which was sent to the environmental team by LLNL as a result of the information request memorandum.

A Pre-Assessment Site visit was conducted on January 24-25, 1990, by the Tiger Team Leader, Management Team Leader, Team Leaders for Environment, and Safety and Health, and the NUS team coordinator. 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 and LLNL personnel.

This Environmental Assessment Plan is based upon the information received by the Environmental Team as of February 2, 1990.

2.2 On-Site Activities and Reports

The on-site activities for the environmental assessment will take place from February 26, 1990, through April 6, 1990. On-site activities will include field inspections, file/record reviews, and interviews with site personnel. The preliminary schedule for the assessment is shown in the attached agenda. For some specialties, the agendas may be incomplete because there was not sufficient information available during the pre-assessment period to allow complete scheduling. These agendas will be expanded during the early part of the on-site assessment. Any and all modifications to the agenda will be coordinated with the principle contacts from the San Francisco Operations Office.

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 from the Office of Defense Programs, the San Francisco Operations Office, and LLNL.

3.0 AIR

The air-related portion of the environmental assessment at LLNL will include activities that emit or have a potential to emit one or more air-contaminating materials, the emission controls or administrative procedures applied to restrict those emissions, the in-stack emission monitoring systems, and ambient-air monitoring equipment and procedures. The assessment will address those air contaminants for which air-quality standards (criteria pollutants) or emission standards (new source performance standards or emission standards for hazardous air pollutants) have been established by the United States Environmental Protection Agency or by state and local agencies. Close liaison will be maintained with the radiation team member because of the importance of air-rad issues. The primary contact at LLNL for the air specialist will be Harold Pfeifer, with other contacts as designated by the LLNL Environmental Protection Department.

3.1 Issue Identification

The general approach to the assessment will include a review of existing air permits, pending applications, and standard operating procedures. Processes and control equipment will be inspected for compliance with DOE ALARA requirements for radionuclide emissions. The assessment will also review the nonradiological air contaminants from the different buildings at the site, and evaluate any existing controls applied to the air emissions.

The ambient air monitoring program, including the meteorological monitoring system, will be evaluated to assess the adequacy of the existing monitoring network to characterize environmental impacts of the air emissions from the facility. The activities involved in this part of the assessment will include the inspection of the ambient air quality samplers, a review of documentation applicable to the ambient air data acquisition, and an evaluation of the processing procedures used to assure the accuracy of the data.

Areas of particular interest will include emissions of the criteria pollutants (e.g., particulates, sulfur oxides, nitrogen oxides, volatile organic compounds, carbon monoxide and lead) as well as regulated hazardous air pollutants (e.g., radionuclides, beryllium, and asbestos).

The use of organic solvents will be assessed as a potential or actual source of emissions to determine if they are adequately characterized, monitored, and controlled.

Fugitive emissions from the resuspension of contaminated soils will be evaluated as a potential means of the airborne release of radionuclides and hazardous materials from the facility. Consideration will be given to historical and current operations to determine the potential for soil contamination and windborne releases.

Several areas of specific interest have been identified during a review of available documentation:

Main Site

- New Source Review Activities For Any Proposed New Sources.
- Sources of Contaminant Emissions
  - Degreasers and cold cleaners
  - Boilers
  - Machining operations
  - Tritium release sources
  - Incinerators
  - Size reduction facility
  - Gasoline dispensing facilities
  - Solvent dispensing facilities
  - Mercury Bake-out Oven
  - Paint booths
  - Asbestos-removal projects
- Emission Controls
  - Wet Chem Scrubber - Bldg. 231
  - Cryogenic Vapor Recovery Systems
  - HEPA filter systems
- Effluent Samplers
- Ambient Air Samplers

Site 300

- Sources of Contaminant Emissions
  - Boilers
  - Fuel dispensers
  - Paint shop
  - Dust collector
  - Burn Pit
  - Air stripping of groundwater
  - Asbestos-removal projects
- Emission Controls
  - Grass Burn Notifications
- Effluent Samplers
- Ambient Air Samplers

3.2 Records Required

Files will be reviewed as part of the assessment including documents not yet reviewed or received (e.g., classified documents, individual files, documents not yet identified). Specific documents and files to be reviewed as part of the assessment include, but will not be limited to, the following:

- Inventory of emission sources and quantification of emissions;
- Air Permits;
- PSD ledger;
- Air effluent sampling and QA procedures;
- Ambient air sampling and QA procedures;
- Contractor stack test results;
- Effluent beryllium sampling results;

- Correspondence with BAAQMD and SJCAPCD relative to LLNL sources;
- Reports on accidental releases of air contaminants; and
- Asbestos-removal documentation.

4.0 SURFACE WATER

4.1 Issue Identification

The history of the LLNL site dates back to its use as a Naval Air Station in the early days of World War II. Atomic Energy Commission activities originated in 1951. Since then it has evolved into a complex, multi-program research center for design of nuclear weapons systems, laser research, magnetic fusion energy, biomedical research, energy and resource programs, and environmental studies. A separate complex, known as Site 300, was developed as a high explosives testing laboratory.

The two sites differ in a number of ways, and present various surface water/drinking water issues for assessment. The Main Site uses purchased water, primarily from the Hetch-Hetchy water system and secondarily from Zone 7 of Alameda County's Flood Control and Water Conservation District, for all its domestic and operational needs. These sources also serve LLNL's neighbor, the Sandia Livermore National Laboratories. The two facilities also share a common sanitary sewerage collection system which delivers its wastewaters to the City of Livermore's Water Reclamation Plant. Both sites depend on retention tank collection systems with monitoring prior to discharge to prevent accidental release of potentially harmful liquids to the POTW. The system is not foolproof, and occasional releases do occur, some without explanation.

Site 300 straddles the boundary between Alameda and San Joaquin Counties. It uses its own deep wells as a water source for most water users. A few remote locations on-site use bottled water for drinking, and shallow local wells for other purposes. Sewage is retained in an evaporation pond on-site, with provisions for possible overflow. Very little surface water run-off occurs from Site 300. Water issues relate principally to possibly contaminated surface water penetrating the ground and becoming part of a perched aquifer. Organic compounds and tritium have been found in shallow groundwater on and off-site.

Potential pathways for off-site migration of pollutants from both sites include:

- Spills or leaks into permeable soil areas
- Releases to sanitary sewers and/or storm drains without retention, chemical and radiological analysis, or treatment
- Catastrophic leaks of concentrated liquid wastes to the sanitary sewer systems or arroyos

A review of available information indicates that considerable attention has been paid to control of radiological releases and elimination of toxic metal pollutants. However, less documentation exists on the fate of trace levels of toxic organics in wastewaters. The investigation will assess the potential for organic contamination of wastewaters, 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 potential discharges to surface waters, or the local sanitary authority, which may not be addressed in operating permits or other documents from LLNL. The Livermore Site and Site 300 will be investigated for evidence of possible breaks or obstructions in the sewer systems which could result in releases of wastewater to the environment. The assessment will also address the possibility of cross-contamination of the potable water piping system by either the sanitary or storm drainage systems. Measures taken at LLNL to prevent back-flow of process wastewater or sanitary sewer flows into the drinking water piping systems will be reviewed, along with LLNL's 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 wastewater monitoring and treatment systems. LLNL field 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, for example plating operations in Building 322; Plant Engineering Operations associated with the Emergency Reservoir (Swimming Pool) and Building 318; Decontamination at B419; Hazardous Waste Operations at B514, B612 and associated storage areas; and selected retention tank systems, some to be identified later, and others as shown on the attached proposed schedule. Site 300 operations will be reviewed for two days during the first week on-site to allow for possible follow-up inspections later. Site surface drainage characteristics, such as culverts, arroyos and ravines will also be examined, along with the man-made efforts to control surface run-on and run-off. The impact of changes resulting from construction of new wastewater diversion facilities at the Main Site will also be evaluated, along with the new groundwater remediation treatment systems currently undergoing testing.

Extensive reviews will also be made of possible undetected sources of contaminants flowing to the storm and sanitary sewage systems. This will require review of most plant production schematic drawings, visits to the respective areas around production facilities and a thorough tour of plant buildings, yard areas, and grounds, particularly areas where the ground surface is or was known to be contaminated.

Other information sources and visitation points that will be examined are:

- NPDES and LWRP permit requirements and treatment plant performance and/or effluent quality information; this will include observation of sample collection and analysis techniques used for the monitoring required by the NPDES and LWRP permits;

- Residue (sludge and sediment) disposal from the wastewater treatment plants, including the stormwater retention pond and the proposed diversion basin (both the technical and the administrative aspects);

- Spill protection provisions for fuels and hazardous materials storage units, including review of the SPCC Plan and of such physical controls as tank containment dikes and runon/runoff drainage control for potential contaminants.

4.2 Records Required

Files will be reviewed as part of the assessment, including documents not yet reviewed or received (e.g., classified documents, individual files, documents not yet identified). Specific documents and files to be examined as part of the review process include, but will not be limited to, the following:

- Recent analytical data on wastewater releases to the local POTW.

- Notices of violations relating to wastewater releases.

- Operators logbooks and treatment plant reports from EPD.

- Standard operating procedures for wastewater collection, holding and treatment.

- Sampling protocols and logbooks.

- Wastewater lab tracking reports.

- Treatment plant and monitoring equipment maintenance records.
- Detailed drawings of the domestic water supply, storage and distribution system.
- Records of drinking water quality.
- SPCC plan, or its equivalent.
- Progress report on proposed new wastewater treatment facility, the DWTF system.
- Internal memos or correspondence relating to surface water/drinking water problems, e.g., back-flow prevention measures.
- Memos and correspondence relating to minimizing infiltration of rainwater/groundwater into sanitary sewers during wet seasons, and exfiltration of sanitary wastewaters into soil or groundwater during dry seasons. Include data on comparison of flow monitoring with precipitation readings.
- Any information on water quality/sludge characteristics for the LLNL drainage retention basin.
- Other records as determined on-site.

5.0 GROUNDWATER/SOIL

Groundwater and soil contamination are present at both the LLNL Main Site and at Site 300. In the environmental assessment, the adequacy of existing monitoring and characterization efforts will be addressed by comparison with regulatory guidance documents and applicable orders. This effort will be coordinated with those of the RCRA, CERCLA, and surface water specialists.

5.1 Issue Identification

The general approach to the assessment will involve the evaluation of existing documentation with respect to state and federal regulatory requirements. These requirements may be in conflict with respect to schedules, and therefore, particular attention will be paid to the status of negotiations and agreements on scheduling of characterization and cleanup efforts. The status of regulatory compliance appears to be dependent on such negotiations.

In addition to document review, visits will be made to areas of interest to observe field conditions, monitoring well construction, and sampling procedures. Discussions will be held with personnel from the Environmental Restoration Division of the Environmental Protection Department and others as identified. Specific contacts include Albert L. Lamarre, Michael J. Taffet, William F. Isherwood, Neil B. Crow, and Bill McIlvride.

Specific areas of interest include:

- Southwestern Corner on-site and off-site
- Southeastern Corner
- Building 403 Gasoline Leak Area
- Northwest off-site area
- South Central Area (Taxi Strip/Old Salvage Yard Area/East Traffic Circle

Site 300:

- Building 834 TCE Spill Area
- GSA/Off-site
- Inactive Landfills
- Inactive HE Process Lagoons
- HE Burn Pit

5.2 Records Required

Many documents have been received but not yet reviewed, so that specific gaps have yet to be identified. However, files of interest for on-site review include:

- Recent analytical results
- Well construction diagrams for any work in progress
- Correspondence with regulatory agencies
- Minutes of meetings with regulatory agencies and the Groundwater Cleanup Community Work Group

6.0 WASTE MANAGEMENT

The waste management assessment will include solid, radioactive, hazardous, classified, and mixed wastes. The assessment will be carried out by reviewing and evaluating all activities generating wastes and the treatment, storage, recycling and disposal practices involved in the handling of the wastes including handling of wastes by commercial off-site facilities.

Management of all solid waste streams from cradle to grave including mixed wastes, hazardous wastes, radioactive wastes and non-hazardous wastes will be reviewed. The review will generally consist of several activities: 1) Physical facilities where wastes are generated, accumulated, stored, treated, recycled or disposed will be inspected; 2) Personnel involved in these activities will be interviewed; 3) Files including operating logs, inspection records, training records, etc. will be reviewed; 4) The potential for contamination of environmental media as defined by waste regulations will be assessed.

At both the Livermore Site and Site 300, large numbers of sources (approximately 100-150 buildings) generate a wide variety of wastes, usually in small volumes, and generally containing toxic, radioactive and/or hazardous constituents. Many waste generating activities may be short term or sporadic since many program activities are short term or intermittent. Therefore, existing records may not accurately reflect the waste streams currently being generated.

Conformance of LLNL hazardous mixed, radioactive, and solid waste management units with County, State, and federal regulations, and DOE Orders will be evaluated. In the case of hazardous wastes, both Federal and State regulations will apply to LLNL. LLNL will present unique considerations, in part because California has lost RCRA primacy. Consequently, USEPA regulations including RCRA non-HSWA regulations not immediately applicable in primacy states will be applicable to LLNL. In addition, certain California regulations are broader in scope than USEPA regulations. Examples of such regulations include waste characterization tests, and the definition of certain PCB wastes and waste oil as hazardous wastes. Provisions of the RCRA Part B permit in effect for Site 300 hazardous waste storage facilities, will serve as an evaluation criteria for permitted Site 300 facilities.

California and RCRA underground storage tank regulations will be used for evaluating regulated substance USTs. USDOE Orders including 5400.1, 5400.3, 5820.2A, 51100.xx, and 6430.1A will be used in evaluating radioactive wastes and the radioactive component of mixed wastes. California solid waste regulations will be used to evaluate wastes which are not radioactive, hazardous, or contain PCBs. In addition to DOE Orders and environmental regulations, LLNL procedures will also be used as assessment criteria.

6.1 Issue Identification

Areas of particular concern will include the following:

- Classified waste including generation, treatment, storage and disposal activities
- Treatment of hazardous wastes
- Manifesting of hazardous and radioactive wastes for offsite shipment
- Storage, handling and treatment of mixed wastes
- Storage of hazardous waste in accumulation areas and longer term storage facilities
- Storage, handling, and treatment (solidification, incineration, etc.) of radioactive wastes
- Classification of radioactive wastes
- Certification of radioactive wastes for WIPP, NTS, or other disposal sites
- Waste minimization plans for solid, radioactive, hazardous and mixed wastes
- Land Ban issues including storage times for hazardous and mixed wastes
- Resource Recovery Activities (i.e., Silver Recovery)
- Closure Plans for RCRA landfills at Site 300
- Physical status of hazardous waste treatment facilities (e.g., wastewater treatment facilities, storage areas, etc.)
- Training of hazardous waste generators and hazardous waste facility employees
- Conformance with NTS acceptance criteria for radioactive wastes
- Solid waste accumulation, collection, treatment, and disposal

6.2 Record Required

Additional records required but not already received include:

- Inspection records
- Operating logs
- Waste minimization plan (draft or final)
- Classified waste records, inventory, procedures, etc.

Discussions will be held with individuals having responsibilities in the area of waste management practices including personnel from at least the following groups:

- Environmental Protection
  - Environmental Guidance
  - Regulatory Affairs
  - Hazardous Waste Management
  - Environmental Restoration
- Hazard Control Department
  - Health and Safety Team Personnel
- Plant Engineering
- Materials Management

7.0 TOXIC AND CHEMICAL MATERIALS

The toxic and chemical substances part of the environmental assessment will address the management and use of raw materials and process-related chemicals used at LLNL with emphasis on their handling, storage, and disposal. Primary emphasis will be given to the substances regulated by the Toxic Substances Control Act (polychlorinated biphenyls, chlorofluorocarbons, and asbestos), and the Federal Insecticide, Fungicide and Rodenticide Act. The large storage tanks used for bulk chemicals and fuels, as well as the drum storage and dispensing facilities will also be included in the assessment. The 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 LLNL'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 concept of best management practice will be applied to prevent or minimize releases of toxic substances to the environment.

7.1 Issue Identification

The management of electrical equipment which contains or has contained PCB and PCB-contaminated coolants will be reviewed during the assessment. LLNL documents reviewed indicate that all PCB transformers were replaced during the 1987 and 1988 calendar years. However, over 6000 PCB capacitors are still in service. The PCB containing electrical equipment will be inspected to determine their condition and potential for release of PCBs to the environment. PCB storage areas and PCB equipment and materials in storage will be inspected for compliance with TSCA regulations. LLNL records concerned with PCBs will be reviewed. Specifically, PCB annual reports and PCB electrical equipment inpsection logs will be reviewed. Records of off-site shipments and disposal of PCBs or PCB-containing materials, as well as information concerning previous spills or landfill areas used for disposal will be reviewed.

Asbestos or asbestos containing materials have been used throughout LLNL. A list of buildings containing asbestos has been provided. Some information on the type, location and condition of the asbestos was presented; however, this information is several years old and should be updated. Additional information will be requested during the on-site assessment and records pertaining to the handling and disposal of asbestos will be reviewed. Any on-going asbestos removal projects and/or disposal of asbestos will be observed directly.

Many pesticides are used at LLNL. The inventory list of pesticides stored in building 520 contains 60 products and 8 of these were applied during December, 1989. The purchase records, application procedures and frequency, personnel training, storage and disposal practices, as well as monitoring methods will be reviewed to determine the potential for environmental contamination and conformance with FIFRA regulations.

Many other toxic/chemical substances are used and stored at LLNL. There are many bulk chemical and/or fuel storage tanks located throughout the facility. A tank systems data base listing the product, tank location, tank volume, and tank construction material was provided. In addition, there are many chemicals stored in moderate quantities (55-gal. drum or less) at or near the point of use. For example, five drum storage and dispensing sites for solvents and oils are located at or near buildings 418, 513, 515, 517, and 519.

Many of these locations will be inspected during this assessment. The management and handling of these materials to prevent or minimize releases to the environment will be evaluated.

7.2 Records Required

Files will be reviewed as part of the environmental assessment, including documents not yet reviewed or received (e.g., classified documents, individual files, documents not yet identified). Specific documents and files to be reviewed as part of the assessment include, but will not be limited to, the following:

- toxic substances labeling and tracking system;
- procedures for handling, control, and management of toxic substances;
- inventory of toxic substances and purchasing records of chemical substances;
- PCB annual inventory documents (1984-1988);
- inventory of current PCB-contaminated electrical equipment;
- records of inspections of PCB transformers (1985 to present);
- PCB handling, storage, and disposal procedures;
- correspondence with fire department on PCB equipment;

- locations of buildings containing asbestos, including usage;
- asbestos disposal records, including method and location of disposal sites;
- asbestos handling, removal, disposal procedures, and environmental monitoring;
- records of asbestos use in process equipment and support facilities including the steam plant;
- pesticide training, handling, storage, disposal records, and environmental monitoring;
- standard operating procedures for pesticides;
- pesticide reports to regulatory agencies;
- special procedures involving handling, storage, use and disposal of chlorofluoroalkanes (freons) and chloroorganic solvents;
- spill control and emergency preparedness plans for aboveground storage tanks;
- audits or inspections pertaining to the toxic substances program; and
- other records as determined on-site.

8.0 RADIATION

8.1 Issue Identification

Radiological issues to be addressed during the Environmental Assessment will center around the Radiological Environmental Monitoring, Radiological Effluent Monitoring, Radioactive Waste Management, and Decommissioning and Decontamination Programs. Each of these program areas will be evaluated by reviewing its scope, bases, documentation, and data quality. The effectiveness of program implementation will also be evaluated compared to its defined objectives and by its regulatory compliance.

The review of the Radiological Environmental Monitoring Program will include the following: evaluation of sampling locations, bases of choosing locations and pathways monitored; sampling equipment, isotopes sampled for and methods; air, surface water, groundwater, storm drain water, soil, milk, vegetation, honey and wine sampling; dose assessment data, methods and documentation for the boundary dose, maximum exposed individual, and population dose calculations; preparation of the radiological portion of the Annual Environmental Monitoring Report.

The review of the Radioactive Effluent Monitoring Program will evaluate the monitoring, control, measurement and minimization of radioactivity in liquid and gaseous effluents. Areas of specific concern are stack emissions, retention tank liquids, sanitary sewer monitoring, and waste treatment facilities. Also of concern in this area is the potential for unmonitored radioactive effluent releases and the ability to evaluate and mitigate such events.

The review of the Radioactive Waste Management Program will cover solid and liquid wastes that are disposed of as radioactive material. The generation of such waste, transportation to Waste Accumulation Areas, and to the Building 612 Storage yard will be evaluated. Waste decontamination, incineration, solidification, compaction, and drumming operations will be evaluated as part of this review. Waste container packaging, labeling, storage and shipment of low level radioactive waste, mixed waste, and transuranic waste will be reviewed. Compliance with Waste Isolation Pilot Project acceptance criteria and Nevada Test Site waste acceptance criteria will be reviewed. This review will also include any active or inactive waste sites containing radioactive material.

The Program for Decommissioning and Decontamination of facilities will be evaluated. Facilities that have reached the end of their useful life or were utilized for programs that were completed may be demolished, mothballed, or cleaned up and re-used. In these cases, decontamination and possibly decommissioning would be required. Records for historical facilities that have undergone this process and current facilities awaiting decommissioning and/or decontamination will be reviewed to ensure that all possible radiological environmental threats have been identified and eliminated.

All of the above programs require the radiological analysis of various sample media. Laboratories performing these analyses will be evaluated to ensure that analytical techniques, records, equipment, and QA/QC are adequate to produce accurate high quality data in a manner consistent with regulatory requirements.

The radiological evaluations will be closely coordinated with the other specialists on the team since many of the areas to be evaluated are also part of the other disciplines. Each area will be assessed based upon observations of processes, operations, radioactive sources, controls, procedures, reports, documents, equipment and regulatory compliance. Discussions with operating and supervisory personnel will also be utilized to provide needed information critical for complete evaluation.

8.2 Required Records

Files will be reviewed as part of this assessment, including documents not yet reviewed or received (e.g., classified documents, individual files, documents not yet identified). Specific documents and files to be reviewed as part of the assessment include, but will not be limited to the following:

- Radiation-related ambient air quality information
- Radiation data for all sampled media
- Inventories of air, soil, surface water, and groundwater radionuclide release points and quantities
- Unscheduled or accidental release reports
- Radioanalytical quality assurance programs and procedures
- Dose assessment methodologies, including assumptions, calculations, reporting, etc.
- Building plot plans showing equipment and locations
- Description of radiation monitoring equipment, practices, and procedures (e.g., calibration, maintenance, etc.)

- Reports or recommendations for upgrading radiation monitoring systems
- Reports prioritizing new radiation monitoring installations
- Offsite and onsite radionuclide sampling point criteria
- Rad-waste management practices, policies, procedures, treatment, storage and disposal
- NESHAPS/DOE Subpart H 61.90-61.98 reports

9.0 QUALITY ASSURANCE

The quality assurance part of the environmental assessment will consist of a review of the methods used for the collection and analysis of environmental samples at LLNL to assure that they result in the generation of scientifically valid and defensible data.

9.1 Issue Identification

The quality assurance (QA) part of the environmental assessment will consist of an evaluation of current sampling and analysis procedures performed at LLNL or at any off-site laboratories conducting analyses on LLNL environmental samples. The objective will be to assess the QA procedures for collecting process effluent and environmental samples, for performing the laboratory analyses to identify and quantify contaminants, and for evaluating and reporting the data. Aspects of the QA program relating to environmental management of LLNL which will be reviewed 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.

Sampling and analysis procedures will be reviewed to ensure that they conform to regulatory requirements and/or accepted practice, and are being properly implemented by LLNL. Also, the interlaboratory test programs participated in by the LLNL laboratories as administered by the DOE's Environmental Measurements Laboratory and the Environmental Protection Agency will be evaluated for the laboratories performance and corrective action plan.

Primary contacts at LLNL are expected to be the quality assurance representative and personnel from the chemical and radiological analytical laboratories in the Hazards Control Department and the Environmental Protection Department.

9.2 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, such as classified documents, individual files, and documents which have not been identified at this time. Some specific documents and files to be reviewed in this phase of the assessment include, but will not be limited to, the following:

- environmental sampling and analysis quality assurance programs;
- quality assurance audits of the analytical laboratories and sampling programs;

- analytical and sampling procedures manuals;
- DOE and EPA quality assurance results of performance evaluation samples;
- quality assurance reports for the LLNL laboratories and off-site laboratories;
- training policy and records for the sample collection and analytical laboratory personnel;
- maintenance and calibration records for the analytical laboratory and sampling instruments/equipment;
- laboratory notebooks, standard data reporting forms, and sampling logbooks;
- other records as determined on-site.

10.0 INACTIVE WASTE SITES

This portion of the Tiger Team assessment will identify compliance issues related to inactive waste sites at both the Livermore site and Site 300. Much of the effort will be coordinated with the hydrogeology team member. The assessment will focus on CERCLA/SARA activities, RCRA RFI activities, and cleanup activities conducted with state oversight.

10.1 Issue Identification

The majority of the Inactive Waste Site portion of the assessment will consist of evaluating both current and planned remediation activities with respect to state and Federal regulatory requirements. Whereas at the Livermore Site, work appears to be progressing in accordance with a negotiated Federal Facilities Agreement that incorporates the State Regional Water Quality Control Board (RWQCB) cleanup order, the activities at Site 300 appear to be more fragmented. Issues at Site 300 include debate over the Site's inclusion on the National Priorities List, the RCRA 3008(h) Corrective Action Order, and the state Cleanup and Abatement Order. Investigation activities have been conducted at Site 300 under direction of the RWQCB for approximately seven years.

There are several areas of interest at the Livermore Site identified in site documents, as follows:

- Southwestern corner (onsite)
- Southwestern corner (offsite)
- Building 403 area
- Southeast corner
- Northwest area
- South Central area

A number of technical documents have been prepared for the Livermore site investigations. All available documents will be reviewed. Particular attention will be paid to the dispensation of other potential sources of contamination identified by LLNL staff since 1985 (Dreicer, May 1985, UCID-20442).

Environmental restoration activities at Site 300 have traditionally lagged behind those at the Main Site. There have been several investigations conducted at Site 300 facilities (Pits 7, 8, and 9; dry wells; and the HE burn pit), and several others are in progress, in accordance with RWQCB requirements. However in their draft Administrative Order under Section 3008(h) of RCRA. EPA has expressed concern that all SWMUs at Site 300 which could release contaminants be addressed. The conflicts associated with the legal agreements between LLNL, the EPA, and the RWQCB at Site 300 both completed work and work in the planning phases.

The investigations completed for the RWQCB will be evaluated for their compliance to the site investigation requirements of RCRA. The following areas have been identified by either the RWQCB or the EPA as requiring investigation:

- Dry wells (9)
- Unlined surface impoundments (12)
- Burn pits (3)
- Unlined landfills (6)
- Building 834 Complex TCE spill
- GSA/Offsite
- Building 854 Complex
- HE Process Area

The remainder of this assessment will cover the requirements of SARA Title III. This includes spill notification, reportable quantity releases, emergency planning, and community right-to-know issues.

10.2 Records Required

Not all documents received have been reviewed, but items of interest for this assessment include the following:

- CERCLA 103(c) notification and updates
- RI/FS Work Plan - Livermore Site
- RI Report - Livermore Site
- Documentation of removal actions

- Community Relations Plan - Livermore Site
- Baseline Risk Assessment - Livermore Site
- Offsite disposal records
- Documents pertaining to selection of groundwater treatment process
- Closure Plans - Pits 1 and 7
- Closure Plans - HE process lagoons
- Documentation of closure of other landfills
- Meeting minutes for 9/27/89 meeting regarding Site 300 Orders
- SARA Title III documentation, including:
  - spill notification documents
  - RQ release documents
  - hazardous/extremely hazardous chemical inventories
  - emergency planning notification documents
  - MSDS submitted documents
  - Tier I/II forms
  - Form Rs

11.0 NATIONAL ENVIRONMENTAL POLICY ACT

11.1 Issue Identification

The objectives of the National Environmental Policy Act (NEPA) assessment are to:

- evaluate the Department of Energy (DOE) San Francisco Operations Office (SAN) and University of California Lawrence Livermore National Laboratory (LLNL) NEPA management structure and NEPA review processes;
- identify inappropriate NEPA procedures or inadequate NEPA documentation; and
- evaluate compliance 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 DOE actions having the potential for significant impacts on the environment.

A NEPA protocol, developed jointly by the DOE Office of NEPA Project Assistance (EH-25) and Oak Ridge National Laboratory will be used to focus the NEPA assessment's lines of inquiry and to ensure a comprehensive, consistent approach. The NEPA protocol is divided into seven main sections:

- overview of NEPA issues;
- management structure (overall organization, training, use of contractors, record keeping, etc.);
- NEPA compliance planning;
- NEPA/CERCLA, NEPA/RCRA integration;
- determination of level of NEPA review required;
- procedural aspects of NEPA documents; and
- technical content of NEPA documents.

The general approach to the assessment will include interviews with: the SAN and LLNL environmental managers responsible for the NEPA procedures and review process; SAN and LLNL project, program, budget, planning, legal, and public relations managers; and others as the need arises. All site NEPA documents will be reviewed for adequacy in relation to their continued use as documents for reference or from which to tier other documents. LLNL categorical exclusions, memorandums-to-files, and action description memorandums will be evaluated for consistency with DOE guidelines.

11.2 Records Required

As part of the assessment, all NEPA/environmental files will be reviewed including any documents not previously submitted to Washington office review. Specific documents and files subject to review during the assessment include, but will not necessarily be limited to, the following items:

- printout from a database that tracks NEPA documentation for SAN and LLNL projects and programs;

- all draft and final environmental impact statements, records of decision, environmental assessments, findings of no significant action, memorandum-to-files, categorical exclusions, Section C.2. analyses, action description memorandums, and any other files used to make, support, or record NEPA determinations since FY 1985;

- records that locate, identify, and describe both on-site occurrences and off-site occurrences of the following resources which could be impacted by facility activities: endangered/threatened species and designated critical habitats; bald/golden eagles and migratory birds and their nests; wild horses and burros; waterways (including waters and navigable waters of the United States, 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 Federal, State, and local lands of any type;

- documentation of consultation with Federal, State, and local agencies responsible for the administration of natural resources and environmental regulations including all necessary Federal, State and local government permits and authorizations to operate;
- copies of all documents and/or studies included by references or cited in support of NEPA documents for LLNL;
- Environmental monitoring and/or mitigation reports and/or studies for LLNL;
- files for ongoing and proposed CERCLA response actions including NEPA documentation;
- files for ongoing and proposed RCRA closures and corrective actions including NEPA documentation;
- all SAN- and LLNL-specific NEPA guidance or policies;
- all correspondence or guidance on delegation of authority from DOE program or operations office to make NEPA determinations;
- California or local "NEPA-type" statutes and regulations as well as all State/local documents prepared for SAN or LLNL projects or programs;
- files on any litigation related to NEPA; and
- capital budget files, A-106 plans, general plant projects, major work orders, capital purchase, or other appropriate records of proposed actions or changes in LLNL activities since FY 1985.

APPENDIX C

DAILY AGENDAS

WEEK 1 2/26/90	AIR Eckle	SURFACE WATER/ DRINKING WATER Boros	GROUND-WATER Robison	WASTE MANAGEMENT Basinski	WASTE MANAGEMENT Winsborough	QA/TCM Caruso	RADIATION Masciulli	INACTIVE WASTE SITES Hubbard	NEPA
Monday, Feb. 26	Brief.	Briefing	Brief.	Briefing	Briefing	Brief.	Briefing	Briefing	Brief.
Tuesday Feb. 27	Tours	Review Proposed Sewerage Diversion Sys. & B-196 Monitoring Shack ********* Review GW Remed. Trtmt. Sys. Operations	Tours	419-Decon. 119-Chem 225-HE 292-RTWS 293-RTWS 294-RTWS	Tours Firing tables 812, 801A, 850, WAAs at B-851A, 823A, 826, 834B & 836B	Tours	Tours	Tours	Tours

WEEK 1 2/26/90	AIR Eckle	SURFACE WATER/ DRINKING WATER Boros	GROUND-WATER Robison	WASTE MANAGEMENT Basinski	WASTE MANAGEMENT Winsborough	QA/TCM Caruso	RADIATION Masciulli	INACTIVE WASTE SITES Hubbard	NEPA
Wed. Feb. 28	Main Site B-331, B-332 (Rad. Sources VOC Sources Boilers Effl. Samplers, Controls, etc.)	Site 300 GSA, incl. Garage, Crafts & Paint Shop, Potable Water Wells & Sewage Lagoon & Overflow Pond	Meet w/contract in Bldg. 4383 to identify most current info. William Isherwood; Albert Lamarre ******* Determine well sampling schedule; plan to observe, if possible. Main site and SW offsite tours with CERCLA specialist saw Boegel durng tours	Site 300 513, 514	Site 300 Lf, Waste Accum. Areas & Tanks. Toured Bldgs. 875, 872, 879, 883, 843 and sewage treatment pond	Review toxic substances Mgmt. (procurement, storage, uses & disposal) ****** Inspection of PCB Equip. & storage area (Bldg. 625, 611, 612, 431, 432, others)	331, 332 Rad. Air sources w/T. Eckle ******* 513, 514 w/R. Basinski	Visit - SW corner & UV treatment unit; Bldg. 403 gasoline leak & treatment unit; 518, 514, 612, 321; New salvage yard; East & West Traffic Circles - Taxi Strip; Old Salvage Yard - Old Landing Mat; Old & 1970's Fire Training areas w/B. Isherwood	Inter. S NEPA mgr review SAN/LLNI NEPA policies SOP; Search files fo MTFs, CA Xs, ADMs EAs, EIS & relate docu. ***** Inter. LLNL NEP mgr.; Begin eval. of site NEP & relate document
Thurs. March 1	Main Site B-490, 491, 492, B-225, B-231	Site 300 Other areas, incl. HE rinsewater lagoons, firing tables, B-834 & 865 complexes, springs & seeps at Elk Ravine, B-865 and Pit 6	Schedule, planning, document review & discussion with other specialist	612 complex storage; biomedial facilities Revisit 513/514 biomedical 361, 365, 362, 377, 612 complex/ lab packing	Firing tables; closed LF	Review toxic chem. management at toxic waste control fac. (Bldgs. 514, 513) continued inspecting PCB equip. B-194, camp packs. Visited	Tour 612 storage fac. & radwaste drumming & compaction operations documents & methods for radwaste shipments	Document review 103(c) notifi cations	Inter. SA & LLNL budget & planning mgrs, interviev NEPA/ CERCLA RCRA mgr:

WEEK 1 2/26/90	AIR Eckle	SURFACE WATER/ DRINKING WATER Boros	GROUND-WATER Robison	WASTE MANAGEMENT Basinski	WASTE MANAGEMENT Winsborough	QA/TCM Caruso	RADIATION Masciulli	INACTIVE WASTE SITES Hubbard	NEPA
Friday March 2	Main Site B-624, (Incinerator) B-612, 514	Review data for permit applic; discuss ongoing permit negot. BMR; point source monitoring	Meet with Pat Post on GW working group. ****** findings develop ment	Classified wastes (Cradle to Grave) ****** 131 class. wastes 251 training review start	Bldg. 819, 865, 873 & 875. Reviewed manifests in B813 HE waste & B874 haz. waste ***** Toured B251 & 231 RB-classified waste 624 inciner.	Visit above ground storage tank sites (bulk chemical & fuel storage throughout site ***** Inspect PCB transforme r w/plant engin.	Tour 175, 490, 231, 251	Admin. record; community relations	Inter. legal, public relations & classific tion mgrs ****** Follow-up interview continue finding prep & review
Sat. March 3	Document review	Review data acquired during 1st week; work on contact/ interviews list & documents reviewed list; meet w/GW & inactive waste spec.	Document review. Meet w/surface water spec.	File RUWs	Doc. review; site 300 manifests & training - at main LLNL	Document & file review; start writing	Document reviews	Writing & planning for Site 300	Follow-up interviews ; continu finding prep & review

WEEK 2 3/5-9	AIR Eckle	SURFACE WATER/ DRINKING WATER Boros	GROUND-WATER Robison	WASTE MANAGEMENT Basinski	WASTE MANAGEMENT Winsborough	QA/TCM Caruso	RADIATION Masciulli	INACTIVE WASTE SITES Hubbard	NEPA
Monday March 5	Ambient air monitors/ main site and community	Tour chemistry/ earth sciences operations incl. B151, 223, 231, 232, 241, 331 & 332. Emphasis on wastewater collection & retention tank systems	Site 300 visits; GSA/offsite; HE process area; B834 complex; inactive landfill, tritium plume area; dry wells	321, 322, SAA, WAAs	Site 300 Sewage treatment lagoon & nearby plume, dry wells at B895, 834, 815, 829A burn pits, 827 complex firing tables 812A, 845, LF9, LF1, LF2, 850A-LF7, 950, pit 6 at pistol range	Review QA program for envir. monitoring (B1680); discuss S&A methods; Visited analytical lab in B222	Review ambient air monit. program; main site verification monit. prog. site 300 verif. prog.	Visit Site 300; GSA - B834; offsite contam. areas; Pits 1-7 HE impoundment, dry wells; burn pits, HE lagoons, tritium plumes	Continue prep of draft findings

WEEK 2 3/5-9	AIR Eckle	SURFACE WATER/ DRINKING WATER Boros	GROUND-WATER Robison	WASTE MANAGEMENT Basinski	WASTE MANAGEMENT Winsborough	QA/TCM Caruso	RADIATION Masciulli	INACTIVE WASTE SITES Hubbard	NEPA
Tuesday March 6	Air permits procedure review; Emission source database ****** 2pm - B331 tritium release monit. vol flow	Tour physics beam research, B212; physics operation at B194, 197, 292, 293, 294, 295, 423, 431, 432, 435, & 438; & BER oper. at B361, 362, 365 & 377. Same emphasis as 3/5	GW sampling at 10am, document review	222 complex; records review; 223, 224, 227, 239 WAA	Records review; 194, 195, sat. areas; 131, 141, 151 waste accum. areas; 194	Visit analytical lab in hazards control (B253 & 222)	Finish review of envir. monit. programs & records; review liquid rad waste discharge permits	Document review	Present draft findings
Wed. March 7	VOC sources at 383, 419, 432, 438, 511 ****** meteorological data acquisit. system; AIRDOS modeling	Records review; Resolve question on regul. compile monit. data	Document review ****** findings develop. 2:30 meet w/Fred Hoffman	Training; manifests, classified wastes, land ban	331, 332; review documents	Records review. develop findings Visit to B361 biomed for toxic chem stor. visit B151 for QA analy. lab	Tour 300 site, burial pits, B865 accelerator, B823, 801, x-ray fac, firing tables, waste accum. areas	Records review Meet w/Fred Hoffman	Rewrite draft findings in response to comments

WEEK 3 3/12-16	AIR Eckle	SURFACE WATER/ DRINKING WATER Boros	GROUND-WATER Robison	WASTE MANAGEMENT Basinski	WASTE MANAGEMENT Winsborough	QA/TCM Caruso	RADIATION Masciulli	INACTIVE WASTE SITES Hubbard
Thurs. March 15	Site 300 Air Sources - burn pit, grass burn ****** Site 300 Air Quality Monitors	Discuss sanitary sewer integrity; rehabil. prog., backflow prev. prog., w/Plant Eng. (Done on Friday, March 23)	Follow-up	N/A	419, 514, 612 follow-up findings develop; emer. drilling	Writing & follow-up; finding develop. QA Biomed. Lab B378, PCB equip. and TCM storage in B321 Complex	M. Trent, C. Barnett, OSP, FSP, SAR's, design review, emerg. plan drill	Report writing
Friday March 16	Finding develop.	Develop 1st draft of findings for Tm. Ldr. review; catch up on lists & other docum. (Done on Monday, March 26)	Follow-up	N/A	Develop findings	Writing; finding develop.	V. Oversby lab., R. Crawford lab	Report writing

WEEK 2 3/5-9	AIR Eckle	SURFACE WATER/ DRINKING WATER Boros	GROUND-WATER Robison	WASTE MANAGEMENT Basinski	WASTE MANAGEMENT Winsborough	QA/TCM Caruso	RADIATION Masciulli	INACTIVE WASTE SITES Hubbard	NEPA
Thurs March 8	Airport; VOC sources; boilers ****** Amb. monit. B418 paint shop	Tour plant eng & adm ops, incl. pool & B318; Battery Shop 419; LWTF B514; 612, 614, 624 & 625; B520	Document review RCRA generator training (1 pm)	DOD facilities waste Training course/records review B137 WAA	253 hazcom; 254 bioassay; 365 & 361	Review pest. areas at site 300 (B814, 819) Reviewed toxic chem. & haz. mat. storage at Site 300 also, ASTs	Tour B194, 212, 292, 281, 321	Documentation of invest. (sampling) docum. reviews & report writing	Rewrite draft findings in response to comments
Friday March 9	Asbestos program re: NESHAPS ***** B391 Cryogenic vapor recovery B410 & 297	Review engin. & defense program ops at B131, 141 & plating ops. at B321/322 (Done on Monday, March 19)	Follow-up	Waste minimization plan; 431, 432, & 438	Waste minimization plans; medical facility	Discuss asbestos program (inspection, monit. removal & disposal w/T Eckle); inspect B612 area disposal areas	Tour B253, 254, 151; review prog. for radiological analysis of envir. & effluent samples, QA/QC of radiological analysis	Writing & planning for SARA Title III (also identify Bldg. supervisors to interview	Rewrite draft findings
Sat March 10				Waste pickup Run					

WEEK 3 3/12-16	AIR Eckle	SURFACE WATER/ DRINKING WATER Boros	GROUND-WATER Robison	WASTE MANAGEMENT Basinski	WASTE MANAGEMENT Winsborough	QA/TCM Caruso	RADIATION Masciulli	INACTIVE WASTE SITES Hubbard	NEPA
Monday March 12	Document review ***** HEPA filter insp. prog. & magnehelic s w/S. Masciulli	Tour Laser ops. incl. ICF prog. B298; AA/SIS prog (B281); Done on Tuesday, March 20)	Follow-up	Motor Pool (611), Met w/Mgmt. Tm. on Training Prog., Records review	Lazer fac. w/SW 298, 161, 175, 490, 169 WAA	Inspect TCE storage areas in Bldgs. 834 & 835 ****** Inspect HE storage areas at site 300; ASTs at site 300	Tour B419 haz. waste man. document reviews & misc. personnel interviews as needed. Industrial Hygiene, HEPA Filter Program	SARA Title III 103(a) spill notif. procedures & records; interview several bldg. supervisor s re: spill proc.; records of offsite RQ releases	Second draft of findings submitted to D. Bergman
Tuesday March 13	Main Site B141, 241, 151, 251	Tour LIS Program B175, 161, 490, & 492 (Done on Wednesday, March 21)	Follow-up Geology field trip (pm)	N/A	Salvage, excess, battery shop, ERD USTs	Visit warehouses for chem. storage onsite & offsite; QA for offsite labs. Discussed envir. sampling & offsite shipment of samples	Review direct radiation monit. program, sources, trending tracking, etc; review TLD (env.) program, calib, instrument s, etc;	Emergency planning, interview emerg. coordinato r; notif. of SEPC/LEPCs	Complete 3rd draft of findings; depart site
Wed. March 14	Main Site B321, 322 gasoline vending	Observe quarterly sampling at B196 (Done on Thurs., March 22)	Follow-up. See Sabre Coleman about USTs	N/A	Follow-up on USTs; review documents	Catch-up day; writing; ground-water sampling discussion	Offsite dose assess. review documents, source terms, pathway analysis, software & verif. & valid.	Right-to-Know - MSDS submission to SEPC/LEPC - original & updates; Tier I/II Forms; Form Rs	N/A

APPENDIX D

CONTACTS/INTERVIEWS

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Ref. Number	Date	Auditor	Organization	Topic
I-A-1	2/28/90	Eckle	Chem & Materials Science Dept.	B331, Tritium emissions VERS
I-A-2	2/28/90	Eckle	Plant Eng.	B331 Monitoring Instrumentation
I-A-3	2/28/90	Eckle	Mechanical Eng.	B331 Beryllium Processing
I-A-4	2/28/90	Eckle	Chem & Material Science Dept.	B331 VERS
I-A-5	2/28/90	Eckle	Chem & Material Science Dept.	B332 Plutonium Fac. Ventilation, TCE uses
I-A-6	2/28/90	Eckle	Chem & Material Science Dept.	B332 Air Sources needing permits
I-A-7	2/28/90	Eckle	Mechanical Eng.	B332 Ventilation Systems

Ref. Number	Date	Auditor	Organization	Topic
I-A-8	2/28/90	Eckle	Chem & Material Science Dept.	B332 Glovebox Filter: (exhaust)
I-A-9	3/1/90	Eckle	Electronics Eng. Laser Eng. Div.	B490, 491, 492 VOC Sources
I-A-10	3/1/90	Eckle	UDS Program	B490 Ventilation System
I-A-11	3/1/90	Eckle	Chem & Material Science Dept.	B225 Boiler
I-A-12	3/1/90	Eckle	Chem & Material Science Dept.	B231 Wet Scrubber for HF effluent
I-A-13	3/1/90	Eckle	Chem & Material Science Dept.	B231 Chemical Vapor Deposition System HF
I-A-14	3/1/90	Eckle	Hazards Control	B231 Glovebox Filtration R-1956A
I-A-15	3/1/90	Eckle	Mechanical Eng.	B231 Glovebox HEPA Work Order T-30094
I-A-16	3/1/90	Eckle	Mechanical Eng.	B231 Grit Blaster Exhaust in Bldg.
I-A-17	3/1/90	Eckle	Mechanical Eng.	B231 Plastics Shop
I-A-18	3/1/90	Eckle	Mechanical Eng.	B231 Epoxy Curing Oven

Ref. Number	Date	Auditor	Organization	Topic
I-A-19	3/2/90	Eckle	Haz. Waste Mgmt.	612 Complex Waste Management
I-A-20	3/2/90	Eckle	Haz. Waste Mgmt.	B612 Compactor, Drur Crusher.
I-A-21	3/2/90	Eckle	Env. Guidance	624 Incinerator
I-A-22	3/2/90	Eckle	Env. Guidance	B614W Tritium Canniste Storage
I-A-23	3/2/90	Eckle	Haz. Waste Mgmt.	B514 Treat Process WV Minor VOC Source
I-A-24	3/5/90	Eckle	Envir. Prot. Dept.	Particulate Ambient Air Samplers
I-A-25	3/5/90	Eckle	KMI	Particulate Ambient Air Sampling
I-A-26	3/5/90	Eckle	KMI	Particulate Ambient Air Sampling
I-A-27	3/6/90	Eckle	Envir. Prot. Dept.	Emissions Source Inv. & Air Permits
I-A-28	3/6/90	Eckle	Chem & Material Science Dept.	Tritium emission monit.
I-A-29	3/6/90	Eckle	Hazards Control	Tritium emission monit.
I-A-30	3/6/90	Eckle	Envir. Prot. Dept.	Tritium emission monit.

Ref. Number	Date	Auditor	Organization	Topic
I-A-31	3/7/90	Eckle	Hazardous Waste	Vapor degreaser, mercury/tritium ovens, vapor blaster, walk-in hoods, HEPA filters, magnehelics
I-A-32	3/7/90	Eckle	SAIC	HEPA filters and magnehelics B419
I-A-33	3/7/90	Eckle	Env. Prot. Dept.	B432, 438, 511 cold cleaners & vapor degreasers
I-A-34	3/7/90	Eckle	Env. Prot. Dept.	Meteorological towers Main Site & Site 300 ARAC, AIRDOS
I-A-35	3/8/90	Eckle	AMI/LLNL LLNL LLNL LLNL AMI/LLNL	Observe hanger ops. for potential air pollutant sources
I-A-36	3/8/90	Eckle	Env. Prot. Dept.	Chrome plating ops.
I-A-37	3/8/90	Eckle	Env. Prot. Dept.	Discuss ambient particulate sampling
I-A-38	3/8/90	Eckle	Env. Prot. Dept.	Discuss ambient particulate sampling
I-A-39	3/8/90	Eckle	Plant Engineering	B418 paint booths sand blaster, oven
I-A-40	3/9/90	Eckle	Plant Engineering	Asbestos

Ref. Number	Date	Auditor	Organization	Topic
I-A-41	3/9/90	Eckle	Nova Operations	Cryogenic Vapor Recovery System
I-A-42	3/12/90	Eckle	Haz. Control Safety Services	HEPA filters and magnehelics
I-A-43	3/13/90	Eckle	Elec. Engineering Elec. Manuf. Elec. Engineering Elec. Engineering	B141, vapor degreasers
I-A-44	3/13/90	Eckle	Chemistry & Materials Science	B241 Be activities, gloveboxes, HEPAs, degreasers, boilers
I-A-45	3/13/90	Eckle	Chemistry & Materials Science	Oil-shale retort and associated equipment
I-A-46	3/13/90	Eckle	Nuclear Chemistry	B151 boilers, dissolver wing, gloveboxes, scrubber, electrostatic precipitator
I-A-47	3/13/90	Eckle	Nuclear Chemistry	B251 boilers, gloveboxes, HEPA, exhaust samplers
I-A-48	3/14/90	Eckle	Vehicle & Mail Services	Gasoline Station
I-A-49	3/14/90	Eckle	Mat. Fab. Div.	B322 & 321
I-A-50	3/14/90	Eckle	Mat. Fab. Div.	PCE Degreaser, B322 S2041

Ref. Number	Date	Auditor	Organization	Topic
I-A-51	3/14/90	Eckle	Mat. Fab. Div.	B321 HEPA filters Cold Cleaners
I-A-52	3/15/90	Eckle		Site 300 Boilers
I-A-53	3/15/90	Eckle		Site 300 Gasoline Pumps
I-A-54	3/15/90	Eckle		Site 300 Paint & Carpenter Shops
I-A-55	3/15/90	Eckle	Env. Prot. Dept.	Site 300 Open Burning
I-A-56	3/15/90	Eckle		HE Burn Area
I-A-57	3/15/90	Eckle		Aqueous-based pistol cleaner
I-A-58	3/15/90	Eckle	Env. Prot. Dept.	Site 300 Amb Particulate Samplers
I-A-59	3/26/90	Eckle	EPD	Site 300 Air permits
I-A-60	3/26/90	Eckle	Fire Safety Div.	Site 300 Burn activities
I-A-61	3/27/90	Eckle	TMA Norcal	Ambient Air Filters Beryllium Analysis

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I-SW-1	2/27/90	Boros	Envir. Rest. Div.	Facility A GW Remed. Plant
I-SW-2	2/27/90	Boros	Envir. Rest. Div.	Facility A GW Remed. Plant
I-SW-3	2/27/90	Boros	Reg. Affairs Div.	Sanitary sewer Monit. & Alarm systems
I-SW-4	2/28/90	Boros	Site 300 Safety Division	Site 300 H&S Orient.
I-SW-5	2/28/90	Boros	Site 300 Plant Eng. Division	Site 300 potable water systems; sewage treatment ponds
I-SW-6	2/28/90	Boros	Site 300 Plant Eng. Division	Site 300 potable water systems; sewage treatment ponds

Ref. Number	Date	Auditor	Organization	Topic
I-SW-7	2/28/90	Boros	Site 300 Plant Eng. Division	Site 300 potable water systems; sewage treatment ponds
I-SW-8	2/28/90	Boros	Site 300 Plant Eng. Division	Site 300 Garage ops.
I-SW-9	3/1/90	Boros	Envir. Rest. Div.	Site 300 firing tables, HE lagoons, springs, seeps, cooling towers
I-SW-10	3/1/90	Boros	Envir. Guid. Div.	Site 300 firing tables, HE lagoons, springs, seeps, cooling towers
I-SW-11	3/1/90	Boros	Site 300 HE Ops. & Test	B801 firing table ops.
I-SW-12	3/1/90	Boros	Site 300 HE Ops. & Test	B801 firing table ops.
I-SW-13	3/1/90	Boros	Site 300 Mech. Engineering	HE W.W. lagoons & B817 operations
I-SW-14	3/2/90	Boros	Regul. Affairs Division	NPDES Permits - 065, 075, Site 300 CTS
I-SW-15	3/2/90	Boros	Regul. Affairs Division	Status of Site 300 permits
I-SW-16	3/2/90	Boros	Env. Guid. Div.	Point source mon.; BMR; san. sewer guid.

Ref. Number	Date	Auditor	Organization	Topic
I-SW-17	3/2/90	Boros	Env. Guid. Div.	Tours with EPA for Monday 3/5/90
I-SW-18	3/5/90	Boros	Chemistry Dept.	B222 - Chemistry Ops
I-SW-19	3/5/90	Boros	USEPA Region 9	B222 - Chemistry Ops
I-SW-20	3/5/90	Boros	USEPA Region 9	B222 - Chemistry Ops
I-SW-21	3/5/90	Boros	C&MSD Plutonium Facility	B332 Operations
I-SW-22	3/5/90	Boros	C&MSD Plutonium Facility	B332 Operations
I-SW-23	3/5/90	Boros	C&MSD Tritium Fac.	B331 Operations
I-SW-24	3/5/90	Boros	C&MSD Tritium Fac.	B331 Operations
I-SW-25	3/5/90	Boros	C&MSD Mat'l. Div.	B241 Operations
I-SW-26	3/5/90	Boros	NUC Chem. Division	B151 Operations
I-SW-27	3/5/90	Boros	Env. Prot. Div.	B222 Operations
I-SW-28	3/5/90	Boros	C&MSD, CM&A Sciences Div.	B222 Operations
I-SW-29	3/5/90	Boros	Mech. Engineering Eng. Sciences	B231 Complex
I-SW-30	3/5/90	Boros	Mech. Engineering Nuclear Testing	B231 Complex

Ref. Number	Date	Auditor	Organization	Topic
I-SW-31	3/5/90	Boros	Haz. Control Dept. Ops. Safety Div.	B231 Complex
I-SW-32	3/6/90	Boros	Env. Prot. Div.	Physics, Beam Res. & Biomed Operations
I-SW-33	3/6/90	Boros	Mech. Engineering Bea[illegible] & Fusion Eng.	B432 Operations
I-SW-34	3/6/90	Boros	Mech. Engineering Mat'l. & Fab. Div.	B432 Operations
I-SW-35	3/6/90	Boros	Dir. Admin. Staff	B432 Operations
I-SW-36	3/6/90	Boros	Elect. Engineer, Fusion Ener. Syst.	B435 & 438 Ops.
I-SW-37	3/6/90	Boros	Haz. Control Dept. H&S Division	B438 Hood Inspection
I-SW-38	3/6/90	Boros	Physics Dept., V Division	B212 Operations
I-SW-39	3/6/90	Boros	Elect. Engineer Field Test Syst.	B212 Operations
I-SW-40	3/6/90	Boros	Physics Dept. Physics Admin.	B197 Operations
I-SW-41	3/6/90	Boros	Elect. Engineer Eng. Res. Div.	B197 Operations
I-SW-42	3/6/90	Boros	Physics Dept. O Division	B197 Operations

Ref. Number	Date	Auditor	Organization	Topic
I-SW-43	3/6/90	Boros	Haz. Control Dept. Ops. Safety Div.	B194 Perimeter Drain System
I-SW-44	3/6/90	Boros	Biomed Sciences Division	B361 Complex Ops.
I-SW-45	3/6/90	Boros	Haz. Control Dept. Ops. Safety Div.	B361 Complex Ops.
I-SW-46	3/6/90	Boros	Haz. Control Dept. Ops. Safety Div.	B361 Complex Ops.
I-SW-47	3/6/90	Boros	Biomed Sciences Division	B365 Operations
I-SW-48	3/8/90	Boros	Env. Prot. Div.	Plt Eng. & HWM Ops.
I-SW-49	3/8/90	Boros	Plant Engineering Maint. Mech's.	B318 & Swimming Pool Operations
I-SW-50	3/8/90	Boros	Plant Engineering Electrical Shop	B419 Battery Shop Ops.
I-SW-51	3/8/90	Boros	Env. Prot. Dept.	B514 Operations
I-SW-52	3/8/90	Boros	Env. Prot. Dept.	B514 Operations
I-SW-53	3/8/90	Boros	Env. Prot. Dept.	B612 Operations
I-SW-54	3/8/90	Boros	Plant Engineering Admin. & Super.	B520 Operations

Ref. Number	Date	Auditor	Organization	Topic
I-SW-55	03/19/90	Boros	Env. Protect. Div.	B131, 141, 321 & 322 Ops.
I-SW-56	03/19/90	Boros	Mat. Fab. Div.	B321 & 322 Ops.
I-SW-57	03/19/90	Boros	Mat. Fab. Div.	B321 & 322 Ops.
I-SW-58	03/19/90	Boros	Elect. Eng. Div.	B131 & B141 Ops.
I-SW-59	03/19/90	Boros	Engng. Res. Div.	B131 Ops.
I-SW-60	03/19/90	Boros	Engng. Res. Div.	B131 Ops.
I-SW-61	03/19/90	Boros	Elect. Engr. Div.	B141 Ops.
I-SW-62	03/19/90	Boros	Elect. Engr.	B141 Ops.
I-SW-63	03/20/90	Boros	Env. Prot. Div.	Lasers/LIS Ops.
I-SW-64	03/20/90	Boros	Mech. Engng. Engng. Sys. Div.	B298 Ops.
I-SW-65	03-20-90	Boros	Haz. Control Div. OPS. Safety GP.	B298 & B281 Ops.
I-SW-66	03-20-90	Boros	Y-Division	B298 Ops.
I-SW-67	03-21-90	Boros	LIS Programs	B175 Ops.
I-SW-68	03-21-90	Boros	I-Division	B175 Ops. Ref.

Ref. Number	Date	Auditor	Organization	Topic
I-SW-69	03/21/90	Boros	I-Division	B161 Ops.
I-SW-70	03/21/90	Boros	Mech. Engng.	B161 Ops.
I-SW-71	03/21/90	Boros	Env. Prot. Div.	B490 Complex
I-SW-72	03/21/90	Boros	LIS Programs	B490 & B492 Ops.
I-SW-73	03/21/90	Boros	Mech. Engng. Div., Engr. Syst. Engng. Y-Div.	B490 & B492 Ops.
I-SW-74	03/22/90	Boros	Env. Prot. Div.	Quarterly Sampling B196
I-SW-75	03/22/90	Boros	Env. Prot. Div.	Sewer Break at B-196; Sewer Integrity
I-SW-76	03/22/90	Boros	Plant Engr. Shops	Sewer Break at B-196; Sewer Integrity
I-SW-77	03/22/90	Boros	Plant Engr. Shops	Sewer Break at B-196; Sewer Integrity
I-SW-78	03/22/90	Boros	Plant Engr. Shops	Backflow Prevention Programs
I-SW-79	03/22/90	Boros	Plant Engr. Shops	Backflow Prevention Programs
I-SW-80	03/29/90	Boros	DOE - SAN	Tech. Accuracy Review or SW Findings
I-SW-81	03/29/90	Boros	Env. Guid. Div.	Tech. Accuracy Review or SW Findings

Ref. Number	Date	Auditor	Organization	Topic
I-SW-82	03/29/90	Boros	Env. Rest. Div.	Tech. Accuracy Review or SW Findings
I-SW-83	03/29/90	Boros	Lab Counsel	Tech. Accuracy Review or SW Findings
I-SW-84	03/29/90	Boros	Plant Engng. Shops	Tech. Accuracy Review or SW Findings

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Ref. Number	Date	Auditor	Organization	Topic
I-GW-1	2/26/90	Robison	EPA Region 9 UIC Section Drink. Wtr. Branch	Expressed interest in joining tour of Site 300; dry wells on March 6
I-GW-2	2/27/90	Robison	SAN	Discussed whether new incinerator was included in Part B revision. Current inc. passed trial burn
I-GW-3	2/27/90	Robison	LLNL ERD (EP Dept)	Revised schedule and contacts. Should deal w/Group Ldrs. first
I-GW-4	2/28/90	Robison Hubbard	EPD ERD (LLNL)	Discussed schedule, recent docu. regul. framework

Ref. Number	Date	Auditor	Organization	Topic
I-GW-5	2/28/90	Robison Hubbard	EPD ERD (LLNL)	Sampling, analysis, data management, leaky tank proc.
I-GW-6	2/28/90	Robison Hubbard	Weiss Assoc. SAN (form. EPD) EPD ERD	Tour of source invest. study areas
I-GW-7	2/28/90	Robison Hubbard	ERD ERD (LLNL) SAN ERD	Process for GW treat. fac. A and vapor ext. at gasoline spill area
I-GW-8	3/1/90	Robison	EPA Region 9 UIC Section Drink. Wtr. Branch	Phone conversation on dry wells & Site 300 tour (Now March 5)
I-GW-9	3/1/90	Robison	LLNL EPD	Arrangements to look at files from GW working group
I-GW-10	3/2/90	Robison	LLNL EPD ERD	Arrangements to observe sampling on Tues. wells 271, 364

Ref. Number	Date	Auditor	Organization	Topic
I-GW-11	3/2/90	Robison	LLNL EPD ERD	Status of arrange. w/Michelle Rembaum for GW sampling obser.
I-GW-12	3/2/90	Robison	CA DHS/TSCP/SMU	Arrangements for GW sampling on Tues. March 6, 10 am
I-GW-13	3/2/90	Robison	LLNL Main Library	Availability of 40CFR Material
I-GW-14	3/2/90	Robison	LLNL Reports Lib.	Acquisition of 40CFR 147.250 & 147.251 VIC Regs
I-GW-15	3/2/90	Robison	LLNL EPD	Minutes of groundwater cleanup working group meetings
I-GW-16	3/2/90	Robison	LLNL Main Library	Plans to look at 40 CFR material on Tues. March 6
I-GW-17	3/5/90	Robison	Env. Sciences (Matrix to ERD)	Site 300 tour of GSA/ offiste, HE process lagoons, & other sites

Ref. Number	Date	Auditor	Organization	Topic
I-GW-18	3/5/90	Robison	LLNL EPD ERD	Tour of Pit 6 and firing tables at Site 300
I-GW-19	3/5/90	Robison	LLNL EPD EGD	Site 300 tour of envir. restoration sites
I-GW-20	3/5/90	Robison	LLNL EPD ERD	Site 300 tour of envir. restoration sites
I-GW-21	3/6/90	Robison	LLNL EPD EGD	Arrangements for March 8 RCRA gener. training
I-GW-22	3/6/90	Robison	LLNL Main Library	Cancellation of plans to look at 40 CFR mat.
I-GW-23	3/6/90	Robison	LLNL EPD ERD	Confirmation of plans to observe well sampl.
I-GW-24	3/6/90	Robison	CA DHS/TSCP/SMU	She is ill and will not observe sampling today
I-GW-25	3/6/90	Robison	LLNL EPD ERD	Cancellation of badging arrange. for M. Rembaum
I-GW-26	3/6/90	Robison	Brown & Caldwell	Observation of sampl. at Wells MW-271 & MW-364
I-GW-27	3/6/90	Robison	LLNL EPD ERD	Data management system for well sampling

Ref. Number	Date	Auditor	Organization	Topic
I-GW-28	3/6/90	Robison	LLNL Env. Sciences (Matrix to ERD)	Absence of SOP for management of muds & cuttings
I-GW-29	3/6/90	Robison	LLNL EPD ERD	Observation of sampl. at Wells MW-271 & MW-364
I-GW-30	3/6/90	Robison	EPA	Observation of well sampling
I-GW-31	3/7/90	Robison	EPD ERD EPD ERD EPD ERD EPD ERD EPD ERD EPD ERD SAN SAN EPD Reg. Affairs EPD Division	Meeting to follow-up on comments from debriefing sessions e.g. soil vapor extr. wells, well closures soil & mud disposal, soil remediation
I-GW-32	3/8/90	Robison	EPD EGD	RCRA Generator Training Course
I-GW-33	3/8/90	Robison	EPD EGD EPD EGD	Discussion of conduct of training course
I-GW-34	3/12/90	Robison	EPD EGD	RCRA GW Monitoring status of HE Burn Pits
I-GW-35	3/12/90	Robison	EPD ERD	RCRA GW Monitoring status of HE Burn Pits

Ref. Number	Date	Auditor	Organization	Topic
I-GW-36	3/12/90	Robison	EPD ERD	Drilling muds & HE Burn Pits
I-GW-37	3/12/90	Robison	DOE SAN	EPA contract arrange. with DHS & RWQCBs
I-GW-38	3/13/90	Robison	LLNL EPD ERD LLNL EPD ERD DOE SAN Kaiser Engineers Kaiser Engineers	Site 300 Geology (Field Trip)
I-GW-39	3/14/90	Robison	LLNL EPD EGD	Tank Program Overview
I-GW-40	3/15/90	Robison	DOE SAN	EPA relationships with state agencies
I-GW-41	3/15/90	Robison	EPA Region IX	Availability of reversion order between EPA and state
I-GW-42	3/15/90	Robison	CA RWQCB - Central Valley	Regulatory aspects of Site 300 EPA/RWQCB interactions
I-GW-43	3/15/90	Robison	LLNL EPD ERD	Review od draft SOPs, water around drilling rig
I-GW-44	3/16/90	Robison	DOE SAN	Request for SAN internal memos
I-GW-45	3/23/90	Robison	LLNL EPD ERD	Nature of two findings

Ref. Number	Date	Auditor	Organization	Topic
I-GW-46	3/26/90	Robison	LLNL Main Library	Availability of water board bulletin 74-81
I-GW-47	3/26/90	Robison	Dept. of Water Resources	Regulations pertinent to water well closures
I-GW-48	3/26/90	Robison	LLNL Main Library	Aquisition of Section 24400 of Health & Safety Code on well closures
I-GW-49	3/27/90	Robison	LLNL Main Library	Further discussion of Health & Safety code and AB 1624
I-GW-50	3/27/90	Robison	LLNL EPD ERD	Site 300 water-supply well list and new regulations
I-GW-51	3/27/90	Robison	LLNL EPD ERD	Compilation of all analyses on drilling muds
I-GW-52	3/28/90	Robison	LLNL EPD (Matrix)	Changes to SOPs and tritium threshold level
I-GW-53	3/28/90	Robison	LLNL EPD EGD	Status of groudwater protection management program plan

Ref. Number	Date	Auditor	Organization	Topic
I-GW-54	3/28/90	Robison	LLNL EPD Regulator Affairs	Status of groundwater protection management program plan
I-GW-55	3/28/90	Robison	CA RWQCB-CV	Regulations pertinent to water well closures
I-GW-56	3/29/90	Robison	LLNL Main Library	Acquisition of AB 1624
I-GW-57	3/29/90	Robison	SAN	Attempt to locate inactive wells at Site 300
I-GW-58	3/30/90	Robison	LLNL EPD (MATRIX)	Existence of QAPP for Site 300 Restoration Activites
I-GW-59	3/30/90	Robison	LLNL EPD ERD	Citation for Regs (Well Closures)

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Ref. Number	Date	Auditor	Organization	Topic
I-WM-1	2/27/90	Basinski	Chemical Science Division	B225 WAA Inspection
I-WM-2	2/27/90	Basinski	HEAF Division Chem. Sci. Div.	B191 WAA Inspection
I-WM-3	2/27/90	Basinski	Haz. Waste Man. Haz. Waste Man.	B419 Inspection
I-WM-4	2/27/90	Basinski	Physics Dept. Env. Analyses Multi-User Tandem Lab	B292, 293 & 197/194 WAA Inspections
I-WM-5	2/28/90	Basinski Winsborough Shafer	Env. Prot. Dept.	Site 300 Discussion
I-WM-6	2/28/90	Basinski Winsborough Shafer	Env. Prot. Dept.	B619 Inspection

Ref. Number	Date	Auditor	Organization	Topic
I-WM-7	2/28/90	Basinski Winsborough Shafer	Env. Prot. Dept.	875 WAA Inspection
I-WM-8	2/28/90	Basinski Winsborough Shafer	Env. Prot. Dept.	872 WAA Inspection
I-WM-9	2/28/90	Basinski Shafer Winsborough	Env. Prot. Dept. Vehicle & Mail Serv. Division	879 Inspection
I-WM-10	2/28/90	Basinski	Env. Prot. Dept. Haz. Waste Haz. Waste Man. Haz. Waste Man.	B514 Inspection
I-WM-11	3/1/90	Basinski	Haz. Waste Man.	Phone conversation on B514
I-WM-12	3/1/90	Basinski	Haz. Waste Man. HWM HWM Env.	612, 625, & 614 Insp.
I-WM-13	3/1/90	Basinski	Biomed. Dept. Env. Prot. Dept.	Biomedical SAA & WAA Inspections, WAA-301
I-WM-14	3/2/90	Basinski	Env. Guid. Div.	B251 WAA Inspections

Ref. Number	Date	Auditor	Organization	Topic
I-WM-15	3/2/90	Basinski	Env. Prot. Dept.	LLNL Env. Training
I-WM-16	3/5/90	Basinski	Env. Prot. Div. Metal Finishing Metal Finishing Metal Finishing	B322 Plating Shop Inspection
I-WM-17	3/5/90	Basinski Yesso	Metal Finishing Mat. Fab. Div. Mat. Fab. Div.	B321 WAA Inspection
I-WM-18	3/6/90	Basinski	Env. Prot. Dept.	B222, 229, 227, 223 Inspections
I-WM-19	3/6/90	Basinski	Metal Finishing	Phone conversation on Article 12
I-WM-20	3/7/90	Basinski	Env. Prot. Dept. Env. Prot. Dept.	Generator & EPD Training
I-WM-21	3/7/90	Basinski	Haz. Waste Man.	Land Disposal Restricted Wastes
I-WM-22	3/8/90	Basinski	Env. Prot. Dept.	General discussion on generator training
I-WM-23	3/9/90	Basinski Winsborough	Env. Prot. Dept. Env. Prot. Dept.	LLNL Waste Minimization Prog.

Ref. Number	Date	Auditor	Organization	Topic
I-WM-24	3/9/90	Basinski	Env. Prot. Dept. Beam Res. Prog.	431 WAA Inspections
I-WM-25	3/9/90	Basinski	Env. Prot. Dept.	B431, 432, 438 Insp.
I-WM-26	3/10/90	Basinski	Haz. Waste Man.	Inspection during waste pickup run
I-WM-27	3/29/90	Basinski	Haz. Waste Man.	TRU Shipment to NTS
I-WM-28	3/29/90	Basinski	NTS	TRU Shipment to NTS
I-WM-29	3/30/90	RRB	LLNL	Waste Minimization Training

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I-WM-101	2/28/90	Winsborough	Env. Guid. Div.	Waste Mgmt. Waste Accum. Areas
I-WM-102	2/28/90	Winsborough	Site 300 Veh. Maintenance	Waste Mgmt. Waste Accum. Areas
I-WM-103	2/28/90	Winsborough	Env. Restoration	Waste Mgmt. Waste Accum. Areas
I-WM-104	2/28/90	Winsborough	Area 850	Waste Mgmt. Waste Accum. Areas
I-WM-105	3/1/90	Winsborough	Material Fabrication Div.	Waste Mgmt. HE surface impound.
I-WM-106	3/1/90	Winsborough	Engineering	Waste Mgmt., Burn Pit
I-WM-107	3/1/90	Winsborough	Chemistry	Waste Mgmt. WAA
I-WM-108	3/2/90	Winsborough	Admin. & Ops.	Waste Mgmt. WAA

Ref. Number	Date	Auditor	Organization	Topic
I-WM-109	3/2/90	Winsborough	Beam Research	Waste Mgmt. WAA
I-WM-110	3/2/90	Winsborough	Materials Mgt.	Manifests
I-WM-111	3/2/90	Winsborough	Site 300 Admin. Ops., Mainten.	Waste oils
I-WM-112	3/2/90	Winsborough	B251	Waste Mgmt. WAA
I-WM-113	3/2/90	Winsborough	B251	Waste Mgmt. WAA
I-WM-114	3/2/90	Winsborough	B231	Waste Mgmt. WAA
I-WM-115	3/2/90	Winsborough	B231	Waste Mgmt. WAA
I-WM-116	3/2/90	Winsborough	B231	Waste Mgmt. WAA
I-WM-117	3/2/90	Winsborough	Area 1600, B231	Waste Mgmt. WAA
I-WM-118	3/5/90	Winsborough	Env. Restoration	Waste Management
I-WM-119	3/5/90	Winsborough	Env. Restoration	Waste Management
I-WM-120	3/5/90	Winsborough	USEPA Region IX	Waste Management
I-WM-121	3/5/90	Winsborough	Env. Guidance Div.	Waste Management
I-WM-122	3/5/90	Winsborough	Safeguards & Security Dept.	
I-WM-123	3/5/90	Winsborough	829A	Waste Management
I-WM-124	3/5/90	Winsborough	Env. Restoration	Waste Management

Ref. Number	Date	Auditor	Organization	Topic
I-WM-125	3/6/90	Winsborough	Hazards Control Dept.	Waste Management
I-WM-126	3/6/90	Winsborough	O Division	
I-WM-127	3/6/90	Winsborough	Lin Accel.	Waste Management
I-WM-128	3/6/90	Winsborough	B131	Waste Management
I-WM-129	3/6/90	Winsborough	B131 - Photo Lab	Waste Management
I-WM-130	3/6/90	Winsborough	B131	Waste Management
I-WM-131	3/6/90	Winsborough	B131	Waste Management
I-WM-132	3/6/90	Winsborough	B141	Waste Management
I-WM-133	3/6/90	Winsborough	B141	Waste Management
I-WM-134	3/6/90	Winsborough	S&D Support Svd.	Waste Management
I-WM-135	3/6/90	Winsborough	Nuc. Chemistry	Waste Management
I-WM-136	3/7/90	Winsborough	B332	Waste Management
I-WM-137	3/7/90	Winsborough	Chem. & Mat. Sci	
I-WM-138	3/7/90	Winsborough	Chem. & Mat. Sci	Waste Management
I-WM-139	3/7/90	Winsborough	B331	Waste Management

Ref. Number	Date	Auditor	Organization	Topic
I-WM-140	3/8/90	Winsborough	Biomedical	Waste Management
I-WM-141	3/8/90	Winsborough	Biomedical	Waste Management
I-WM-142	3/8/90	Winsborough	Biomedical	Waste Management
I-WM-143	3/8/90	Winsborough	Biomedical	Waste Management
I-WM-144	3/8/90	Winsborough	Haz. Control	Waste Management
I-WM-145	3/8/90	Winsborough	Haz. Control	Waste Management
I-WM-146	3/8/90	Winsborough	B253	Waste Management
I-WM-147	3/8/90	Winsborough	B253	Waste Management
I-WM-148	3/8/90	Winsborough	B253	Waste Management
I-WM-149	3/8/90	Winsborough	B253, Rm. 1907	Waste Management
I-WM-150	3/8/90	Winsborough	B253, Rm. 1909	Waste Management
I-WM-151	3/8/90	Winsborough	B253W	Waste Management
I-WM-152	3/8/90	Winsborough	B254	Waste Management
I-WM-153	3/9/90	Winsborough	Waste Min.	Waste Minimization
I-WM-154	3/9/90	Winsborough	Waste Min.	Waste Minimization
I-WM-155	3/9/90	Winsborough	Med. Services	Waste Management
I-WM-156	3/9/90	Winsborough	Med. Services	Waste Management

Ref. Number	Date	Auditor	Organization	Topic
I-WM-157	3/12/90	Winsborough	TS&T	Waste Management
I-WM-158	3/12/90	Winsborough	TS&T	Waste Management
I-WM-159	3/12/90	Winsborough	Health & Safety	Waste Management
I-WM-160	3/12/90	Winsborough	Env. Guid. Div.	Waste Management
I-WM-161	3/12/90	Winsborough	B161	Waste Management
I-WM-162	3/12/90	Winsborough	B161	Waste Management
I-WM-163	3/12/90	Winsborough	B175	Waste Management
I-WM-164	3/12/90	Winsborough	B175	Waste Management
I-WM-165	3/12/90	Winsborough	B175	Waste Management
I-WM-166	3/12/90	Winsborough	B490	Waste Management
I-WM-167	3/12/90	Winsborough	B490	Waste Management
I-WM-168	3/12/90	Winsborough	B490	Waste Management
I-WM-169	3/13/90	Winsborough	Supply & Distribution	Waste Management Waste minimization
I-WM-170	3/13/90	Winsborough	Supply & Distribution	Waste Management Waste minimization

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I-WM-171	3/13/90	Winsborough	Supply & Distribution	Waste Management Waste Minimization
I-WM-172	3/13/90	Winsborough	Supply & Distribution	Waste Management Waste Minimization
I-WM-173	3/13/90	Winsborough	Supply & Distribution	Waste Management Waste Minimization
I-WM-174	3/13/90	Winsborough	Env. Prot. Dept.	Waste Management
I-WM-175	3/13/90	Winsborough	Env. Prot. Dept.	Waste Management
I-WM-176	3/13/90	Winsborough	Env. Prot. Dept.	Underground storage tanks
I-WM-177	3/15/90	Winsborough	Eng. Sciences	Waste Management
I-WM-178	3/15/90	Winsborough	DOE SAN	Waste Management
I-WM-179	3/15/90	Winsborough	Env. Prot. Dept. Haz. Waste Mgt.	Waste Management
I-WM-180	3/15/90	Winsborough	Haz. Waste Mgt.	Waste Management
I-WM-181	3/15/90	Winsborough	Haz. Waste Mgt.	Waste Management
I-WM-182	3/15/90	Winsborough	B514 - Neutralization Facility	Waste Management
I-WM-183 Ref.	3/16/90	Winsborough	Haz. Waste Mgt.	Waste Management

Number	Date	Auditor	Organization	Topic
I-WM-184	3/16/90	Winsborough	Chemistry & Materials Sci. Dept.	Waste Management and chemical character-ization
I-WM-185	3/16/90	Winsborough	Chemistry & Materials Sci. Dept.	Waste Management and Chemical character-ization
I-WM-186	3/16/90	Winsborough	Health Physics	Waste character-ization
I-WM-187	3/16/90	Winsborough	Condensed Matter & Analytical Sciences Div.	Waste Character-ization
I-WM-188	3/26/90	Winsborough	Hazards Control Dept.	Waste Mgt.
I-WM-189	3/26/90	Winsborough	Materials Fabrication Div.	Waste Mgt.
I-WM-190	3/26/90	Winsborough	Materials Fabrication Div.	Waste Mgt.
I-WM-191	3/26/90	Winsborough	Materials Fabrication Div.	
I-WM-192	3/26/90	Winsborough	Env. Protection Dept. Regulatory Affairs	Permitting of B693

Ref. Number	Date	Auditor	Organization	Topic
I-WM-193	3/15/90	Winsborough	Transportation	Waste pick-up
I-WM-194	3/16/90	Winsborough	Haz. Waste Mgmt.	Waste handling

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I-TCM-1	2/28/90	Caruso	Env. Prot. Dept.	Toxic Chemical Man. PCBs
I-TCM-2	2/28/90	Caruso	Env. Prot. Dept.	PCB Waste Storage Area
I-TCM-3	2/28/90	Caruso	Env. Prot. Dept.	PCB Waste Storage Area
I-TCM-4	2/28/90	Caruso	Vehicle Services (Garage)	Chemical, oil, etc. storage/ dispensing
I-TCM-5	2/28/90	Caruso	Beam & Fusion Eng.	PCB Cont. equipment
I-TCM-6	2/28/90	Caruso	Envir. Prot. Dept.	General site info and escort
I-TCM-7	2/28/90	Caruso	Hazards Control	Toxic & Chemical & Materials Management

Ref. Number	Date	Auditor	Organization	Topic
I-TCM-8	3/1/90	Caruso	Physics Dept. Beam Research	PCB contaminated equip.
I-TCM-9	3/1/90	Caruso	Physics Dept. (E Division)	PCB contaminated equip.
I-TCM-10	3/1/90	Caruso	Physics Dept. (CAMS)	PCB contaminated equip.
I-TCM-11	3/1/90	Caruso	Supply & Dist.	Storage of PCB-cont. equipment
I-TCM-12	3/1/90	Caruso	Envir. Prot. Dept.	Escort for Chemical Storage
I-TCM-13	3/1/90	Caruso	Envir. Prot. Dept.	Chemical handling & storage
I-TCM-14	3/1/90	Caruso	Mechanical Eng.	Chemical handling & storage
I-TCM-15	3/1/90	Caruso	Plant Eng. Shops (Heavy Equip. Shop)	Chemical handling & storage
I-TCM-16	3/1/90	Caruso	Gardener Shop	Pesticide storage & application
I-TMC-17	3/1/90	Caruso	Paint Shop	Toxic Chemical & Mat. storage/dispensing
I-TMC-18	3/2/90	Caruso	Envir. Prot. Dept.	Aboveground storage tanks
I-TMC-19	3/2/90	Caruso	Envir. Prot. Dept.	Aboveground storage tanks

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I-TMC-20	3/2/90	Caruso	Plant Eng. Shops (Water Shops)	Aboveground storage tanks
I-TCM-21	3/2/90	Caruso	Plant Engineering	PCB-Contaminated transformer
I-TCM-22	3/2/90	Caruso	Plant Engineering	PCB-Contaminated transformer
I-TCM-23	3/2/90	Caruso	Plant Engineering	PCB-Contaminated transformer
I-TCM-24	3/7/90	Caruso	Biomedical Scien. Division	Toxic Chemical Storage
I-TCM-25	3/7/90	Caruso	Biomedical Scien. Division	Toxic Chemical Storage
I-TCM-26	3/8/90	Caruso	Plant Eng. Shops Site 300	Pesticide handling, use, disposal, etc.
I-TCM-27	3/8/90	Caruso	Plant Eng. Shops Site 300	Pesticide & Toxic Chemical Storage
I-TCM-28	3/8/90	Caruso	Supply & Dist. (Site 300)	Pesticide & Toxic Chemical Storage
I-TCM-29	3/8/90	Caruso	Plant Eng. Shops Dept (Site 300)	Pesticide & Toxic Chemical Storage
I-TCM-30	3/8/90	Caruso	Chemistry & Mat. Science Dept.	Pesticide & Toxic Chemical Storage
I-TCM-31	3/9/90	Caruso	Env. Prot. Dept.	Asbestos Management

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I-TCM-32	3/9/90	Caruso	Hazards Control (Ind. Hygiene)	Asbestos Management
I-TCM-33	3/9/90	Caruso	Plant Engineering	Asbestos Management
I-TCM-34	3/9/90	Caruso	Laboratory Counsel	Asbestos Management
I-TCM-35	3/9/90	Caruso	Env. Prot. Dept.	Waste Asbestos/Storage Disposal
I-TCM-36	3/12/90	Caruso	Mechanical Eng. (Site 300)	Toxic Chemical/Materials Storage
I-TCM-37	3/12/90	Caruso	Mechanical Eng. (Site 300)	Toxic Chemical/Materials Storage
I-TCM-38	3/12/90	Caruso	Mechanical Eng. (Site 300)	Toxic Chemical/Materials Storage
I-TCM-39	3/12/90	Caruso	HE Shipping/Rec. (Site 300)	TCM Storage (HE)
I-TCM-40	3/12/90	Caruso	Chem. & Materials Science Dept. (Site 300)	TCM Storage (HE)
I-TCM-41	3/12/90	Caruso	Plant Eng. Shops (Site 300)	Toxic Chemical/Materials Storage
I-TCM-42	3/12/90	Caruso	Defense Sciences Dept. (Site 300)	PCB Equipment Management

Ref. Number	Date	Auditor	Organization	Topic
I-TCM-43	3/12/90	Caruso	Plant Eng. Shops (Site 300)	PCB equipment
I-TCM-44	3/13/90	Caruso	Business Ops.	Storage of Toxic Chemicals/ Materials
I-TCM-45	3/13/90	Caruso	Supply & Dist. Dept.	Storage of Toxic Chemicals/ Materials
I-TCM-46	3/13/90	Caruso	Supply & Dist. Dept.	Storage of Toxic Chemicals/ Materials
I-TCM-47	3/13/90	Caruso	AMI (Airport)	Storage of Toxic Chemicals/ Materials
I-TCM-48	3/15/90	Caruso	Mat. Fab. Div.	PCB Cont. Equipment

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I-QA-1	3/5/90	Caruso	Env. Prot. Dept.	QA/QC Procedures
I-QA-2	3/5/90	Caruso	SAIC (Contractor)	QA/QC Procedures
I-QA-3	3/5/90	Caruso	Env. Prot. Dept.	QA/QC Procedures
I-QA-4	3/5/90	Caruso	Env. Prot. Dept.	QA/QC Procedures
I-QA-5	3/5/90	Caruso	Chemistry Dept.	QA/QC Procedures
I-QA-6	3/5/90	Caruso	Haz. Waste Man. Lab	QA/QC Procedures
I-QA-7	3/5/90	Caruso	HWM Lab Organic Sect.	QA/QC Procedures

Ref. Number	Date	Auditor	Organization	Topic
I-QA-8	3/6/90	Caruso	Haz. Control Dept.	Analytical QA Proc.
I-QA-9	3/6/90	Caruso	Haz. Control Dept.	Analytical QA Proc.
I-QA-10	3/6/90	Caruso	Haz. Control Dept.	Analytical QA Proc.
I-QA-11	3/6/90	Caruso	Haz. Control Dept.	QA/QC Hepa Filter Testing
I-QA-12	3/6/90	Caruso	Haz. Control Dept.	Analytical QA Proc.
I-QA-13	3/6/90	Caruso	Haz. Control Dept.	Analytical QA Proc.
I-QA-14	3/6/90	Caruso	Haz. Control Dept.	Analytical QA Proc.
I-QA-15	3/7/90	Caruso	Nuclear Chemistry Division	Analytical QA Proc.
I-QA-16	3/7/90	Caruso	Nuclear Chemistry Division	Analytical QA Proc.
I-QA-17	3/7/90	Caruso	Nuclear Chemistry Division	Analytical QA Proc.
I-QA-18	3/13/90	Caruso	Env. Prot. Dept.	Sampling at Sewer Shack (B-196)

Ref. Number	Date	Auditor	Organization	Topic
I-QA-19	3/14/90	Caruso	Env. Prot. Dept.	QA/QC Groundwater Sampling
I-QA-20	3/14/90	Caruso	Env. Prot. Dept.	QA/QC Water Sampling
I-QA-21	3/14/90	Caruso	SAIC	QA/QC Water Sampling
I-QA-22	3/15/90	Caruso	Env. Sciences Div.	QA/QC Rad Analy. Lab
I-QA-23	3/16/90	Caruso		QA/QC Analy. Lab

CONTACTS/INTERVIEWS

Environment
IWS = Inactive Waste Sites
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SW = Surface Water
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QA = Quality Assurance
TCM = Toxic & Chemical Materials
A = Air
R = Radiation
N = NEPA

Ref. Number	Date	Auditor	Organization	Topic
I-R-1	2/28/90	Masciulli	Chemistry & Mat. Science Dept.	Radioactive effluents 331, 332
I-R-2	2/28/90	Masciulli	Envir. Prot. Dept.	Radioactive effluents 331, 332
I-R-3	2/28/90	Masciulli	Chemistry & Mat. Science Dept.	Radioactive effluents 331
I-R-4	2/28/90	Masciulli	Plant Engineering	B331 - stack monitors
I-R-5	2/28/90	Masciulli	Haz. Control Dept.	Radioactive effluents & waste at B331

Ref. Number	Date	Auditor	Organization	Topic
I-R-6	2/28/90	Masciulli	Chemistry & Mat. Science Dept.	B331 VERS
I-R-7	2/28/90	Masciulli	Mech. Engineering	Ventilation at 332 Sys.
I-R-8	2/28/90	Masciulli	Chemistry & Mat. Science Dept.	Ventilation at 332 Sys.
I-R-9	2/28/90	Masciulli	Chemistry & Mat. Science Dept.	Ventilation at 332 Sys.
I-R-10	2/28/90	Masciulli	Envir. Prot. Dept.	513, 514 Ops.
I-R-11	2/28/90	Masciulli	Plant Engineering	513, 514 Ops.
I-R-12	2/28/90	Masciulli	Envir. Prot. Dept. HWM Division	513, 514 Ops.
I-R-13	2/28/90	Masciulli	Envir. Prot. Dept. HWM Division	513, 514 Ops.
I-R-14	2/28/90	Masciulli	Envir. Prot. Dept. HWM Division	513, 514 Ops.
I-R-15	3/1/90	Masciulli	Envir. Prot. Dept.	612 complex Ops.
I-R-16	3/1/90	Masciulli	Envir. Prot. Dept. HWM Division	612 complex Ops.

Ref. Number	Date	Auditor	Organization	Topic
I-R-17	3/1/90	Masciulli	Envir. Prot. Dept. HWM Division	612 complex Ops.
I-R-18	3/1/90	Masciulli	Envir. Prot. Dept. HWM Division	612 complex
I-R-19	3/1/90	Masciulli	Envir. Prot. Dept. HWM Division	612 complex
I-R-20	3/1/90	Masciulli	Envir. Prot. Dept. HWM Dision	612 complex tracking of TRU & LSA waste
I-R-21	3/1/90	Masciulli	Envir. Prot. Dept. HWM Division	612 complex TRU waste
I-R-22	3/1/90	Masciulli	Envir. Prot. Dept. HWM Division	HWM procedures
I-R-23	3/1/90	Masciulli	SAIC	NTS NVO-325 Application
I-R-24	3/1/90	Masciulli	Comp. Directorate Appl. Syst. Div.	TRU, LSA track. system
I-R-25	3/1/90	Masciulli	Comp. Directorate Appl. Syst. Div.	TRU, LSA track. system
I-R-26	3/1/90	Masciulli	Envir. Prot. Dept. HWM Division	612 complex SAR's and OSP's

Ref. Number	Date	Auditor	Organization	Topic
I-R-27	3/2/90	Masciulli	Haz. Control Dept. H&S Division	175, 490 Ops.
I-R-28	3/2/90	Masciulli	Envir. Prot. Dept. Regul. Affairs Div.	175, 490 Ops.
I-R-29	3/2/90	Masciulli	Haz. Control Dept. Oper. Safety Div.	175, 490 Ops.
I-R-30	3/2/90	Masciulli		175, 490 Ops.
I-R-31	3/2/90	Masciulli	Mech. Engineering	175, 490 Ops.
I-R-32	3/2/90	Masciulli	I Division	175, 490 Ops.
I-R-33	3/2/90	Masciulli	Haz. Control Dept. H&S Division	490 operations
I-R-34	3/2/90	Masciulli	Laser Programs	490 operations
I-R-35	3/2/90	Masciulli	Laser Programs	490 operations
I-R-36	3/2/90	Masciulli	Mech. Engineering	490 operations
I-R-37	3/2/90	Masciulli	Envir. Prot. Dept. Env. Guid. Div.	251 operations

Ref. Number	Date	Auditor	Organization	Topic
I-R-38	3/2/90	Masciulli	Nuc. Test Exp. Science Program	251 operations
I-R-39	3/2/90	Masciulli	Haz. Control Dept.	251 operations
I-R-40	3/2/90	Masciulli	Engineering Serv.	231 operations
I-R-41	3/2/90	Masciulli	Chem & Material Science Dept.	231 operations
I-R-42	3/2/90	Masciulli	Hazards Control Dept.	231 operations
I-R-43	3/2/90	Masciulli		231 operations
I-R-44	3/5/90	Masciulli	Env. Prot. Dept. Reg. Affairs Div. Env. Monit. Group	Field Env. Monit. operations
I-R-45	3/5/90	Masciulli	Env. Monit. Group (KMI)	Field Env. Monit. operations
I-R-46	3/5/90	Masciulli	Env. Monit. Group (KMI)	Field Env. Monit. operations
I-R-47	3/5/90	Masciulli	Reg. Affairs Div. Env. Monit. Group	Field Env. Stack operations

Ref. Number	Date	Auditor	Organization	Topic
I-R-48	3/5/90	Masciulli	Haz. Control Dept. H&S Div., Health Physics Group	Radiological Effluent Monit.
I-R-49	3/6/90	Masciulli	Reg. Affairs Div. Env. Monit. Group	Env. Monit. Prog.
I-R-50	3/6/90	Masciulli	Reg. Affairs Div. Env. Monit. Group	Env. Monit. Prog.
I-R-51	3/6/90	Masciulli	Reg. Affairs Div. Env. Monit. Group	Env. Monit. Prog.
I-R-52	3/6/90	Masciulli	Env. Prot. Dept. Env. Guidance Wastewater & Tank Systems Group	Wastewater and Tank Systems controls
I-R-53	3/7/90	Masciulli	Env. Prot. Dept. Env. Guid. Div.	Site 300 Ops.
I-R-54	3/7/90	Masciulli	Env. Prot. Dept. Env. Rest. Div.	Tritium in ground-water at Site 300
I-R-55	3/7/90	Masciulli	Mech. Engineering	B809, 823 Ops.
I-R-56	3/7/90	Masciulli	Mech. Engineering	B809, 823 Ops.
I-R-57	3/7/90	Masciulli	Mech. Engineering	B809, 823 Ops.
I-R-58	3/7/90	Masciulli	F Division	ATA 865 Ops.

Ref. Number	Date	Auditor	Organization	Topic
I-R-59	3/7/90	Masciulli	Mech. Engineering	ATA 865 Ops.
I-R-60	3/7/90	Masciulli	B Division	850 operations
I-R-61	3/8/90	Masciulli	Env. Prot. Dept. Reg. Guidance Div.	B321, 322 Ops.
I-R-62	3/8/90	Masciulli	Mech. Engineering	B321, 322 Ops.
I-R-63	3/8/90	Masciulli	Mech. Engineering	B321, 322 Ops.
I-R-64	3/8/90	Masciulli	Office of Assoc. Dir. for Eng.	B321, 322 Ops.
I-R-65	3/8/90	Masciulli	Mech. Engineering	B321, 322 Ops.
I-R-66	3/8/90	Masciulli	Haz. Control Dept.	B321, 322 Ops.
I-R-67	3/8/90	Masciulli	Eng. Operations	B321, 322 Ops.
I-R-68	3/8/90	Masciulli	Mech. Engineering	B321, 322 Ops.
I-R-69	3/8/90	Masciulli	Mech. Engineering	B321, 322 Ops.
I-R-70	3/8/90	Masciulli	Mech. Engineering	B321, 322 Ops.
I-R-71	3/8/90	Masciulli	Physics Dept.	B194, 292 Ops.
I-R-72	3/8/90	Masciulli	Physics Dept.	B194, 292 Ops.
I-R-73	3/8/90	Masciulli	Haz. Control Dept. Oper. Safety Div.	B194, 292 Ops.

Ref. Number	Date	Auditor	Organization	Topic
I-R-74	3/8/90	Masciulli	Physics Dept.	B194, 292 Ops.
I-R-75	3/8/90	Masciulli	Haz. Control Dept. Oper. Safety Div.	B194, 292 & 212 operations
I-R-76	3/8/90	Masciulli	Physics Dept.	B194 operations
I-R-77	3/8/90	Masciulli	Physics Dept.	B212 operations
I-R-78	3/8/90	Masciulli	Haz. Control Dept. Oper. Safety Div.	B212 operations
I-R-79	3/8/90	Masciulli	Physics Dept.	B212 operations
I-R-80	3/8/90	Masciulli	Elect. Engin.	B212 operations
I-R-81	3/8/90	Masciulli	Env. Prot. Dept. Reg. Guidance Div.	B194, 212, 292 operations
I-R-82	3/8/90	Masciulli	Env. Prot. Dept. Reg. Guidance Div.	B281 operations
I-R-83	3/8/90	Masciulli	Nuclear Test Exp. Science Program	B281 operations
I-R-84	3/9/90	Masciulli	Haz. Control Dept. Safety Serv. Div. Rad. Dosimetry Group	Analysis of env. samples
I-R-85	3/9/90	Masciulli	Rad. Dosimetry Group	Analysis of env. samples

Ref. Number	Date	Auditor	Organization	Topic
I-R-86	3/9/90	Masciulli	Rad. Dosimetry Group	Analysis of samples
I-R-87	3/9/90	Masciulli	Env. Prot. Dept. Env. Guidance Div.	Analysis of env. samples
I-R-88	3/9/90	Masciulli	Haz. Control Dept. Safety Serv. Div. IH Lab Group	Analysis of env. samples
I-R-89	3/9/90	Masciulli	IH Lab Group	Analysis of env. samples
I-R-90	3/9/90	Masciulli	IH Lab Group	Analysis of env. samples
I-R-91	3/9/90	Masciulli	Haz. Control Dept. Safety Serv. Div.	Safety Services Division QA
I-R-92	3/9/90	Masciulli	Nuclear Chem. Div. Radiochem. Sect.	Analysis of Env. Samples
I-R-93	3/9/90	Masciulli	Nuclear Chem. Div. Radiochem. Sect.	Analysis & Env. Samples
I-R-94	3/9/90	Masciulli	Nuclear Chem. Div. Radiochem. Sect.	Analysis & Env. Samples
I-R-95	3/9/90	Masciulli	Nuclear Chem. Div. Radiochem. Sect.	Analysis & Env. Samples
I-R-96	3/12/90	Masciulli	Fluor Daniel	B419 Battery

Ref. Number	Date	Auditor	Organization	Topic
				Shop
I-R-97	3/12/90	Masciulli	Maintenance	B419 Battery Shop
I-R-98	3/12/90	Masciulli	EPD Haz. Waste Man. Division	B419 Waste Ops.
I-R-99	3/12/90	Masciulli	Mech. Engineering	B419 Waste Ops.
I-R-100	3/12/90	Masciulli	EPD Haz. Waste Man. Division	B419 Waste Ops.
I-R-101	3/12/90	Masciulli	EPD Reg. Affairs Division	B419 & 612 Operations
I-R-102	3/12/90	Masciulli	EPD HWM Division	B419 & 612 Waste Operations
I-R-103	3/12/90	Masciulli	EPD HWM Division	612 Waste Ops.
I-R-104	3/12/90	Masciulli	EPD HWM	612 Waste Ops.
I-R-105	3/12/90	Masciulli	EPD HWM Division	612 Waste Ops.
I-R-106	3/12/90	Masciulli	Chem Material Science Dept.	612 Waste Ops.
I-R-107	3/12/90	Masciulli	SAIC	HWM Division QA

Ref. Number	Date	Auditor	Organization	Topic
I-R-108	3/12/90	Masciulli	Haz. Control Dept. H&S Division IH Group	HEPA filters and Ventilation Systems
I-R-109	3/12/90	Masciulli	Haz. Control Dept. Safety Serv. Div. IH Lab Group	HEPA filters and Ventilation Systems
I-R-110	3/12/90	Masciulli	Haz. Control Dept. Op. Safety Div.	HEPA filters and Ventilation Systems
I-R-111	3/13/90	Masciulli	EPD Reg. Affairs Div., Env. Monit. Group	Envir. Report
I-R-112	3/13/90	Masciulli	EPD Reg. Affairs Div., Env. Monit. Group	Envir. TLD
I-R-113	3/13/90	Masciulli	Z Division	Emergency Plan
I-R-114	3/13/90	Masciulli	Haz. Control Dept. Safety Serv. Div. Rad. Dosimetry Grp.	Env. TLD Program
I-R-115	3/13/90	Masciulli	Haz. Control Dept. Op. Safety Div.	Env. TLD
I-R-116	3/13/90	Masciulli	Haz. Control Dept. Safety Serv. Div. Rad. Dosimetry Grp.	Env. TLD

Ref. Number	Date	Auditor	Organization	Topic
I-R-117	3/13/90	Masciulli	Haz. Control Dept. Safety Serv. Div. Rad. Dosimetry Grp.	Env. TLD Program
I-R-118	3/14/90	Masciulli	EPD - Reg Affairs Div. - Env. Maint. Group	Annual Environmental Report
I-R-119	3/14/90	Masciulli	EPD - Reg Affairs Div. - Env. Maint. Group	Annual Environmental Report and offsite dose assessment
I-R-120	3/14/90	Masciulli	Haz. Cont. Dept. H&S Div. - Health Physics Group	Offsite dose assessment
I-R-121	3/14/90	Masciulli	Haz. Cont. Dept. H&S Div. Health Physics Group	Offsite dose assessment
I-R-122	3/14/90	Masciulli	Haz. Cont. Dept. Safety Services Div. - Rad Dosimetry Group	Offsite dose assessment

Ref. Number	Date	Auditor	Organization	Topic
I-R-123	3/14/90	Masciulli	Haz. Cont. Dept. Safety Services Div. - Rad. Dosimetry Group	Offsite dose assessment
I-R-124	3/14/90	Masciulli	Haz. Cont. Dept. Safety Services Div.	Offsite dose assessment
I-R-125	3/14/90	Masciulli	Haz. Cont. Dept. Safety Services Div. - Rad. Dosimetry Group	Offsite dose assessment
I-R-126	3/15/90	Masciulli	Haz. Cont. Dept. Op. Safety Div.	Offsite Hazards Analysis
I-R-127	3/15/90	Masciulli	Haz. Cont. Dept. Op. Safety Div.	Offsite Hazards Analysis
I-R-128	3/15/90	Masciulli	Haz. Cont. Dept. Op. Safety Div.	Offsite Hazards Analysis
I-R-129	3/15/90	Masciulli	Haz. Cont. Dept. H&S Div. Criticality and Safety Group	Offsite Hazards Analysis

Ref. Number	Date	Auditor	Organization	Topic
I-R-130	3/16/90	Masciulli	Chem. & Mat. Science Dept. Condensed Matter and Analytic Sciences Div.	Environmental Analytical Sciences Laboratory
I-R-131	3/16/90	Masciulli	Chem. & Mat. Science Dept. Condensed Matter and Analytic Sciences Div.	Environmental Analytical Sciences Laboratory
I-R-132	3/16/90	Masciulli	SAIC	Environmental Analytical Sciences Laboratory
I-R-133	3/16/90	Masciulli	Nuclear Chemistry Division	Environmental Analytical Sciences Laboratory
I-R-134	3/16/90	Masciulli	Hazards Control Dept. Health & Safety Div.	Environmental Analytical Sciences Laboratory
I-R-135	3/16/90	Masciulli	Env. Prote. Dept. Hazardous Waste Mgmt. Div.	Environmental Analytical Sciences Laboratory

Ref. Number	Date	Auditor	Organization	Topic
I-R-136	3/16/90	Masciulli	Chem. & Mat. Science Detp. Condensed Matter & Ana. Sciences Div.	Waste Characteriz-ation Quality Assurance
I-R-137	3/16/90	Masciulli	Env. Prot. Dept. Env. Rest. Div. Remediation Design & Ops Group	Decontamination & decommissioning
I-R-138	3/26/90	Masciulli	Computation Directorate App. Dev. Dept. App. Systems Div.	Software V&V
I-R-139	3/27/90	Masciulli	Env. Prot. Dept. HWM Division	Non-shippable TRU-Waste
I-R-140	3/27/90	Masciulli	Env. Prot. Dept. HWM Division	Non-shippable TRU-Waste
I-R-141	3/27/90	Masciulli	Env. Prot. Dept. Reg. Affairs Div. Env. Monitoring Group	LWRP Plutonium Concentration
I-R-142	3/27/90	Masciulli	Safeguards and Security Dept. Materials Mgmt. Division	Classified Waste

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Ref. Number	Date	Auditor	Organization	Topic
I-IWS-1	2/28/90	Hubbard	Env. Restor. Div.	Schedule setup w/ERD staff
I-IWS-2	2/28/90	Hubbard	Env. Restor. Div.	General disc. of 3008(h) Order, Comm. Rel., closures, NPL
I-IWS-3	2/28/90	Hubbard	Env. Restor. Div. EP Dept.	General disc. of sampling, SOPs, data man. GW extr., USTs, soil excav.
I-IWS-4	2/28/90	Hubbard	SAN/LLNL	Attended disc. & tour
I-IWS-5	2/28/90	Hubbard	Weiss Associates	General site tour of 14 source areas

Ref. Number	Date	Auditor	Organization	Topic
I-IWS-6	2/28/90	Hubbard	Env. Restor. AEP Dept.	Design Operation of Unit UV-OX treatment for offsite plume & B403 spill
I-IWS-7	3/1/90	Hubbard	Env. Restor. Div. EP Dept.	103(c) facility notif.
I-IWS-8	3/2/90	Hubbard	Env. Restor. Div. EP Dept.	Decon. water, Admin. Record
I-IWS-9	3/2/90	Hubbard	Env. Restor. EP Dept.	Design Water handling at B403
I-IWS-10	3/2/90	Hubbard	Env.Protect.Community	RI/FS Community Relations
I-IWS-11	3/5/90	Hubbard	Env. Protection	Site 300 Remed. Proj.
			DOE SAN	

Ref. Number	Date	Auditor	Organization	Topic
I-IWS-12	3/7/90	Hubbard	Env. Protection	Permission to discharge purge water/permission to spread cuttings/admin. records/hotline call/ Soil Management Plan/ Inspection Site 300 Landfill Covers
			SAN SAN Env. Protection	
I-IWS-13	3/8/90	Hubbard	Hazards Control	Inspection Site 300 Landfill Covers
I-IWS-14	3/9/90	Hubbard	Env. Protection	Transmittal of PAs/ Installation Assess.
I-IWS-15	3/9/90	Hubbard	Admin. & Ops.	PA negotiations - Main Site
I-IWS-16	3/9/90	Hubbard	Env. Protection	SOP for cutting/mud handling
I-IWS-17	3/12/90	Hubbard	Env. Guidance	Spill reporting
I-IWS-18	3/12/90	Hubbard	Haz. Waste Man.	Spill reporting
I-IWS-19	3/12/90	Hubbard	Paint Shop	Spill reporting
I-IWS-20	3/12/90	Hubbard	Photo Processing	Spill reporting
I-IWS-21	3/12/90	Hubbard	Bioassays	Spill reporting

Ref. Number	Date	Auditor	Organization	Topic
I-IWS-22	3/13/90	Hubbard	Env. Guid. Emerg. Serv. DOE SAN LLNL Fire Dept. Env. Monitoring	Emergency Response/ Emergency Planning
I-IWS-23	3/14/90	Hubbard	Env. Guidance	SARA Section 311/312
I-IWS-24	3/16/90	Hubbard	Env.Restoration Div. Env.Restoration Dv. DOE SAN	Well Closures and decon pad
I-IWS-25	3/29/90	Hubbard	Env. Rest. Div Adim.	Findings review - inmobile constituents
I-IWS-26	3/29/90	Hubbard	Env. Rest. Div. Env. Rest. Div. Weiss Assoc. Weiss Assoc.	Immobile constituents

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Ref. Number	Date	Auditor	Organization	Topic
I-N-1	2/28/90	Gilliam	LLNL/Envir. Evaluation Gr.	LLNL/NEPA Documents
I-N-2	2/28/90	Anderson	LLNL/Envir. Evaluation Gr.	NEPA/RCRA/CERCLA Integration
I-N-3	2/28/90	L. Sigal	SAN	NEPA Mgmt. and Review Procedures
I-N-4	2/28/90	L. Sigal	SAN	NEPA Tracking Sys.
I-N-5	2/28/90	L. Sigal	SAN	FOIA Requests
I-N-6	2/28/90	L. Sigal	SAN	Public Reading Rm
I-N-7	3/1/90	L. Sigal	LLNL/EEG	NEPA Mgmt Structure Review Procedures

Ref. Number	Date	Auditor	Organization	Topic
I-N-8	3/1/90	L. Sigal	LLNL/Human Resources Div.	NEPA requests under FOIA
I-N-9	3/1/90	L. Sigal	SAN	Litigation involving NEPA
I-N-10	3/2/90	L. Sigal	LLNL	Litigation involving NEPA; CEQA/NEPA relationships
I-N-11	3/2/90	L. Sigal	LLNL	LLNL visitor reading Room
I-N-12	3/2/90	L. Sigal	LLNL	Classified info. in NEPA documents
I-N-13	3/2/90	L. Sigal	LLNL	Reading Room/ NEPA Information
I-N-14	3/3/90	L. Sigal	LLNL	NEPA procedures
I-N-15	3/5/90	L. Sigal	LLNL	NEPA files
I-N-16	3/5/90	L. Sigal	LLNL	NEPA review process and documentation
I-N-17	3/5/90	L. Sigal	LLNL	NEPA documentation and review
I-N-18	3/5/90	L. Sigal	LLNL	NEPA documentation and review

Ref. Number	Date	Auditor	Organization	Topic
I-N-19	3/6/90	L. Sigal	LLNL	NEPA review procedures
I-N-20	3/6/90	L. Sigal	LLNL	NEPA review procedures
I-N-21	3/6/90	L. Sigal	LLNL/Plant Eng.	NEPA review procedures
I-N-22	3/6/90	L. Sigal	LLNL/Budget Office	NEPA Records and Schedule 44s
I-N-23	3/1/90	Gilliam	LLNL	GPP/Line Item Projects
I-N-24	3/1/90	Anderson	LLNL	Public involvement in NEPA/CERCLA actions
I-N-25	3/6/90	Anderson	SAN	NEPA Action Status at SAN
I-N-26	3/2/90	Anderson	LLNL	NEPA/CERCLA Action

APPENDIX E

LIST OF DOCUMENTS

LIST OF SITE DOCUMENTS

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N = NEPA

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
A-1	AF Scrubber permitting by Dept.* of Health Services, DHS permit not required	D.S. Jackson Env. Prot. Div. letter to J. Kass	3/1/90	3/1/90
A-2	Application for Permit to Operate HF Scrubber at B-231	R.C. Ragaini EPD, letter to H.S. Doss, BAAQMD	8/30/89	3/1/90
A-3	Memo on Tubing for PAM Probes with other Correspondence on PAM and CAM upgrade at B-332 in Response to TSA Recommendation AX.4-1	C. Folker to B. Miller	4/11/89	2/28/90
A-4	Exception to the HEPA Filter Replacement Policy	A.J. Toy Plutonium Fac. Mgr. to Distribution	10/10/88	2/28/90

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
A-5	Freon Loss Log	P.D. Weber Laser Engr.	3/1/90	3/1/90
A-6	LLNL Environmental Report for 1988 UCRL-50027-88	Lawrence Livermore National Lab	1988	2/15/90
A-7	Rules and Regulations	Bay Area Air Quality Mgt. District	Current Subscription	
A-8	Air Pollution Rules and Regulations	San Joaquin Co. Air Pollution Control District	8/22/89	
A-9	List of Permits to Operate Issued by the BAAQMD	BAAQMD to LLNL	7/1/90	2/15/90
A-10	Location of Air Particulate Sampling Stations, EMP-AP-L, Rev. 0	Michael Brown EPD	8/30/88	2/15/90
A-11	Location of Airborne Tritium Sampling Stations, EMP-AT-L, Rev. 0	Michael Brown EPD	9/2/88	2/15/90
A-12	Airborne Particulate Envir. Sampling EMP-AP-S, Rev. 0	Michael Brown EPD	6/15/88	2/15/90
A-13	Airborne Tritium Envi. Sampling Procedure, EMP-AT-S, Rev. 0	Michael Brown EPD	6/14/88	2/15/90
A-14	Meteorological Monitoring at LLNL EMP-MET, Rev. 0	No Author	6/87	2/15/90
A-15	Radiological Dose Assessment EMP-RDA	D.D. Brekke	6/89	2/15/90

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
A-16	1988 Review of LLNL Radionuclide Stack Sampling Systems	A. Biermann to D. Meyers	3/22/89	2/15/90
A-17	Quality Assurance Sampling, EMP-QA-S	R.C. Holland	6/16/89	3/5/90
A-18	Data Analysis, EMP-QA-D (Rev. 1)	R.C. Holland	6/16/89	3/5/90
A-19	Air Emission Assessment Guideline	H. Pfeifer	Undated	3/6/90
A-20	Authorization to use/report ambient conc. of Beryllium (Reg. 11, Rule 3)	H. Brinkley, BAAQMD R. Salazar, USDOE	3/21/80	3/6/90
A-21	Beryllium reporting requirements	C.D. Jackson, DOE SAN letter to J.L. Olsen, LLNL	4/23/8	03/6/90
A-22	December 1989 Beryllium concentrations in air LLNL site perimeter	C.S. Jackson, LLNL letter to B. Jennison, BAAQMD	1/30/90	3/6/90
A-23	Building 331 Tritium Sampler Verification Test Results	M. Wong, Haz. Control memo to G. Morris Chem & Material Sci	5/2/89	3/6/90
A-24	Conversion Factors for Tritium Effluent Sampling System	No Author	Undated	3/6/90
A-25	ANS Guide to Sampling Airborne Radioactive Materials in Nuclear Fac.	ANSI N13.1-1969	2/19/69	3/6/90
A-26	Air Flow Measurements: B332	W. Eneidi, Haz. Cont to R. Jenson, Pers. Sec.	8/14/87	3/6/90

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
A-27	CAM Sample System - B332	W. Eneidi, Haz. Cont to T. Schroeder	6/17/86	3/6/90
A-28	Verification of Particulate Conc. Uniformity in B332 Exhaust Ducts	A. Biermann, Haz Ctrl to C. Kerns	8/12/87	3/6/90
A-29	CAM System Upgrade B332	W.Eneidi,Haz.Ctrl. to R. Jensen	6/24/87	3/6/90
A-30	Gauge Readings on HEPA Filters in B419 - Walk in Hoods	J. Lipera/SCIA W. Kelley	3/5/90	3/7/90
A-31	Testing & Eval. of HEPA Filters 12.02 Responsibilities	Hazards Control Manual	6/87	3/12/90
A-32	High-Efficiency Particulate Air (HEPA) Filter System Design Guidelines for LLNL Applications, Health & Safety Manual, Supplement 12.05	M.K. Wong	12/23/87	3/12/90
A-33	DRAFT Air Particulate Sampler Calibration, EMP-AP-C, EMP-QA-CA		3/15/90	3/15/90
A-34	Guidelines for the Permitting of Air-Pollution Emission Sources	H. Pfeifer,EPD& M. Rogozen, SAIC	1/90	3/16/90
A-35	Permit for Agricultural Burning, No.700052-01, exp. 12.31.90	J. Wilson/SJCAPD J. Loverin		3/26/90
A-36	Quarterly Report of Estimated Emissions from Burning HE Waste at LLNL Site 300.	C. Jackson/EPD/ L. Grewal	1/29/90	3/26/90

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
A-37	Newspaper Article, "Lab May Resume Chemical Burning"		8/8/80	3/26/90
A-38	Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Ambient Air Specific Methods. EPA-600/4-77-027a	U.S. Environmental Protection Agency, Research Triangle Park NC 27711, 1977		
A-39	Projected Doses from Unsampled Stacks at LLNL	M. Singh/Hazards Ctrl Dept./ D. Myers	11/10/89	3/30/90

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SW-1	Wastewater Point Source Monitoring at LLNL's Livermore Site, Semi-annual	C.H. Grandfield Guid.&Monit.Div.	5/87 to Present	3/1/90
SW-2	Memo from D. Wetherell to Env. Team; Subject: Bottled Water (Site 300)	D. Wetherell Site 300 Stores	3/1/90	3/1/90
SW-3	List of LLNL Site 300 Water Supply Wells - Active & Inactive	A. Lamarre Env. Rest. Div.	12/89	3/1/90
SW-4	Order No. 85-188 Waste Discharge Requirements for Site 300	Cal. Reg. Water Qual.Cont.Board (CRWQCB), Central Valley Region	6/28/85	3/1/90
SW-5	Application for Facility Permit Waste Discharge for Site 300 CT's	R.O. Godwin, LLNL	4/87	3/1/90
SW-6	Order No. 87-108 Waste Discharge Requirements for Main Site	CRWQCB, San Francisco Bay Region	8/19/87	3/1/90

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SW-7	Order No. 88-065 Waste Discharge Requirements for Main Site	CRWQCB, San Francisco Bay Region	4/20/88	3/1/90
SW-8	Order No. 88-075 Waste Discharge Requirements for Main Site	CRWQCB, San Francisco Bay Region	5/18/88	3/1/90
SW-9	LLNL Livermore Site Baseline	C.H. Grandfield Monitoring Report Guid. & Monit. Div.	7/87	3/1/90
SW-10	Guidelines for Env. Laws, Regs. & Orders Affecting LLNL	C.E. DeGrange Env. Guidance Div.	2/90	3/1/90
SW-11	LLNL Environmental Report for 1988	D.D. Brekke & R.C. Holland Guid. & Monit. Div.	Undated (1989)	3/1/90
SW-12	NPDES Pretreatment Compliance Inspection Report	J. Gavette EPA Region IX Waste Mgmt. Div.	11/15/89	3/1/90
SW-13	Title 22 Chapter 15 - Domestic Water Quality & Monitoring	Calif.Code of Regs. Env. H & S Dept.	3/18/89	3/3/90
SW-14	Draft EI Report for U of Cal. Contract w/DOE for operation and management of LLNL	Univ. of Calif.	12/22/86	3/3/90
SW-15	SAN Env. Compliance Activity Report for LLNL	San Francisco Oper. Office, DOE	12/89	3/3/90
SW-16	Site 300 Annual Report 1988	LLNL Site 300 Staff	Undated (1989)	3/6/90

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SW-17	LLNL Action Plan-DOE Env. Survey	LLNL Env.Prot.Div.	4/89	3/6/90
SW-18	Administrative Order RCRA-09-89-0016	USEPA Region 9, HWM Div.	2/24/89	3/6/90
SW-19	Calif. Law Environmental Handbook	R.J. Denney, M.L. Hickok; D.W. Burhenn Govt. Institutes, Inc.	5/87	3/6/90
SW-20	Title 23 Subchapter 15 - Discharges of Waste to Land	Calif. Water Res. Control Board	Undated (1987?)	3/6/90
SW-21	California Porter-Cologne Wat. Qual. Act	Calif. Water Res. Control Board	Undated	3/6/90
SW-22	Plt. Engng. Form 1 - Request for P. Eng. Support	W.Gartside/F.Rohas	7/20/89	3/5/90
SW-23	ERD Tank Sys. Progress Meeting Notes	B. Mallon/ Env. Rest.Div.	3/14/90	3/19/90
SW-24	DATA Record Sheet--Utility Division	Plt.Engng.(Received from P. Dempsey)	11/22/89	3/23/90
SW-25	Conceptual Design Report San Sewer Rehab. Proj.	CH_2M Hill, Emeryville, CA	3/90	3/23/90
SW-26	Utilities Plan - All Blocks	LLNL Plt. Engng.	1/5/89	3/23/90
SW-27	Guildlines for Discharges to the Sanitary Sewer System	C.H. Grandfield, Guid.& Monitor.Div.	8/89	3/23/90

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SW-28	Order No. 88-103 Site Cleanup Order and Rescission of Order No. 87-108	CRWQCB,San Francisco Bay Region	6/15/88	3/23/90
SW-29	Spill Prevention, Control & Countermeasures Plan	LLNL/Science Apps. Int'l. Corp.	1/90	3/23/90
SW-30	Reportable & Incident Report - 12" Main Sewer	R.Burton/Plt.Engr.	3/19/90	3/23/90
SW-31	Retention Tank Analysis List	Env. Guidance & Monitoring Division	3/90	3/23/90
SW-32	Internal Memo; Subject: Response to Tiger Team Action Items as of 3/6/90	R. Crawford to C. DeGranger & K. Gilbert	3/26/90	3/29/90
SW-33	Internal Memo; Subject: Requested Copies of Non-Categorical Tank Analytical Results	S. Brigdon to J. Boros, DOE Tiger Team	3/28/90	3/29/90
SW-34	Analytical Report - Bldg. 318 Filter Backwash	Brown & Caldwell Labs (Rec'd from C. Grandfield	11/13/87	3/29/90
SW-35	Internal Memo; Subject: Requested info. for Bldg. 362	C. Grandfield to J. Boros, DOE Tiger Team	3/16/90	3/23/90

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GW-1	RCRA 3008(h) Order for Site 300	Davis/HWMD-EPA UC Regents-DOE LLNL	3/8/89	
GW-2	Federal Facility Agreement - CERCLA 120	EPA-DOE-DHS CRWQCB	11/2/88	
GW-3	CRWQCB Order No. 88-103 Site cleanup	CRWQCB-SF Bay LLNL-DOE	6/15/88	
GW-4	RCRA closure/post-closure plans, Pits 1 and 7	R. Corey/LLNL Guid. & Monit. Div./EPA	5/9/88	

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GW-5	LLNL Responses to CRWQCB comments Pits 1 & 7 closure plans	LLNL-ERD/CRWQCB	11/17/89	
GW-6	Evaluation of the hydrogeology & GW chemistry assoc. w/landfills at Site 300	R. Carpenter/LLNL	June 1983	
GW-7	Env. Res. Program, SOPs Rev. 1.3 Draft	D. Rice, P. Daley T. Carlsen/ERD	Jan 1990	3/1/90
GW-8	RI for Landfill Pit 9, LLNL Site 300	Taffet & Lamarre ERD	July 1989	
GW-9	RI for Landfill Pit 8, LLNL Site 300	M. Taffet/ERD	August 1989	
GW-10	Solid Waste Assess. Test (SWAT) Pit 6	Taffet & Lamarre ERD	7/1/88	
GW-11	LLNL Site 300 Work Plan	A. Lamarre/ERD	Oct. 1989	
GW-12	RI for HE Burn Pit, Bldg. 829 Complex	Webster-Scholten & Crow/ERD	August 1989	
GW-13	Firing Table Gravel Cleanup, Site 300	Lamarre & Taffet/ ERD	June 1989	
GW-14	Soil Disposal at LLNL	Compilation of memos & analytical	Various Dates	
GW-15	Site 300 Env. Investigations Quarterly	Ruggieri et al./ ERD	3/31/88	
GW-16	Site 300 Env. Investigations Quarterly	McIlvride et al./ ERD	Apr-June 88	

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
GW-17	SOP 1.10 (LLNL) draft (muds & cuttings)	J.R. Copland/Sci. Applications Int. Corp.	3/8/90	3/12/90
GW-18	SOP 1.10 (S. 300) draft (muds & cuttings)	J.R. Copland/Sci. Applications Int.	3/8/90	3/12/90
GW-19	CRWQCB-CV Site 300 Cleanup Order	William H. Crooks/ Ex. Officer/Ragaini	4/25/90	
GW-20	LLNL Environmental Report for 1988	Brekke & Holland, eds./EPD/many recipients	Undated (1989)	
GW-21	Letter on SAN Asessment of LLNL Programs	James T. Davis/SAN/ Dennis K. Fisher	2/23/90	3/15/90
GW-22	Memo on Review of 1/9/90 SAIC Audit	Ray Corey/Waste Mgt Operations Branch/ Jim Davis	2/15/90	3/15/90
GW-23	Memo on SAIC 8/89 and 11/89 Audits	Mark Kamiya/SAN/ Joe Juetteix	1/22/90	3/15/90
GW-24	Memo on SAIC Phase II Report	Mark Kamiya/SAN/ Joe Juetteix	2/22/90	3/15/90
GW-25	Memo on Discharge of Treated GW at Site 300	Joe Juetten/SAN-EOS/Jim Hartman	2/14/90	3/16/90
GW-26	Letter on Juetten/Hartman Memo	R. Ragaini/EPD/ Joe Juetten	3/8/90	3/16/90

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GW-27	Memo on RCRA Status of Contaminated GW	Marcia Williams/ EPA OSW/Patrick Tobin	11/13/86	3/19/90
GW-28	Memo on Status of Contaminated GW	Sylvia Lowrance/ EPA OSW/Jeff Zelison	1/24/89	3/19/90
GW-29	WDR Order No. 88-065 (NPDES Permit)	Roger James/ CRWQCB-SFB/LLNL	4/20/88	3/15/90
GW-30	WDR Order No. 88-075	Roger James/ CRWQCB-SFB/LLNL	5/18/88	3/15/90
GW-31	WDR Order No. 85-188	William Crooks/ CRWQCB-CV/LLNL	6/28/85	3/15/90
GW-32	WDR Order No. 80-184	James Robertson/ CRWQCB-CV/LLNL	12/5/80	
GW-33	Interim Status Document CA 2890090002	Harvey Collins DHS Env. Health Branch/ U. Cal Regents	3/3/81	
GW-34	QAPP-LLNL Ground Water Project Rev. 1.2	D. W. Rice, Jr./ LLNL/EPA	June 1989	
GW-35	Corrective Action Order for Site 300	C. David Willis/ DHS-TSCD/DOE-U. Cal	9/24/87	
GW-36	Settlement Agreement for Order	DHS/U. Cal Regents/ DOE (all authors)	9/25/87	

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GW-37	Testing Underground Tanks for Leak Tightness at LLNL	R. K. Henry/LLNL EPD/ CRWQCB	7/1/86	
GW-38	Testing and Correction of Underground Tanks at LLNL - Workplan and Schedule	Henry et. al./LLNL CRWQCB	11/1/87	3/16/90
GW-39	Testing and Correction of Underground Tanks at LLNL - 1988 Report and 1989 Workplan	Henry et. al./LLNL CRWQCB	10/1/88	3/16/90
GW-40	Memo on Discussion with BAAQMD Concerning Regulation 8, Rule 40	Leslie Peeters/SAIC/	3/13/89	3/16/90
GW-41	Summary of 1989 Tank Testing Results	David Castro/EPD/ Distribution	3/1/90	3/14/90
GW-42	ERP Tank System Progress Meeting Notes	B. Mallon/EPD/ Distribution	3/7/90	3/16/90
GW-43	Assembly Bill 1624 (on Well Closures)	CA Legislature & Governor	9/29/89	3/29/90
GW-44	QAPP for Site 300 Env. Restoration	Carlsen and Rise/ LLNL/File	Feb. 1990	3/30/90
GW-45	Site 300 Env. Investigations Quarterly	Lamarre et. al./ LLNL/CRWQCB	Oct/Dec 1989	2/28/90
GW-46	LLNL Site 300 Water-Supply Wells	Phillips et. al./ LLNL/File	Dec. 1989	3/5/90
GW-47	Draft Cercla RI Report for Livermore Site	Thorpe et. al./LLNL/ EPA	Nov. 1989	

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GW-48	SOP 4.9 (S.300), 1.10 (S.300), 1.10 (LLNL) Drafts	J.R. Copland/SAIC/ File	3/15/90	3/15/90
GW-49	SOP 4.7S.300), 4.7 (LLNL), 1.10 Drafts	Devany & Howard, Copland & Carlsen/ Weiss SAIC LLNL/File	3/28/90	
GW-50	Database Printouts for GWS&A	Greg Howard/LLNL	March 1990	3/6/90
GW-51	Drilling Mud Analyses	ERD Database	31590	3/27/90
GW-52	Memo on TCE Inventory Control at B-834	Lee MacLean/Weapons Eng. Div./Mary Robison	3/21/90	3/26/90
GW-53	Site 300 Env. Invesitgations Quarterly	Taffet et al./LLNL & Weiss/CRWQCB	Jan-Mar 1989	
GW-54	Remedial Investigation of Dry Wells	F. Hoffman/LLNL/ CRWQCB	1/29/90	2/28/90

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WM-1	Current Inventory Report for Location 513	Haz. Waste Man.	3/1/90	3/2/90
WM-2	Liquid Mixed Waste Treatment Results (B514) -CY-1988	Haz. Waste Man.	Undated	3/2/90
WM-3	Current Inventory Report for Location 514-3	Haz. Waste Man.		
WM-4	Current Inventory Report for Location 61200	Haz. Waste Man.	3/1/90	3/2/90
WM-5	Building 612 Area Containment		Undated	3/1/90
WM-6	Building 514 Area Containment		Undated	3/4/90

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
WM-7	Glidden Protective Maintenance Coatings Data	Glidden	Undated	3/5/90
WM-8	Preparation Guide for Generators of Hazardous Chemicals and Radioactive waste at LLNL	J. Huss/LLNL	3/87	3/1/90
WM-9	The New Hazardous Waste Management Requisition System	Env. Prot. Dept. LLNL	5-6/88	3/1/90
WM-10	Hazardous Waste Management Plan	Haz. Waste Man. Div.	9/89	2/20/90
WM-11	Summary of Closeout Meeting from the California DOHS Inspection of 2/26 & 2/28/90	Ray Corey, DOE SAN	3/2/90	
WM-12	Input Sheets for National Report on LDR Prohibited Mixed Waste and Treatment Options	R.C. Ragaini/ Env. Prot. Dept./ W. Lambert	12/4/87	3/2/90
WM-13	Daily/Weekly Inspections for the 612 Facility (Jan/Feb 1990)	Haz. Waste Man.	3/7/90	3/7/90
WM-14	Environmental Compliance and Self Assessment Presented to DOE Tiger Team	Connie DeGrange/Env. Guid. Div.	2/27/90	2/27/90
WM-15	Monthly Environmental Compliance Activities Report for LLNL	D. Pearman/DOE SAN/ DOE Headquarters	12/21/89	2/27/90
WM-16	Stored Mixed Wastes -1985-1988	Env. Prot. Dept.-LLNL	Undated	3/1/90
WM-17	Integrated Data Base Program Summary Mixed Waste Data	K. Gilbert/Haz. Waste Management	3/1/90	3/1/90

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
WM-18	Appendix A, Nevada Test Site Defense Waste Acceptance Criteria and Certification Requirements	USDOE NV Operations & Reynolds Electrical & Engineering, Co.	10/88	2/26/90
WM-19	Intent to Deny a Permit for LLNL to Perate under RCRA	USEPA Region 9	10/3/89	2/26/90
WM-20	LLNL B322 Plating Shop Subfloor	C. DeGrange/ Env. Guid.Div. LLNL/ L. Miller	11/13/89	2/26/90
WM-21	Segragation Plan for R-Program Solid Waste in B131	H. Gales/Laser Eng. & Materials	2/26/90	3/2/90
WM-22	Program Compliance Log 1/1/88-2/28/90			3/2/90
WM-23	Basic Out Training for HWM Techs	S. Steiner/EPD	3/14/89	3/6/90
WM-24	HWM Operations Training Program Plan Proposal	S. Steiner	3/1/90	3/6/90
WM-25	Professional Staff Development (Proposal)	S. Steiner	Undated	3/6/90
WM-26	EPD Course Listing by Number		2/13/90	3/6/90
WM-27	Contact List - Haz. Waste Handling Practices 1989-90		Undated	3/6/90
WM-28	Draft-Guidance Document Environmental Training Requirements		Undated	3/6/90
WM-29	Generator Training Questionairre		Undated	3/6/90

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WM-30	Generic Training Outline Haz. Waste Handling Practices EPD-0006 1989 Series		5/22/89	3/6/90
WM-31	Job Code Number Description	Env. Prot. Dept.	3/5/90	3/6/90
WM-32	Report of Violation	J. Bullock/DOHS/ D. Pearman & D. Fisher		
WM-33	Waste Accumulation Areas, LLNL Site 300 and Main Site	Env. Prot. Dept.	3/5/90	3/7/90
WM-34	Inspection Checklists WAA 872	WAA-872 Inspectors		Reviewed 2/28/90
WM-35	HWM Facility Operating Procedure	HWM	2/22/90	3/2/90
WM-36	Inspection Checklists B419	B419 Inspectors		Reviewed 2/28/90
WM-37	Inspection Checklists B322	B322 Inspectors		Reviewed 3/5/90
WM-38	Inspection Checklists WAA321E	WA321-E Inspectors		Reviewed 3/5/90
WM-39	Inspection Checklists 612	612 Inspector		
WM-40	Environmental Protection Handbook	LLNL/Env. Prot. Dept.	2/16/90	2/28/90
WM-41	LLNL Waste Minimization Plan	LLNL/Env. Prot. Dept.	2/14/90	2/28/90
WM-42	Resource Conservation & Recovery Permit	Env. Prot. Dept.	12/15/89	2/13/90

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WM-43	Table I, LLNL Minimization Waste Program Plan	Env. Prot. Dept/LLNL	2/14/90	2/28/90
WM-44	Inspection Checklist	B-321 WAA Inspector		Reviewed 3/5/90
WM-45	Inspection Checklist	B-431 WAA Inspector		Reviewed 3/9/90
WM-46	Draft Guidance to Hazardous Generators or the Elements of a Waste Minimization Plan	USEPA	6/12/89	6/12/89
WM-47	Implementation Guidance for DOE Order 5400.1 Waste Minimization Plan and Waste Reduction Reporting of DOE Hazardous, Radioactive and Radioactive Mixed Wastes	USDOE	1/90	2/90
WM-48	Environmental Survey, Preliminary Report LLNL California	USDOE Headquarters	12/87	12/87
WM-49	Guidelines for Waste Accumulation Areas	J.M. Hirobayashi/EPA	3/89	12/90
WM-50	NVO-185-Operational Radioactive Defense Waste Management Plan for the Nevada Test Site	USDOE NVO & REBCO	Jan 1985	3/90
UM-51	Weekly Inspection Checklist, Verification of Correct Lists, Site 30C	Vince Tobia/EPD	3/13/90	3/30/90
WM-52	Weekly Inspection Checklist, Waste	Vince Tobia/EPD	3/13/90	3/30/90
WM-53	Weekly Inspection Checklist, Waste Accumulation Area	Vince Tobia/EPD	3/27/90	3/27/90

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WM-54	New Waste Labels (DRAFT)	Connie DeGrange/EPD	Undated	3/30/90
WM-55	Certification TRU Waste Shipment	George Rockanic, Jr./ LLNL	3/27/90	3/30/90
WM-56	Deadline for Generatr Application	Bruce W. Church/NVO	12/20/89	3/30/90
WM-57	Ned to Review Employee Checkout Proce re	Richard Rogani/EPD	3/7/90	3/30/90

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WM-101	FY 90 Update - LLNL Waste Management Plan per DOE Order #5820.2A	LLNL	N/D	3/6/90
WM-102	Resource Conservation and Recovery Act Part B Permit Application Hazardous Waste Treatment and Storage Facilities, LLNL, Vol. 1	LLNL Regulatory Affairs Div.	12/15/89	3/6/90
WM-103	LLNL Site 300 Waste Minimization Program Plan	LLNL M.A. Gonzalez & R. Heckman	2/2/90	3/6/90
WM-104	LLNL Waste Minimization Plan Bldg. 141	LLNL C. Sato & R. Hersey	2/20/90	3/6/90
WM-105	Tank System Database	LLNL B. Schwartz	2/8/90	3/6/90
WM-106	Testing Underground Tanks for Leak Tightness at LLNL	LLNL R. Henry	7/1/86	3/16/90
WM-107	LLNL Site 300 Interim Status Document (EPD 0046 tab 8)	Cal. Dept. of Health Serv.	3/30/81	3/6/90

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WM-108	Final Report of the LLNL Independent ES&H Review Team	LLNL ES&H 90-05 D.C. Sewell	1/19/90	3/6/90
WM-109	Guidelines for Waste Accumulation Areas	LLNL Env. Prot. J.M. Hirobayashi	3/89	3/6/90
WM-110	Preparation Guide for Generators of Hazardous Chemicals and Radioactive Waste at LLNL	LLNL BHV Prot. J. Huss	3/87	3/6/90
WM-111	Guidance on Waste Run Precheck and Disposition of Wastes Received from the Waste Run	LLNL HWM Operations K. Gilbert	1/22/90	3/16/90
WM-112	Final RCRA Hazardous Waste Facility permit issued to LLNL-Site 300	EPA Region IX	8/29/89	3/6/90
WM-113	Testing and Correction of Underground Tanks at LLNL-Report on 1988 activities and 1989 work plan	LLNL Guidance and Monitoring Div.	10/1/88	3/16/90
WM-114	Testing and Correction of Underground Tanks at LLNL Workplan and Schedule	LLNL Guidance and Monitoring Div.	11/1/87	3/16/90
WM-115	Summary of 1989 Tank Testing Results	D.Castro, Wastewater & Tank Systems Group	3/1/90	3/16/90
WM-116	Requested information on VST Monitoring	S. Coleman, Env. Protection	3/29/90	3/29/90

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Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
TCM-1	Hazardous Material Business Plan	D. Armstrong	1990	
TCM-2	1988 PCB Annual Document	D. Armstrong	undated	
TCM-3	1987 PCB Annual Document	D. Armstrong	undated	
TCM-4	1986 PCB Annual Document	unknown	undated	
TCM-5	1985 PCB Annual Document	unknown	undated	
TCM-6	Inventory of Pesticides Bldg. 520	unknown	02/01/90	
TCM-7	Tank System Data Base	W. Schwartz	01/08/90	
TCM-8	Retention Tanks on LLNL Site - January 1985	unknown	01/85	

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
TCM-9	Tiger Team Issue - Asbestos	unknown	1990	
TCM-10	Management Newsnotes, Vol. 12	J. Morris	10/89	
TCM-11	Spill, Prevention, Control & Countermeasures (SPCC) Plan	Science Applications International Corp.	01/90	
TCM-12	Site 300 - Annual Report 1988		1988	
TCM-13	Deactivation of Caustic and Acid Storage Tanks at Bldg. 291 and 325	Memo for Pat Dempsey to Bob Fisher	03/30/90	
TCM-14	Safe Handling of Asbestos and Asbestos Products (Health and Safety Manual)	Revised by R. Kelley	10/89	
TCM-15	Health Hazard Communication (Health and Safety Manual)	B. Baptiste	03/10/86	
TCM-16	Proper Disposition of Usable Surplus Chemicals (Environmental Alert)	R. Regaini (EPD)	undated	
TCM-17	List of Bldgs. that contain asbestos insulation containing materials	LLNL	undated	
TCM-18	Environmental Incident Report (G.E. Capacitor Leaks in Bldg. 436)	S. Cerruti	07/31/89	
TCM-19	Environmental Incident Report (G.E. Capacitor Leaks in Bldg. 436)	S. Cerruti	06/23/89	
TCM-20	Environmental Incident Report (G.E. Capacitor Leaks in Bldg. 436)	S. Cerruti	06/22/89	

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TCM-21	Environmental Survey Preliminary Report Lawrence Livermore National Laboratory	U.S. DOE	Rec. 1987	

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QA-1	QA Project Plan - LLNL Groundwater			
QA-2	Environmental Quality Verification Group QA Plan		09/87	
QA-3	Environmental Report for 1988	D.D. Brefbe et al (EPD)	1988	
QA-4	Quality Assurance Project Plan - LLNL Site 300 Environmental Restoration Project	T.M. Carlsen and D.W. Rice, Jr.	02/90	
QA-5	Quality Assurance Program "Action Plan"	M. Simpson	03/05/90	
QA-6	LLNL Hazardous Waste Management Control Laboratory - Analytical Quality Control Manual		04/88	

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
QA-7	LLNL Program Responsibilities	LLNL		
QA-8	Environmental Restoration Program Standard Operating Procedures (draft)	D. Rice, P. Daley	01/90	
QA-9	Environmental Quality Verfication Group - Procedure Manual	D.D. Brefbe et al	10/88	
QA-10	LLNL Hazards Control Laboratory - Analytical Quality Control Laboratory (Rev.2)	LLNL	1988	

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R-1	1988 Review of LLNL Radionuclide Sampling Systems in regard to DOE 5480.XX	A. Bierman/ Haz. Cont. Dept. D. Meyers	3/22/90	3/3/90
R-2	FSP Procedure 419	LLNL	12/88	3/3/90
R-3	FSP Procedure 514	LLNL	4/15/88	3/3/90
R-4	FSP Procedure 612	LLNL	12/1/88	3/3/90
R-5	Contingency Plan B419	LLNL	2/21/89	3/3/90

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
R-6	Contingency Plan B514	LLNL	11/30/89	3/3/90
R-7	Contingency Plan B612	LLNL	11/30/89	3/3/90
R-8	Envir. Evaluation for the Nuclear Directed Energy Research Facility	LLNL	2/10/86	3/3/90
R-9	Env. Assessment, Nuclear Test Tech. Complex, DOE/EA-0357	DOE	5/88	3/3/90
R-10	Env. Assessment, Nuclear Directed Energy Research Facility	DOE	12/15/87	3/3/90
R-11	Tritium Fac. Upgrade, NEPA Determin.	W. Warner/DOE J. Elferink	12/27/88	3/3/90
R-12	Env. Assessment, Construction and Operation of the Hardened Engineering Test Building, UCAR-10208	L. Santos/SAIC for DOE	8/87	3/3/90
R-13	Draft Env. Impact Report for Univ. of CA contract with DOE for LLNL	Univ. of CA	12/22/86	3/3/90
R-14	Hazards Control Manual	Haz.Control.Dept.	6/87	3/5/90
R-15	Health & Safety Manual	LLNL	1/90	3/5/90
R-16	Env. Protection Handbook	Env. Prot. Dept.	2/16/90	3/5/90
R-17	FY90 Update, Lawrence Livermore Lab. Waste Management Plan	LLNL	None	3/5/90

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
R-18	Haz. Waste Man. Quality Assurance Plan, M-078-92	Haz. Waste Man. Division	3/23/88	3/5/90
R-19	Hazardous Waste Management Plan	Haz. Waste Man. Division	9/89	3/6/90
R-20	LLNL TRU Waste Certficiation Program: M-078, Supp. 2	LLNL	2/87	3/6/90
R-21	Hazardous Waste Management Standard Operating Procedures	Haz. Waste Man. Division	3/1/90	3/6/90
R-22	The New Hazardous Waste Management Requisition System	Env. Prot. Dept.	6/88	3/6/90
R-23	Waste Disposal Requisition Guidelines	Haz. Waste Man. Division	1/90	3/6/90
R-24	Waste Disposal Flowcharts HWM 89-652	T. Olund/ E. Ambrose, W. Kelly, S. Kidd	9/27/89	3/6/90
R-25	Env. Quality Verification Group Quality Assurance plan UCAR-10203	Env. Monit. Group	9/18/87	3/7/90
R-26	Env. Quality Verification Group procedures Manual UCAR-10254	Env. Monit. Group	10/88	3/7/90
R-27	Environmental Monitoring at the Lawrence Livermore Nat. Lab. Annual Report 1987 UCRL-50027-87	R. Holland, D. Brekke/Env. Monit. Group	4/88	3/7/90
R-28	LLNL, Env. Report for 1988 UCRL-50027-88	R. Holland,	None	3/7/90

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
		D. Brekke/Env. Monit. Group		
R-29	AIRDOS-PC Users Guide DRAFT	EPA	1/88	3/7/90
R-30	Env. Prot. Implementation Plan UCAR-10307	Env. Guid. Div.	9/89	3/8/90
R-31	Plan to Address Finding E10, Mini-Tiger Team Audit	J. Sims/Env.Monit. Group/G. MacKanic	11/22/89	3/8/90
R-32	Evaluation of Air Monitoring at Site 300	J. Sims/Env. Monit. Group/R. Ragaini	2/15/90	3/8/90
R-33	Use of Radionuclides at Lawrence Livermore National Laboratory	R. Ragaini/Env. Prot. Dept./S. Rosenblum	2/6/90	3/8/90
R-34	Retention Tank List	Wastewater & Tank Systems Group	3/90	3/8/90
R-35	Retention Tank Approval Instructions (DRAFT)	Wastewater & Tank Systems Group	8/17/89	3/8/90
R-36	List of Hazards Control Field Support Instructions	Health Physics Group	11/7/89	3/8/90
R-37	Projected Doses from Unsampled Stacks at LLNL	M. Singh/Health Physics Group	11/10/89	3/8/90
R-38	Additional Information on Pit 7 Complex and B850 Area, Site 300	A. Lamarre/Env. Rest. Division	3/7/90	3/8/90
R-39	Lawrence Livermore (DRAFT) Application to Dispose of Radioactive Waste	SAN-DOE & LLNL	3/90	3/8/90

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
R-40	Guidelines for Preparing an Operational Safety Procedure		2/11/86	3/9/90
R-41	Env. Evaluations Group Document Status		1/21/90	3/9/90
R-42	Safety Analysis of the Haz. Waste Disposal Facilities (B514, 612 & 614) UCID 18706	B. Odell, A. Toy LLNL	12/13/79	3/9/90
R-43	Safety Analysis of the Decontamination Facility B419, UCID 18886	B. Odell/LLNL	6/17/80	3/9/90
R-44	Preliminary Safety Analysis Document for the Hazardous Waste Management Facilities Buildings (419, 513, 514, 612, 614, 624, 625 and 693) DRAFT	SAIC	11/89	3/9/90
R-45	Quality Assurance Reviews	Haz. Cont. Dept. Safety Serv. Div.	3/12/90	3/9/90
R-46	LLNL Env. Prot. Dept. Quality Assurance Program Action Plan	M. Simpson/Env. Prot. Dept.	3/5/90	3/9/90
R-47	Radiochemical methods of the site Environmental Monit. Program M-122, Rev. 1	J. Garrison/et.al. Nuclear Chemistry Division	1/85	3/9/90
R-48	Hazards Control Team #6, 1988 Annual Report	Hazard Controls Dept. Oper. Support Division	None	3/10/90
R-49	HWM Audit Report Audit #90-01	H. Canter/HWM QA Coord.	2/5-20/89	3/12/90

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
R-50	QA Manual M-078, Rev. 1	J.S. Kahn/Lab Assoc. Dir.	9/11/85	3/12/90
R-51	HWM Self-Assessment Matrices	H. Canter/SAIC K. Gilbert	2/9/90	3/12/90
R-52	Preparation Guide for Generators of Hazardous Chemical & Radioactive Waste at LLNL (DRAFT)	J. Huss/EPD	2/90	3/12/90
R-53	HWM SOP 612.1 (DRAFT)	HWM Division	None	3/12/90
R-54	Guidance on Waste Run Precheck and Disposition of Waste Received from the Waste Run	K. Gilbert/HWM HWM Operations	1/22/90	3/12/90
R-55	LLNL Site 300 Firing Table Debris Waste Stream	R. Fitzsimmons DOE NVOO/W. Lambert DOE SAN	12/26/89	3/13/90
R-56	HOT SPOT Health Physics Codes M-161	S. Homann/Haz. Cont. Dept. LLNL	4/85	3/14/90
R-57	Hazards Control Dept., Annual Tech. Review 1985 UCRL-5007-85	R. Griffith/LLNL	1985	3/14/90
R-58	Administrative Memo	W. Silver/Haz. Control Dept. H & S Division	2/19/88	3/15/90
R-59	A Guide to Performing & Documenting Safety Analyses	E. Halliman/Haz. Control Dept.	2/89	3/15/90
R-60	SOP 4.9 (S.300) Disposal of purged	J. Copland/Env.	3/15/90	3/16/90

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	ground water at Site 300	SAIC/Restoration Division		
R-61	Independent Env. Safety and Health Review of LLNL Nuclear Matl. Handling Facilities	Independent Env. Safety & Health Review Team	1/19/90	3/16/90
R-62	Memorandum from P. M. Baylacq Screening of potentially contaminated samples	P. M. Baylacq/ Hazards Control Dept., Op. Safety Div.	3/7/90	3/26/90
R-63	Rapid Detection of plutonium and other trace elements in Laboratory effluent	G. Price Russ III LLNL, Nuc. Chem. Div.	none	3/27/90
R-64	Classified Waste Compliance Memorandum	W. Lambert/DOE-SAN J. Tseng, EH-23 J. Lytle, OP-12	1/18/90	3/27/90
R-65	Haz. Waste Mgmt. Screening Procedures for Bldg. 226 (Draft)	R. Silva/Nuc.Chem. Div./R. Crawford	3/2/90	3/30/90
R-66	Tritium contam. waste water released to sanitary sewer from Bldg. 331 for past year 1989	A. S. Nicolsi/Haz. Cont. Dept./ L. Fischer	2/9/90	3/31/90

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R-67	Quality Assurance Assessment of Air Monitoring Program	R. Holland/Env. Prot. Dept./Env. Maint. Group/ R. Shah/M. Ruggieri	5/6/88	3/31/90
R-68	Env. Prot. Dept., Env. Quality Verification Grp, Internal Audit Report, Dec. 19-21, 1988	J. Palmer/Quality Assurance Group	1/12/88	3/31/90
R-69	Status Report 11/6-30/89	K. Surano/Env. Prot. Dept.,Env. Monit. Group		3/31/90
R-70	Fourth Quarter QA Summary	R. Holland/Env. Prot. Dept.,Env. Monit. Group	3/7/89	
R-71	EQVG Technician Training Checklist	N/A	6/89	3/31/90
R-72	Team Action Plan Safety Team 2	J. K. Wong/Safety Team Leader	3/10/89	4/2/90
R-73	Discipline Action Plan Hazards Control Safety Team 1	Env. Prot. Dept.	10/88	4/2/90
R-74	Discipline Action Plan Hazards Control Safety Team 2	Env. Prot. Dept.	12/88	4/2/90
R-75	Discipline Action Plan Bldg. 231 Hazards Control Safety Team 3	Env. Prot. Dept.	5/88	4/2/90
R-76	Discipline Action Plan Hazards Control Safety Team 5	Env. Prot. Dept.	10/88	4/2/90

Document Number	Title/Description	Author/ Organization/ Recipient	Document Date	Date Document Received
R-77	Discipline Action Plan Hazards Control Safety Team 6	Env. Prot. Dept.	8/24/89	4/2/90
R-78	1986 Hazards Control Safety Review Program Safety Team 4	R. Latimer/Safety Team 4/A. Toy	2/26/87	4/2/90
R-79	Annual Inspection of Bldg. 281 and 282	R. Latimer/Safety Team 4/J. Dupzyk	11/30/88	4/2/90
R-80	Annual environmental inspection of Bldg. 221-229	B. Thompson/Env. Prot. Dept./R. Latimer	6/15/88	4/2/90
R-81	Annual Safety Report for 1988 (corrected)	R. Latimer/Safety Team 4/V.Mode	4/10/89	4/2/90
R-82	Team 1 Discipline Action Plans	Safety Team 1	3/2/90	4/2/90
R-83	Team 3 Discipline Action Plans	Safety Team 3		4/2/90

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IWS-1	Draft CERCLA Rem. Inv. Report for LLNL Livermore Site	R. Thorpe, W. Isherwood et.al./Env. Rest. Div./UCAR-10299	11/89	
IWS-2	LLNL Site 300 Envir. Rest. Work Plan	A. Lamarre/Env. Rest. Div./UCAR-10247	10/89	
IWS-3	Draft Admin. Order - RCRA 3008(h)	USEPA	3/89	
IWS-4	Work Plan - LLNL Livermore Site; CERCLA Rem. Inv./Feas. Study	C. Webster-Scholten C. Hall/Env. Rest. Div./UCAR-10225	5/89	
IWS-5	CRWQCB, San Francisco Bay Region Order No. 88-103	CRWQCB	6/88	
IWS-6	RCRA Facility Assess. Visual Site Inspection Report - LLNL	A. T. Kearney, Inc. & The Earth Tech. Corp.	Undated	

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IWS-7	Federal Fac. Agreement under CERCLA	USEPA/USDOE/CDOHS/ CRWQCB	11/88	
IWS-8	RCRA Closure & Post-closure Plans Landfill Pits 1 & 7 - LLNL Site 300	R. Corey/Guid. & Mon. Division	5/88	
IWS-9	Baseline Public Health Assessment for CERCLA Invest. at the LLNL-Liv. Site	D. Layton/Env. Rest. Div./UCAR-10279	6/89	
IWS-10	Remedial Invest. & Feas. Study for the LLNL Site 300 Pit 7 complex (Vol. I and II)	M. Taffet, et.al., Env. Rest. Div./ UCID-21685	10/89	
IWS-11	LLNL responses to comments by CRWQCB (Sept. 21, 1989) on closure & post-closure plans (Vol. II) for Landfill Pits 1 and 7	Env. Rest. Div./ UCAR-10313	11/89	
IWS-12	Solid Waste Assessment Test (SWAT) Inactive Landfill Pit 6 - LLNL Site 300 - San Joaquin Co, CA	M. Taffet & A. Lamarre/Env. Rest. Div./UCAR-10242	7/88	
IWS-13	LLNL Groundwater Project - Monthly Prog. Report - August 15 - Sept. 15, 1988	F. Yukic, M. Dresen et.al./Env. Rest. Div./ UCAR-10160-88-10	Undated	3/5/90
IWS-14	Assessment of the Extent of TCE in Soil and Water at LLNL, Site 300	D. Carpenter, et.al./ Env. Prot./UCID-20774	7/86	
IWS-15	Assessment of the Extent of TCE in Soil and Water at LLNL, Site 300	D. Carpenter, et.al./ Env. Prot./UCID-19945	9/83	
IWS-16	LLNL Site 300 Env. Invest. Quarterly/ October-December 1989	A. Lamarre/Env. Rest. Div./UCAR-10194-89-4	2/90	2/28/90

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IWS-17	Remedial Investigation of Dry Wells LLNL Site 300	A. Lamarre, et.al./ Env. Rest. Div./ UCID-21774	11/89	
IWS-18	Addendum to Initial Remedial Invest. of Site 300 Dry Wells	F. Hoffman & A. Lamarre/ Env. Rest. Div.	1/90	
IWS-19	Closure Plan for the Decommissioned High Explosives Rinse-Water Lagoons at LLNL Site 300	D. Carpenter, et.al./ Env. Rest. Div./ UCID-21369	5/88	
IWS-20	Remedial Investigation of Landfill Pit 8 LLNL Site 300	M. Taffet/Env. Rest. Div./UCID-21764	8/89	
IWS-21	East Traffic Circle Landfill Closure Rep.	W. McConachie, et.al./ Env. Prot./UCID-20662	1/86	3/7/90
IWS-22	Memorandum regarding use of cooling towers to air strip organics from water	H. Pfeifer/Env. Prot. Dept.	4/85	3/7/90
IWS-23	Letter to H.S. Doss, BAAQMD	R. Ragaini/Env. Prot. Dept.	5/88	3/7/90
IWS-24	Screening-Level Assessment of the Potential Health Risks of VOC Emissions from Air Strippers at LLNL	D. Layton & R. Cederwall LLNL	5/88	3/7/90
IWS-25	Authority to Construct 3 Air Strippers	J. Swanson/BAAQMD	6/88	3/7/90
IWS-26	Telecon w/Mike Higgins, RWQCB	J. Greci/Env. Rest. Div.	2/90	3/7/90

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IWS-27	Letter regarding Proposed Disposal of Hydraulic Test Waters from LLNL Monitoring Wells	R. James/RWQCB	9/86	3/7/90
IWS-28	Telecon with RWQCB regarding NPDES/WDR permit for well discharges at Site 300	J. Steenhoven/Permits & Regul. Aff. Div.	6/88	3/7/90
IWS-29	Telecon w/RWQCB regarding handling of purge water	A. Lamarre	11/89	3/7/90
IWS-30	East Traffic Circle Landfill Closure Rep.	W. McConachie, et.al/ Env. Prot. Div./ UCID-20662	1/86	3/7/90
IWS-31	Letter to RWQCB regarding analysis of excavated drums	E. Lateiner for R.O. Godwin/Plant & Tech. Services	11/87	3/7/90
IWS-32	Letter to RWQCB regarding analysis of excavated drums	L. Cleland for R.O. Godwin/Plant & Tech. Services	2/88	3/7/90
IWS-33	Inspection Records for Site 300 Pits	J. Shingleton and W. Egbert	8/89-2/90	3/9/90
IWS-34	Summaries of Community Relations Program Activities	P. Post	1988-1990	3/2/90
IWS-35	LLNL Comments on EPA HRS Scoring for LLNL Site 300	Jacobs Eng. Group, Tetra Tech, Inc.	7/88	
IWS-36	Letter to A.L. Lamarre transmitting HRS evaluation for Site 300	Ecology & Environment, Inc.	7/89	

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IWS-37	Letter to L. Reed, EPA HQ regarding placement of Site 300 on NPL	D. Fisher/LLNL Admin. and Operations	9/89	
IWS-38	Letter to A.L. Lamarre regarding HRS Scoring	R. Cross/Woodward-Clyde Consultants	9/89	
IWS-39	Letter to F. Hoffman regarding TCE in Well W-834-T 1 at Site 300	D. Barth/Env. Research Ctr, Las Vegas	9/89	
IWS-40	Letter to A.L. Lamarre regarding HRS Scoring (details)	R. Cross/Woodward-Clyde Consultants	9/89	
IWS-41	Letter to L. Reed, EPA HQ regarding placement of Site 300 on NPL	D. Fisher/LLNL Admin. and Operations	9/89	
IWS-42	Letter to J. Chesnutt, EPA IX regarding continuing soil gas investigation	F. Hoffman/Env. Rest. Division	1/90	3/5/90
IWS-43	Letter to J. Chesnutt, EPA IX regarding Soil Borings in West Traffic Circle Area	F. Hoffman/Env. Rest. Division	1/90	3/5/90
IWS-44	LLNL Groundwater Project Monthly Progress Report August 15-September 15, 1988	F.A. Yukic, et.al./Env. Rest. Div./ UCAR-10160-88-10	Undated	3/5/90
IWS-45	Letter to J. Khanna, San Joaquin Co Air Pollution Control District regarding B834 remediation	R. Godwin/LLNL Plant & Tech. Services	6/87	3/12/90
IWS-46	Memo to Dr. Sadredin, SJCAPCD regarding B834 remediation	W. McConachie/Env. Prot. Dept.	8/87	3/12/90

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IWS-47	Letter to R. Godwin, LLNL Plant & Tech. Services regarding B834 remediation	L. Grewal/Director SJCAPCD	8/87	3/12/90
IWS-48	Application for Authority to Construct B834 Pilot Test Facility	D. Fisher/LLNL Admin. & Operations	12/88	3/12/90
IWS-49	Authority to Construct TCE Air Stripping System	L. Grewal/Director SJCAPCD	5/89	3/12/90
IWS-50	Letter to J. Khanna, SJCAPCD regarding modifications to Application	R. Ragaini/Env. Prot. Dept.	8/89	3/12/90
IWS-51	Letter to R. Ragaini, LLNL regarding Authority to Construct conditions	L. Grewal/Director SJCAPCD	9/89	3/12/90
IWS-52	Telecon with S. Sadredin, SJCAPCD regarding need for carbon canisters on pilot test	D. Armstrong, Env. Guidance Div.	10/89	3/12/90
IWS-53	Assessment and clean-up of the Taxi Strip Waste Storage Area at the LLNL	A.L. Buerer	1/83	3/12/90
IWS-54	Memo to J. Steenhoven regarding SARA Title III Chronology - 1988 survey	D. Armstrong/Envir. Guidance Div.	3/89	
IWS-55	Guidance for Conducting Remedied Investigations and Feasibility Studies Under LERLLA	USEPA	10/88	
IWS-56	Draft Cleanup and Abatement Order & Environmental Restoration Time Schedule	W. Crooks, CRWQCB Central Valley Region	4/89	

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N-001	Review of Environmental Evaluation, Safeguards and Security, Enhancements II, LLNL	J.T. Davis/Dir., Environment, Safety and Quality Assurance Div.(ESQA), San Francisco Operations Office (SAN)/ B. Nettleton	04/09/85	02/90
N-002	Environmental Evaluation for the Safeguards and Security Enhancements II	LLNL	03/85	02/90
N-003	Review of Environmental Evaluation, Fume Hood Installation, Building 222	J.T. Davis/Dir., ESQA-SAN/ File	04/17/85	02/90
N-004	Military Applications and Computations Facility-LLNL-Level of NEPA Determination	W.C. Reddick/ Dir., Engineering and Property Mgmt. Div.(EPM)-SAN/ File	09/05/86	02/90
N-005	Environment, Safety and Quality Assurance Division System Review, Military Applications and Computations Facility	ESQA-SAN	08/86	02/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
N-006	Environmental Evaluation, Military Applications and Computations Facility	LLNL	05/86	02/90
N-007	Proposed Chemical Waste Storage Building, (Bldg. 693), LLNL, Level of NEPA Determination	W.C. Reddick/ Dir., EPM-SAN /File	04/15/86	02/90
N-008	Environment, Safety and Quality Assurance System Review, Chemical Waste Storage Building	ESQA-SAN	04/86	02/90
N-009	Environmental Evaluation, Chemical Waste Storage Building, Building 693	LLNL	03/86	02/90
N-010	Proposed Video Teleconferencing Studio Facility, LLNL, Level of NEPA Documentation	M.K. Hooper/ Dir., Advanced Concepts Research Div./ File	05/28/87	02/90
N-011	Environmental Evaluation, Video Teleconferencing Studio Facility, Building 118	LLNL	05/87	02/90
N-012	Proposed Westgate Drive Entrance to LLNL	W.C. Reddick/ Dir., EPM-SAN /File	08/03/87	02/90
N-013	Proposed Westgate Drive Entrance to LLNL, Action Description Memorandum	S.D. Adams & L.E. Santos/ Science Applications International Corp. (SAIC)	07/87	02/90
N-014	Environmental Documentation for Building 483 and Building 490 Expansion, LLNL	J. A. Elfernick/ Manager-SAN/ File	05/11/88	02/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
N-015	Hardened Engineering Test Building, NEPA Determination	J.T. Davis/ Dir., ESQA-SAN/ J. A. Elfernick	09/20/88	02/90
N-016	Hardened Engineering Test Building, Action Description Memorandum	L.E. Santos & M. Kolar/SAIC/US DOE	08/87	02/90
N-017	Tritium Facility Upgrade, NEPA Determination	W.W. Warner/Act. Dir., ESQA-SAN/ J.A. Elferink	12/22/88	02/90
N-018	Environmental Evaluation, Tritium Facility Upgrade	LLNL	03/84	02/90
N-019	Advanced Implementation Technology Trailer Complex NEPA Determination	M.J. Domagala/ Dep. Asst. Manager, ESQA-SAN/File	07/25/89	02/90
N-020	Impact of Building 197 on Trailer 1888 Complex	G.C. Miller/ Industrial Hygiene Group, Hazards Control Dept./E. English	07/14/89	02/90
N-021	Impact of Building 197 Toxic Gas Operations on Trailer 1888 Complex	J. Simpson/ Resource Manager, "O" Program/ W. Lambert	07/27/89	02/90
N-022	Advanced Implementation Technology Trailer Center Complex Project Memorandum	C. DeGrange/ Leader, Guidance and Monitoring (G&M)-LLNL/ E. English	06/29/89	02/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
N-023	Building 153 NEPA Determination	J.T. Davis/Asst. Manager for ESQA-SAN/Files	05/15/89	02/90
N-024	Microfabrication Operations, Building 153	C. DeGrange/ Leader, G&M-LLNL/File	04/21/89	02/90
N-025	Action Description Memorandum, Building 153	SAIC	04/89	02/90
N-026	Hazard Classification and Gas Release Calculations, Building 153	B. Bettencourt/ unknown/ A. Celoni	03/14/89	02/90
N-027	LLNL O-Program Advanced Implementation Technology Light Laboratory Project Building 185 NEPA Determination	M. Schanfein/ RP & A Branch Chief, Weapons Development Div. /D.W. Pearman, Jr.	09/29/89	02/90
N-028	Advanced Implementation Technology Bldg. 185 Light Laboratory Project Memorandum	R. Raginin/ Head, Environmental Protection (EP) Div. /J. Juetten	08/22/89	02/90
N-029	Parking Lots A-8 and D-1, NEPA Documentation	E.J. Valle/ Engineering and Facilities Management (EFM) Div./ D.W. Pearman, Jr.	10/13/89	02/90
N-030	Parking Lots A-8 and D-1 Memorandum	R.Ragaini/Head, EP/ J. Juetten	09/89	02/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
N-031	Memo-to-File for Trailer 2632 Light Laboratory	J.A. Blasy/ Act. Asst. Manager, Defense Programs /D.W. Pearman, Jr.	02/02/90	02/90
N-032	LLNL O-Program Advanced Implementation Technology Project Temporary Trailer 4-Plex NEPA Determination	N.Lucas/Act. Branch Chief, Reimburseables, Planning and Assessment Branch/ D.W. Pearman, Jr.	02/02/90	02/90
N-033	Memorandum-to-File for Construction and operation of a Sewage Diversion Facility at LLNL	J. Gonzales/ Asst. Dir, EFM/D.W. Pearman, Jr.	02/05/90	02/90
N-034	Categorical Exclusion under DOE NEPA Guidelines, 12 kV Replacement Project	K. Bridwell/ unknown/ Memorandum-to-File	08/09/89	02/90
N-035	Categorical Exclusion under DOE NEPA Guidelines, Central Cafeteria, Building 4675	K. Bridwell/ unknown/ Memorandum-to-File	08/10/89	02/90
N-036	Categorical Exclusion under DOE NEPA Guidelines, 15 kV Sectional Switch Project	K. Bridwell/ unknown/. Memorandum-to-File	09/89	02/90
N-037	Building 197 Modifications Memorandum	C. DeGrange/Leader, G&M/ Memorandum-to-File	10/17/89	02/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
N-038	Categorical Exclusion under DOE NEPA Guidelines LLNL Polymer Group Relocation-Building 227	C. DeGrange/ Leader, G&M/ Memorandum-to-File	10/17/89	02/90
N-039	Environmental Evaluation for the Nuclear Directed Energy Research Facility	LLNL	01/86	02/90
N-040	Environmental Evaluation for the Heritable Mutation Laboratory and Library Addition, B-361	LLNL	02/86	02/90
N-041	Environmental Evaluation for the Clean Room Retention System, Building 151	LLNL	02/86	02/90
N-042	Laboratory Financial Management Center	H.E. Pfeifer/ EP/ H. Wilson	02/24/86	02/90
N-043	Environmental Evaluation for the Laboratory Financial Management Center	LLNL	03/86	02/90
N-044	Environmental Evaluation for the Two Remote Microwave Stations Located Between Mocho Pumping Station and LLNL/Sandia Main Site	LLNL	04/86	02/90
N-045	Environmental Evaluation for the Drum Storage and Dispensing Facilities, Livermore Site	LLNL	04/86	02/90
N-046	Environmental Impact Classification and Environmental Evaluation for a Remote Microwave Relay Station	H.E. Pfeifer/ G & M/ K. Campbell	12/08/86	02/90
N-047	Environmental Evaluation for Lease Space in Industrial Park, 5963C Graham Court, Livermore, CA (Draft)	LLNL	12/86	02/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
N-048	Environmental Evaluation for Lease Space in Industrial Park, 5963B Graham Court, Livermore, CA (Draft)	LLNL	12/86	02/90
N-049	Electrical Power Distribution System Upgrade	H.E. Pfeifer/G & M/ D. Pal	01/23/87	02/90
N-050	Environmental Evaluation for the Foreign Technology Assessment Building	LLNL	02/87	02/90
N-051	Environmental Evaluation for the Common Facilities/Utilities High Voltage Distribution System Upgrade	LLNL	03/87	02/90
N-052	Environmental Evaluation for the Building 131 High-Bay Addition and Mechanical Equipment Room	LLNL	04/87	02/90
N-053	Letter and attachments regarding implementation of the California Environmental Quality Act, Improvement of South Vasco Road	P.E. Baker/ Envir. Coord./ R. Brown, Dir. of Planning, City of Livermore	09/21/87	02/90
N-054	Environmental Impact Classification for the Lease of Office Space at the Research Drive Office Building	H.E. Pfeifer/ Envir. Analyst/ G.A. Dolan	11/10/87	02/90
N-055	Environmental Impact Classification for the Lease of Industrial Building located at 5573 Brisa Road, Livermore, CA	H.E. Pfeifer/ Envir. Analyst/ G.A. Dolan	12/10/87	02/90
N-056	Action Description Memorandum for the Cogeneration Projects: National Magnetic Fusion Energy Computer Center Computations Block	L.E. Santos/ SAIC	03/88	02/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
N-057	Draft Action Description Memorandum for Hydrazine Laboratory and Storage Building	L.E. Santos/ SAIC	03/88	02/90
N-058	Cogeneration Conceptual Design Report	Impell Corp./ LLNL	04/88	02/90
N-059	Memorandum-To-File, Building 332 SAS Office Addition	R. Ragaini/EP/ J. Juetten	08/15/89	02/90
N-060	Action Description Memorandum, Tritium Evaporator at Well 8 Spring, Site 300	LLNL	07/89	02/90
N-061	Westside Drainage Project Memorandum	R. Ragaini/ Head, EP/ J. Juetten	08/18/89	02/90
N-062	NTTC Temporary Parking Lot Project Memorandum	R. Ragaini/ Head, EP/ J. Juetten	08/22/89	02/90
N-063	High Explosive Rinse-Water Lagoons Closure Plan Memorandum	R. Ragaini/ Head, EP/ J. Juetten	09/15/89	02/90
N-064	Disaster PLanning Triage Complex Memorandum	R. Ragaini/ Head, EP/ J. Juetten	09/12/89	02/90
N-065	Building 165 Advanced Optical Process Laboratory Memorandum	R. Ragaini/ Head, EP/ J. Juetten	09/12/89	02/90
N-066	Building 281 Chemistry and Materials Science/Technology Research Center Project	R. Ragaini/ Head, EP/ J. Juetten	09/21/89	02/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
N-067	Action Description Memorandum, Building 166 Laboratory Addition	LLNL	10/89	02/90
N-068	Sewer Diversion Facility Action Description Memorandum	LLNL	10/89	02/90
N-069	Site 300 - Hetch Hetchy Water Supply System	H. Pfeifer/ G & M/ H. White	02/27/87	02/90
N-070	Environmental Assessment for the Environmental Compliance and Clean-up Project; UCAR-10184	D.A. Hieb & C.E. DeGrange/G & M	02/87	02/90
N-071	Draft CERCLA Remedial Investigation Report for the LLNL-Livermore Site; UCAR-10298	R.K. Thorpe et al/ Environmental Restoration Div.	11/89	02/90
N-072	Lawrence Livermore National Laboratory Site 300 Environmental Work Plan; UCAR-10247	A.C. Lamarre/ Restoration Group Leader	10/89	02/90
N-073	Status of NEPA Document Approval Annotated by Holman-SAN	B. Holman/SAN/ NEPA Tiger Team	03/05/90	03/05/90
N-074	NEPA Documentation Status for LLNL-Livermore Site and Site 300 RI/FS Restoration Project	B. Toler/ Envir. Evaluation GR. (EEG)/ A. Lamarre	03/01/90	03/01/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
N-075	LLNL listing of Environmental Document by Year 1973-1990	C. Kielusiak/ NEPA Coord., EEG/ NEPA Tiger Team	03/02/90	03/02/90
N-076	Letter to: Knox Mellon, California State Historic Preservation Officer	C. Busby/ Basin Research Assoc.	05/06/81	03/07/90
N-077	Letter to: C.I. Busby, Basin Research Assoc.	L.K. Napton/ Calif. Archaeological Site Survey	No Date	03/07/90
N-078	Letter to: C.I. Busby, Basin Research Assoc.	G. Collins/ Calif. Archaeology Site Survey	05/18/81	03/07/90
N-079	Letter to: C.I. Busby, Basin Research Assoc.	N.H. Evans/ Sacred Lands Study-Gov. Office/ Native American Heritage Comm.	05/18/81	03/07/90
N-080	Guidelines for Complying with the National Environmental Policy Act at Lawrence Livermore National Laboratory	C.M. Kielusiak & C.E. DeGrange/ Envir. Guidance Div./ L.L. Sigal	2/90	3/1/90
N-081	Letter: Compliance with NEPA	W.C. Reddick/ SAN/ D.K. Fisher	8/29/89	2/28/90
N-082	SAN MD/ Implementation of the National; Environmental Policy Act	SAN/SAN/SAN and SAN contractor facilities	11/27/89	2/28/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
N-083	Memorandum: NEPA Compliance for SAN Activities	D.W. Pearman/ SAN/ Senior Managers	8/24/89	2/28/90
N-084	Memorandum/ NEPA Related Documentation- EFM Control/ Tracking Process	J.K. Hartman/ SAN/ Distribution	9/20/89	2/28/90
N-085	Memorandum/ NEPA -Project Process (EFM)	J.L. Gonzales/ SAN/ Distribution	2/1/90	2/28/90
N-086	Memorandum/NEPA Implementation Changes	J.T. Davis/ SAN/ D.W. Pearman	1/25/90	2/28/90
N-087	Letter: NEPA Compliance	D.W. Pearman/ SAN/ J.H. Nuckolls	09/05/90	02/28/90
N-088	Letter: Categorical Exclusions	J.P. Juetten/ SAN/ C. DeGrange	02/08/90	02/28/90
N-089	Letter: Categorical Exclusion	J.P. Juetten/ SAN/ C. DeGrange	02/08/90	02/28/90
N-090	Notice (SEN-15-90): National Environmental Policy Act	J.D. Watkins/ DOE/ All Departments elements	02/05/90	03/06/90
N-091	Schedule 44s for FY 91 Budget Requests	LLNL		03/06/90
N-092	Memorandum/NEPA documentation	N.W. Petersen/ LLNL Plant Engineering/ Distribution	02/05/90	03/06/90
N-093	Memo: Approval of EA for Land Acquisition for LLNL and SNLA	W.W. Hoover, Dir., Military Applications,	06/21/84	03/07/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
		DOE/HQ		
N-094	Letter to D.F. Riley, Asst. Regional Dir., U.S. Fish and Wildlife Serv.: Recovery Plan for Amsinchia grandiflora	J.T. Davis, Dir., ESQA-SAN	09/08/87	03/07/90
N-095	Letter to Regional Dir., U.S. Fish and Wildlife Serv.: Request for Endangered Species information	C.D. Jackson, Dir., Envir. Safety & Program Support Div., SAN	06/24/80	03/07/90
N-096	Letter: J. Davis, SAN, Agency Review for Large Flowered Fiddleneck Recovery Plan	D.F. Riley, Asst. Regional Dir., U.S. Fish and Wildlife Serv.	06/18/87	03/07/90
N-097	Letter: Knox Mellon, State Historic Preservation Officer/Cultural Resources Inventory, Site 300	J.P. Juetten, Environment, Safety and Program Support-SAN	10/29/81	03/7/90
N-098	Letter: Knox Mellon, State Historic Preservation Officer/ Cultural Resources Inventory, Site 300	J.P. Juetten, Environmental, Safety and Program Support-SAN	01/04/82	03/07/90
N-099	Letter: Knox Mellon, Calif. Dept. Parks and Recreation: Transmittal of Archaeological Rpt. for LLNL	C.C. Lindeken, LLNL, Environmental Evaluation Group	11/08/79	03/07/90
N-100	Notice of Intent for preparation of DEIS on the operations at Lawrence Livermore National Laboratory and Sandia Laboratories at Livermore), 41 FR 29477.	DOE	07/16/76	02/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
N-101	Final Environmental Impact Statement: Lawrence Livermore National Laboratory and Sandia National Laboratories - Livermore Sites, Livermore California, DOE/EA-0028.	DOE	07/82	02/90
N-102	Record of Decision (for FEIS, DOE Livermore Sites, DOE/EA-0028), 47 FR 44836.	DOE	10/12/82	02/90
N-103	Environmental Assessment Report - High Explosives Applications Facility, Lawrence Livermore National Laboratory (DOE/EA-0172)	DOE	10/82	03/07/90
N-104	Finding of No Significant Impact for HEAF EA?	DOE	10/82	03/07/90
N-105	Environmental Assessment of a Proposal to Acquire Land for a Buffer Zone Around Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore, DOE/EA-0236	DOE	07/84	02/90
N-106	Finding of No Significant Impact (FONSI) for the Buffer Zone Acquisition	DOE	07/84	03/07/90
N-107	Notice of Intent for preparation of EIS on the Decontamination and Waste Treatment Facility at the Lawrence Livermore National Laboratory, CA, 52 FR 8503	DOE	03/18/87	02/90
N-108	Environmental Assessment: Nuclear Test Technology Complex at Lawrence Livermore National Laboratory, DOE/EA-0357	DOE	05/88	02/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
N-109	Finding of No Significant Impact for the Nuclear Test Technology Complex at Lawrence Livermore National Laboratory Environmental Assessment, DOE/EA-0357	DOE	06/28/88	02/90
N-110	Draft Environmental Impact Statement: Decontamination and Waste Treatment Facility for the Lawrence Livermore National Laboratory, Livermore, California, DOE/EIS-0133-D	DOE	06/88	02/90
N-111	Notice of Availability of Draft Environmental Impact Statement: Decontamination and Waste Treatment Facility (DWTF) for the Lawrence Livermore National Laboratory, Livermore, CA, and Public Hearing on the DEIS, 53 FR 27382	DOE	07/20/88	02/90
N-112	Availability of EPA comments for the Draft Environmental Impact Statement: Lawrence Livermore, Nonactive, Mixed and Radioactive Waste Decontamination and Waste Treatment Facility Construction and Operation, implementation Alameda County, CA, 53 FR 44657	DOE	11/04/88	02/90
N-113	Environmental Assessment: High Explosives Applications at Lawrence Livermore National Laboratory, DOE/EA-0384	DOE	03/89	02/90
N-114	Environmental Assessment: Nuclear Directed Energy Research Facility at Lawrence Livermore National Laboratory, DOE/EA-0364	DOE	06/89	02/90
N-115	Finding of No Significant Impact for the Nuclear Directed Energy Research Facility at Lawrence	DOE	08/18/89	02/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
	Livermore National Laboratory, DOE/EA-0364			
N-116	Finding of No Significant Impact for the High Explosives Applications at Lawrence Livermore National Laboratory Environmental Assessment, DOE/EA-0384	DOE	10/06/89	02/90
N-117	Notice of Intent (to prepare an EIS for Proposed Laser Isotope Separation Experiments with Plutonium in the Engineering Demonstration System at Lawrence Livermore National Laboratory, 55 FR 774	DOE	01/09/90	02/90
N-118	Postponement of Public Scoping Hearings for an EIS for Proposed Laser Isotope Separation Experiments with Plutonium in the Engineering Demonstration System at Lawrence Livermore National Laboratory, 55 FR 3023	DOE	01/29/90	02/90
N-119	Vegetation of Site 300 Lawrence Livermore National Laboratory, San Joaquin County, California. D.W. Taylor and W. Davilla - BioSystems Analysis, Inc., Santa Cruz, California, UCRL-15873	LLNL	11/86	02/90
N-120	Draft Environmental Impact Report for the University of California Contract with the Department of Energy for Operation and Management of Lawrence Livermore National Laboratory, University of California, SCH-85112611	LLNL	12/22/86	02/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
N-121	Final Environmental Impact Report for the University of California Contract with the Department of Energy for Operation and Management of Lawrence Livermore National Laboratory, University of California, SCH-85112611	LLNL	07/28/87	02/90
N-122	Lawrence Livermore Direct Service 230-Kv Transmission Line Project Environmental Assessment, DOE/EA-0283	DOE	04/87	02/90
N-123	Approval of the Environmental Assessment and Finding of No Significant Impact for the Lawrence Livermore Direct Service Transmission Line Project, DOE/EA-0283	DOE	11/30/87	02/90
N-124	Report to the Chairman, Subcommittee on water and Power Resources, Committee on Interior and Insular Affairs, House of Representatives: Federal Electric Power - Western Area Power Administration's Tracy/Livermore Transmisssion Project, GAO/RCED-88-19	GAO	10/27/87	02/90
N-125	NEPA/CEQA Summary	C. Kielusiak/ LLNL	02/28/90	02/28/90
N-126	NEPA Related Documents to DOE	C. Kielusiak/ LLNL	02/28/90	02/28/90
N-127	LLNL Environmental Documents 73-90	C. Kielusiak/ LLNL	03/01/90	03/01/90
N-128	1989 Yearbook Documents	C. Kielusiak/ LLNL	03/02/90	03/02/90
N-129	Facility Hazards Classification List	LLNL	07/26/89	03/02/90

Document Number	Title/Description	Author/ Organization/ Recipient	Doc.Date	Doc. Rec.
N-130	LLNL NEPA and Safety Documentation	LLNL	07/13/89	03/02/90
N-131	Program Compliance Log From 1/1/88 to 2/28/90	LLNL	02/28/90	02/28/90
N-132	LLNL General Plant Projects with no SAN NEPA Review	J.K. Gilliam/ DOE, LLNL Tiger Team	03/12/90	03/12/90
N-133	LLNL Construction Project Inventory	E. Stabb/LLNL Director's Office	03/02/90	03/02/90
N-134	LLNL Environmental Documents and SAN NEPA Documents for LLNL 03/12/90	J.K. Gilliam/ DOE, LLNL Tiger Team	03/12/90	03/12/90
N-135	LLNL Facilities with Neither LLNL Environmental Documentation and/or SAN NEPA documentation	J.K. Gilliam/ DOE, LLNL Tiger Team	03/12/90	03/12/90
N-136	Memo: Memoranda-to-File	D.W. Pearman, SAN	09/15/89	02/90

APPENDIX F

OSHA ASSESSMENT REPORT OF

LAWRENCE LIVERMORE NATIONAL LABORATORY

OCCUSAFE INC.
OFFICE CAMPUS SEVEN, 4685 PEORIA, DENVER, COLORADO 80239 • 1•(303) 373-5500

OSHA ASSESSMENT REPORT OF LAWRENCE LIVERMORE NATIONAL LABORATORY LIVERMORE, CALIFORNIA 94550

For U.S. Department of Energy
Washington, DC 20545

March 28, 1990
Job No. 21067/0032R

Prepared by:
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Vice President, Western Region

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Donald R. McFee, Sc.D., P.E., CSP, CIH
Executive Vice President

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March 28, 1990

Mr. Fredric D. Anderson
Team Leader
Office of Safety Appraisal, EH-331
U.S. Department of Energy
Washington, DC 20545

Mr. Lewis G. Hulman
Director of Quality Programs, EH-32
U.S. Department of Energy
Washington, DC 20545

RE: OSHA Assessment Report of Lawrence Livermore National Laboratory

Dear Messrs. Anderson and Hulman:

Your report summarizing OCCUSAFE's OSHA assessment of the Lawrence Livermore National Laboratory is attached. The report contains 250 individual inconsistencies observed at 25 buildings and 6 construction sites at the laboratory.

Significant concerns with electrical safety, Hazard Communication, and construction safety are addressed in the report. The follow-up, correction, and implementation of systems to prevent reoccurrence will assist DOE in continuing efforts for occupational safety and health improvements.

We appreciate the opportunity to have been of service to you in this most important assignment. I will follow-up with you. However, in the meantime, if you have any questions or comments regarding this report, please contact me at (303) 373-5500.

Thank you.

Sincerely,

Dennis J. Murphy, CIH
Western Region Vice President

DJM/vg

Enclosure: Report

21067/0032R

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EXECUTIVE SUMMARY

An OSHA-type inspection of selected buildings at Lawrence Livermore National Laboratory (LLNL), Livermore, California, was conducted by OCCUSAFE, INC. as part of a site-wide DOE Tiger Team evaluation. OCCUSAFE's inspection was performed March 5-16, 1990.

LLNL reportedly has approximately 10,000 permanent and contract employees site-wide. While there are about 500 buildings at the main site and Site 300, many are office trailers. Facilities were selected for inspection based on a review of available safety records, a site-wide hazard classification document, number of employees, presumed level of activity, and professional judgment. There were 25 buildings and 6 construction sites evaluated.

The assessment was performed in a way the Occupational Safety and Health Administration (OSHA) would conduct a compliance inspection. Facility physical conditions and employee work practices were observed for compliance with OSHA standards. Additionally, employees were interviewed concerning their knowledge of appropriate safety and health procedures. OSHA's Occupational Safety and Health Standards (29 CFR 1910) and Safety and Health Regulations for Construction (29 CFR 1926) were used as inspection criteria. A total of 208 inconsistencies with OSHA General Industry standards were observed. An additional 39 inconsistencies with the Construction Standards were found at the six construction sites inspected. It is not known if similar inconsistencies would be found in those facilities not inspected. Buildings not inspected during this Tiger Team assessment should receive a similar evaluation to identify, characterize, and correct inconsistencies.

The number and type of deficiencies identified are significant. The majority would be classified by OSHA as "other-than-serious." This type of deficiency is considered to be one that the safety and health of the employee would be affected, but not cause death or serious physical harm. Each deficiency is identified along with its location, hazard, and appropriate OSHA standard in the Supplement.

CONCLUSIONS

1. The potential hazard presented by non-functional ground fault circuit interrupters warrants follow-up action to completely characterize and correct the situation.

2. Hazard Communication Program implementation and effectiveness is highly dependent upon individual first line supervision.

3. Construction safety inspector training was not sufficient to insure adequate performance of OSHA-type inspections at construction sites.

4. An effective site-wide program to identify and eliminate cut/frayed flexible power cords could significantly decrease occurrence and help further reduce electric shock potential.

CONCERNS

The following concerns are based on an OSHA-type inspection conducted at LLNL by OCCUSAFE on March 5-16, 1990.

1. A significant number of ground fault circuit interrupters were found to be non-functional by the OSHA compliance team and an LLNL electrical engineer. Due to the serious electrical hazard associated with this, appropriate steps should be taken to identify and correct faulty ground fault circuit interrupters.

2. The number of cut/frayed electrical cords indicates that a site-wide system to routinely identify and correct defective flexible cords is needed.

3. Temporary electrical wiring should not be used for more than 90 days.

4. Outdoor storage of wooden ladders accelerates ladder deterioration.

5. There was no evidence that ladder users and owners performed frequent inspections to identify and correct ladder defects.

6. Hazard Communication Program effectiveness appeared to be highly dependent on first-line supervisor enthusiasm and motivation for this particular program. This concern is based on the observation that the majority of employees interviewed did not have knowledge of health hazards associated with the chemicals they worked with.

Additionally, problems associated with Material Safety Data Sheet (MSDS) accessibility and availability were frequently observed.

7. Although required monthly inspection documentation was complete, several crane users reported, after detailed questioning, that they did not thoroughly perform the required monthly inspection. The most common response was that another group performed a more thorough test every six months.

8. Construction safety inspector training did not provide sufficient information for those individuals to perform a thorough OSHA-type inspection at construction sites.

9. There was no evidence that construction safety program effectiveness was evaluated to identify and correct deficiencies.

10. Based on the number of misused "Caution" and "Danger" tags observed, there appeared to be confusion over proper OSHA lockout/tagout standard requirements.

PURPOSE AND SCOPE

PURPOSE

The purpose of this project was to augment a DOE Tiger Team assessment at LLNL by concentrating on compliance with OSHA Health and Safety Regulations found in both 29 CFR 1910 and 29 CFR 1926.

SCOPE

1. Inspection criteria consisted of those OSHA regulations found in 29 CFR 1910 and 29 CFR 1926.

2. The assessment was limited to the number of buildings in which a thorough, wall-to-wall inspection could be conducted from March 3-16, 1990.

3. Submission of a formal report to DOE for inclusion in the Tiger Team Assessment Report.

One Q Cleared, Certified industrial hygiene/safety consultant was provided from March 5 through 16, 1990. Additionally, a non-cleared Certified Safety Professional, with occupational health experience, conducted inspections from March 12-16, 1990.

FINDINGS AND DISCUSSION

INTRODUCTION

An OSHA-style inspection was conducted in selected buildings at Lawrence Livermore National Laboratory (LLNL) by OCCUSAFE, INC. This OSHA assessment was part of a DOE Tiger Team site assessment at LLNL.

The University of California operates LLNL for the US Department of Energy as a Government-Owned Contractor Operated (GOCO) facility. The main site, located in Livermore, California, was one square mile in size. Site 300 was located in the foothills, about 15 miles southeast of Livermore. Approximately 10,000 permanent and contract employees work at the laboratory in about 500 facilities. This figure includes many office trailers.

Inspection criteria were OSHA regulations for general industry and construction. Construction sites were selected at random for inspection. Buildings were selected for inspection based on the following:

- Review of LLNL safety summary
- Review of LLNL "Hazard Classification Listing of Facilities," dated July 25, 1989.
- Number of employees
- Presumed level of activity
- Professional judgment

Facilities inspected included maintenance/craft shops, R & D buildings, laboratories, and general office areas. A list of facilities and construction sites inspected by OCCUSAFE personnel is located in Table I.

TABLE I
FACILITIES INSPECTED FOR
OSHA COMPLIANCE

Building Number	Building Number	Construction Sites
611	331	391
3203	S300 872	323
322	S300 873	490
223	S300 874	153
227	S300 875	154
233	S300 879	482
261		
151	329	
243	321C	
298	511	
411	512	
418	515	
519	520	

As the assessment progressed, several items became apparent. The general activity level, as compared to a production environment, was relatively low. The majority of inconsistencies identified concerned safety items. These two factors combined to focus the assessment on actual physical safety conditions within facilities and employee work practice observations. Opportunities for industrial hygiene measurements were severely limited.

PART 1910 - OCCUPATIONAL SAFETY AND HEALTH STANDARDS ASSESSMENT

The following items are discussed in the order of being most frequently identified. Each deficiency discussed is identified along with its location, hazard, and appropriate OSHA standard in Supplement 2.

The OSHA 29 CFR 1910 regulations for general industry were used as evaluation criteria.

Electrical

Electrical hazards were the most frequently identified non-compliance issue. About 43% of all findings related to electrical hazards.

During the assessment, electrical extension cords, powered hand tool cords, and other flexible power cords were physically and visually inspected. A significant number of flexible power cords were found defective. Non-compliance conditions included cuts through the power cord outside insulation through to the conductors, and damaged insulation at the cord junction at the male or female connector. A number of cords were found to be improperly spliced together. These conditions could all result in serious electrical hazards.

The most serious items identified were non-functional Ground Fault Circuit Interrupters (GFCI's). GFCI's are designed to interrupt current flow whenever a load of 5 milliamps or more is applied. GFCI's are manufactured with an internal trip/reset button, with the intent that devices be tested/exercised periodically.

OCCUSAFE personnel utilized electrical circuit testing devices designed to trip a GFCI, as well as identify other conditions, such as reverse polarity, open ground, open neutral, etc. A significant number of GFCI's did not function as designed when tested. However, they did work when the internal test button was tripped. All devices found to be non-functional were either old or located in a potentially corrosive environment.

These non-functional GFCI's do represent a significant safety hazard, since people assume that they work, and they are designed to be used in a wet/damp environment. A non-functional GFCI places employees in wet/damp locations at serious risk.

Shortly after the first non-functional GFCI's were identified, OCCUSAFE personnel were contacted by an LLNL electrical engineer. Upon further discussion, it was determined that he had identified a completely different problem, that in which the GFCI's were wired improperly during manufacture. These devices were reportedly installed in relatively new workbench mounted power strips. The two problems associated with GFCI electrical safety devices suggests that a site-wide program be implemented to identify and correct all non-functional GFCI's.

Temporary electrical wiring was observed at many locations throughout the site. By OSHA standards, temporary electrical power and lighting installations may be used during and for remodeling, maintenance, repair, or demolition of buildings, structures, or equipment and similar activities; for experimental or development work, and for a period not to exceed 90 days . . . Many instances of temporary wiring being utilized for purposes other than

those stated above were observed. Additionally, in a number of instances, the temporary wiring was not protected as it passed through walls and other fixed barriers.

Walking/Working Surfaces

The most common non-compliance issue noted under this OSHA subpart concerned portable wooden ladder use. Wooden ladders appeared to be the most prevalent type of portable ladder at LLNL. However, an occasional metal or fiberglass/metal ladder was also observed.

A number of wooden ladders were stored outside with obvious deterioration from the elements. Frequently ladders stored outside had sharp edges and splinters, were shakey, and had loose steps. Additionally, a separation along the grain was noted.

In general, the most common deficiency noted on ladders was missing or damaged non-skid safety feet. The standard requires that safety feet and other auxiliary equipment be kept in good condition to ensure proper performance.

In Building 298, Fusion Target Development, an instrument mounted at ground level, went up through the mezzanine floor. While the mezzanine was protected by a wooden rail, conforming to standard rail requirements, a 16 inch high platform had been built up around the device.

This user-built platform effectively negated the standard rail. In fact, chicken wire was loosely placed from the ceiling down to the rail, reportedly to catch someone if they did fall. It is doubtful that this wire would support the load of an individual falling against it.

These facts indicate that while the user did have a thought of safety, the appropriate procedures were not followed and the right people were not contacted prior to platform construction.

Hazard Communication

About 10% of the inconsistencies found during this assessment concerned various elements of OSHA's Hazard Communication Standard. While the laboratory appeared to have a strong written program, there seemed to be many inconsistencies at the user end. Based on information collected during this evaluation, it can be concluded that the Hazard Communication Program is highly dependent upon the motivation and enthusiasm of the first line supervisor.

Material Safety Data Sheets (MSDS's) were found in various forms. Some programs maintained a computerized MSDS database. Others purchased commercially available MSDS books and augmented these by adding manufacturer supplied specific MSDS's. During this assessment, flammable storage cabinets or chemical cabinets were opened and the types of materials assessed. A chemical would then be chosen at random and the supervisor asked to produce the MSDS for that particular chemical.

On numerous occasions, data sheets could not be found for items in question. In other cases, the supervisor called the manufacturer and had an MSDS FAX'ed to him. It is unknown whether the supervisor would go to such trouble to obtain an MSDS if the average employee requested it, rather than a Tiger Team member.

OSHA's Hazard Communication Standard 1910.1200(g)(9) states, "the employer shall ensure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in their work area(s)."

Throughout inspected buildings, unlabeled chemical containers were identified. The standard does require that each container of hazardous material be labeled, tagged, or marked with the identity of the hazardous chemical contained and appropriate hazard warnings. Usually, the deficiency had to do with the container either being completely unlabeled or the hazard warning omitted.

Container labeling appeared to be program dependent. Some buildings used small quantity squeeze bottles manufactured with the chemical name and National Fire Protection Association (NFPA) hazard rating on them. This type of system eliminates one of the more common complaints of labeling solvent squeeze bottles - that the labels fall off.

By far, the most common method of labeling small quantity chemical containers was a commercially available pre-printed label containing chemical name and appropriate hazard information. In numerous instances, these labels were available, they just hadn't been placed on the container. This was further evidence of Hazard Communication Program dependency on first-line supervision enforcement.

As has been previously mentioned, this survey was performed in the way OSHA would actually do it, including interviewing employees. Employees were asked about their awareness of hazardous chemicals they worked with. In every instance, except one, employees could not provide information in their own words about the chemicals they worked with. In fact, one employee stated that "things that we use, we assume are safe."

OSHA has very specific requirements concerning employee information and training. The Standard requires that employees be informed of Standard requirements, any operations in their work area where hazardous chemicals are present, the location and availability of the written program, and MSDS's. Additionally, employee training is required to include methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area, physical and health hazards of chemicals in the work area, and measures employees can take to protect themselves from these hazards.

Based on discussions with LLNL employees, supervisors, and Hazard Control personnel, it appeared that the laboratory was providing general employee training on how to read a Material Safety Data Sheet and general chemical hazard information. It was reported that supervisors were responsible to provide training on the specific chemicals used. However, individual employees were not aware of the physical properties of, hazards of, and safe practices associated with the specific chemicals used. In effect, the employees were not being trained according to the specific requirements of the Hazard Communication Standard.

Compressed Gas Storage

Due to the very nature of the work at LLNL, a large number of compressed gas cylinders were observed. Types of gases used ranged from welding gases to inert gases to toxic, flammable, and radioactive gases. Inside buildings, cylinders were commonly secured by chains or synthetic web belting. While the actual materials used to secure the cylinders were adequate, most non-compliance issues concerned loose belts or chains. When loosely secured, compressed gas cylinders could sustain catastrophic failure if knocked against adjacent equipment and thereby breaking a valve or regulator.

Compressed gas cylinder storage sheds outside of occupied buildings were common. In these sheds, a new device developed by an LLNL employee was frequently used to secure cylinders. Reportedly a new securing system was designed in the early 1980's because of concerns with earthquakes.

The main part of the system was about 1-1/2 inch diameter pipe. The pipe rose vertically from a ground level support for about 3 feet and then went into a smooth 90 degree bend to the horizontal, where it was attached to the back wall. A series of these rails were installed so that the width between each pipe was about 2 feet. Over one of the rails, a rectangular metal bar was attached by a sleeve and set screw. The bar extended across to the other pipe, where it rested. The bar could be raised for cylinders moving in and out, and slid along the axis of the bar to adjust for the number of cylinders within the storage area.

This securing device appeared to be much more positive than chains or synthetic web belting. It can be viewed as a noteworthy practice. However, there were still a number of instances where, even with this bar, employees failed to adjust it to properly secure cylinders.

Cranes/Hoists

OSHA standards require various inspections on a frequent and periodic basis. Some parts of the crane are to be inspected daily, others inspected and documented monthly, while still others on an annual basis. As part of this inspection, documentation of monthly inspection was usually asked for from the supervisor where a crane was present.

While OSHA requires that the crane hook be inspected for twist and the throat opening be measured on a monthly basis, along with documentation, LLNL went further. The laboratory developed a form requiring hook information plus a very detailed documentation of other crane functions.

The vast majority of the laboratory cranes did have proper monthly documentation. However, in one particular instance, the form was not filled out properly. When the supervisor was questioned about this, he stated that his employee simply filled out the form wrong. When pressed as to exactly how the throat opening was measured, he finally stated that the hook throat opening was, in fact, not measured as required on a monthly basis by his workers, yet documentation was filled in. The supervisor also stated the reason they didn't do it was because the rigging crew performed a more detailed inspection every six months.

Lockout/Tagout

Relatively few inconsistencies with OSHA's new Lockout/Tagout Rule (1910.147) were found. However, a number of practices were observed which raise questions concerning practices and employee training.

The rule requires that lockout and tagout devices be standardized within the facility by at least one of the following criteria: color, shapem, or size, and additionally, in the case of tagout devices, print format shall be standardized. A wide variety of different type tags were in use throughout the laboratory.

A common finding of concern was that various warning tags were misused. "Caution," "Danger," and "Do Not Operate" tags were attached to equipment inappropriately. For example, a "Danger" tag was utilized on an electric circuit when a "Do Not Operate" would have been more appropriate. In the same manner, "Caution" and "Danger" tags were often used in place of each other. This seems to indicate that lockout/tagout users have not been given the training required under the new rule.

The lockout rule also requires that all other employees whose work operations are or may be in an area where energy control procedures may be utilized, shall be instructed about the procedure and about the prohibition relating to attempts to restart or re-energize machines or equipment which are locked out or tagged out. There was no evidence that this type of training had been provided.

Tags that were utilized were either tied to the equipment using string or taped to the equipment. The OSHA regulation requires that tagout devices be attached by a non-reusable, hand locking mechanism with a strength of no less than 50

pounds, and equivalent to a one-piece nylon cable tie. The tags provided with strings do not meet the standard criteria.

Industrial Hygiene

During the assessment, operations were also examined from an industrial hygiene standpoint. However, the opportunity to collect industrial hygiene samples and conduct measurements were very limited due to the overall low activity level in the buildings surveyed, the small quantities of materials utilized, and general controls present.

In Building 239, a plasma torch cutting operation was evaluated from a noise and welding fume standpoint. This numerically controlled torch was used to cut a variety of different metals such as stainless steel, carbon steel and aluminum. The torch had the capability to cut up to 4 inch steel plates.

The metal plate to be cut was placed onto a large grid-shaped water table. Water was provided underneath the plate. Additionally, a water muffler was installed on the torch so that a water column surrounded the gas plasma. The water table and water muffler appeared to have a dramatic effect on both noise levels and metal fume generation. Visually, very little plume was observed. Much of the visible emission that was seen was steam. The operator generally positioned himself so that any visible plume moved away from him. Additional controls were provided by a large canopy hood and the fact that the building was partially open on one side.

A breathing zone personal air sample was obtained during morning cutting operations. The operator reported that

afternoon conditions would be similar. A second sample was obtained simultaneously by personnel from LLNL. The first sample, however, was later voided due to a laboratory mistake. The indicated concentration will need to be obtained from the sample collected and analyzed by LLNL.

The absence of significant discoloration on the sample filter media, the observation of work practices which avoid fume emission, the presence of the water muffler, and the presence of ventilation controls made it most probable cutting fumes were well below the new OSHA PEL of 5 mg/m^3. Typically, this type of cutting with the controls mentioned does not produce high fume levels.

Noise dosimetry measurements were taken in the operator's hearing zone during the morning activities. Again, assuming that afternoon activities were similar, the 8-hour time-weighted average noise level was estimated to be 88 dBA. OSHA requires that any employee with an 8-hour TWA equal to or greater than 85 dBA be included in a hearing conservation program. Hazard Control representatives stated that this individual was, in fact, in the hearing conservation program and that this operation had been evaluated. More specific details concerning this measurement are found on the noise dosimeter data sheet, located in the Supplement.

Based on discussions with a number of representatives from Special Projects, it was determined that radio frequency (RF) measurements would be obtained for one particular electronic device. Hazard Control supplied a Holiday Instruments Model 3002 Broad Band Isotropic Field Strength meter with probes. The meter had a sticker indicating that it was in calibration specifications.

The R & D scientists working on the project, set up the electronic device so that it would simulate assumed worst case conditions. Near field measurements were obtained in the electrical (E) and magnetic (H) fields. Measurements were barely detectable on the most sensitive instrument scale, with the probe less than 6 inches from the electronics device. These measurements indicate that radio frequency radiation output from the device was well below OSHA limits and American National Standards Institute (ANSI) guidelines.

PART 1926 - SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION

On March 14, 1990, six construction areas were chosen at random for evaluation. These sites were evaluated by an OCCUSAFE consultant with considerable experience in the construction safety industry. The OSHA 29 CFR 1926 regulations for the construction industry were used as the evaluation criteria. Electrical deficiencies were the most common noted, followed by improper flammable storage, fire protection, and hazard communication issues.

Again, frayed and cut power cords were the most predominant item observed. However, the construction standard does require that all flexible cords be inspected quarterly at a minimum, or before use. Construction contractors did not seem to be aware of this requirement.

Fire hazards at construction sites were also common. These findings consisted of improper storage of flammable materials, and lack of adequate fire protection. Fire extinguishers were either not present in sufficient numbers, or they were not readily available. At one site, there was only one fire extinguisher for the entire construction site. At another, a fire extinguisher was placed over 300 yards

from the point of potential use. Non-compliance with flammable storage requirements, coupled with inadequate fire protection, could result in an extremely dangerous situation.

The Hazard Communication requirements under OSHA's construction standards require that contractors have a written program, provide MSDS's, and employee training. Of the six sites surveyed, three did not know a Hazard Communication Program was required. The remaining three had a "boilerplate" document which may have been given to them as part of their contract with the lab.

With the exception of one, all construction sites lacked evidence of MSDS's and employee training records. More disturbing was the fact that the LLNL construction safety officer and two of three inspectors present were not aware that the OSHA Hazard Communication Standard applied to the construction industry.

Additionally, when a number of construction standard inconsistencies were pointed out to the LLNL inspectors, they stated they were not aware that those conditions were problems. Construction inspectors reportedly are given 10 hours of training. They then inspect several construction sites daily. It does not appear that their 10 hours of training was sufficient to provide them the skills necessary to adequately enforce construction standards.

There was no evidence of any written follow-up by LLNL inspectors to ensure that program requirements or obligations were met once a contractor was on-site. These observations suggest that a thorough, detailed audit construction safety program is needed to strengthen the program.

METHODOLOGY

Once selection of the buildings to be inspected had been performed, OCCUSAFE personnel conducted a briefing about the inspection with each building's management. Next, a thorough safety and industrial hygiene walk-through survey was performed in each facility. Where inconsistencies with OSHA standards were noted, each inconsistency was recorded, location identified, potential hazard noted and corresponding OSHA standard identified. During all inspections, OCCUSAFE personnel were accompanied by LLNL Hazard Control representatives and building supervision.

All inconsistencies were categorized according to OSHA's rating system as follows:

- Imminent Danger
- Serious Hazard
- Other-Than-Serious
- De Minimis

OSHA classifies the degree of hazard as follows:

Imminent Danger - Death or serious harm could occur immediately or certainly within a short time; also includes health hazards, exposure to which could cause irreversible harm to such degree as to shorten life or reduce physical or mental efficiency (immediate manifestation of harm is not necessary).

Serious Hazard - Death or serious physical harm is reasonably predictable in the existence of one or more of the practices, means, methods, operations, or practices which have been adopted or are in use.

Other-Than-Serious - The safety and health of the employee would be affected but not cause death or serious physical harm.

De Minimis - No direct or immediate relationship to the safety and health of the employee but in violation of the OSHA act.

APPLICATION AND LIMITATIONS

An effort has been made to provide as complete and comprehensive an evaluation as professionally practical. However, inherent constraints of time, observation, and scope of work must be recognized. Observations, findings, results, and conclusions are limited accordingly and to those apparent at the time. They are not to be construed to be all inclusive nor covering every possible aspect. It should not be construed that actions taken as a result of this work will achieve complete compliance with every regulatory standard nor prevent every possible accident or loss. Neither should it be considered that any recommendations noted are the only possible actions to be taken. Management should assess and analyze each thought in relation to its more intimate knowledge of its resources, objectives, and activities. Decisions should then be made and acted on accordingly.

SUPPLEMENT 1

Radio Frequency (RF) Measurement Data Sheet

Air Sampling Field Data Sheet

Noise Dosimeter Data Sheet

RADIO FREQUENCY (RF) MEASUREMENT DATA SHEET

Machine I.D. N/A
Manufacturer R&D UNIT
Model # N/A
Power Output ≅ 100 WATTS
Frequency ≅ 300 MHZ
Duty Cycle % 0.042
ON 5 seconds
Cycle total 120 seconds

Date 3/13/90
Job # 21067
R&D 261
Survey Instrument HOLIDAY 300E
Probe # E = 923 H = 179
Calibration 5/13/89

Production Application/Location: N/A
Operators Position: STANDING AT BENCH ABOUT
#1 1' FROM INSTRUMENT.
#2 N/A

RF Level Measurement:

	Operator #1 E field V/M X10³		H field A/M X 0.01		Operator #2 E field V/M		H field A/M	
Eye								
Neck								
Chest								
Legs								
Groin								
Stomach								
Other *	0.5		.3-.5					
Other								

Comments/Calculations: * MEASUREMENTS TAKEN ABOUT 6"-8" FROM INSTRUMENT
E field = 0.5 X10³ V²/m³ 'H'E = 0.005 A²/m²
Limit At 300 MHz "E" = 11.3X10³ V²/m³
"H" = 0.079 A²/m²
Both "E" + "H" well within limits

Collected by DJM Date 3/13 Calculated by DJM Date 3/21 Checked By DJL Date 3/21/90

C-45

AIR SAMPLING FIELD DATA SHEET

Data Sheet No._____

OSI- 77151

LLNL | | PWRK | Date 3/14/90 | Mgmt Syst Data Keys

Source Code | Sample Number | Type | Job No. 310677

Media Lot No. N/A | Flowmeter Serial No. 1196 | Materials: STAINLESS STEEL

Employee ID: ✓

FIELD NOTES

Location of Sampler: OPERATOR BREATHING | Location: B-329

Process Details: PLASMA CUTTING | Process: PLASMA

Operation Details: | Operations: CUTTING

Conditions/Notes: B-329 PLASMA TORCH CUTTING 1"-2" STAINLESS, WATER MUFFLER CUTS FUME RELEASE | Trade/Job:

Other:

Engineering Controls: CANOPY HOOD - WATER MUFFLER

Sampling Equip. No. 20257 Pre-Survey Calibration ✓ Post Survey Calibration ✓

Analyze for (Materials): METAL FUME

Interferences: NONE OBSERVED

FOR INTEGRATED SAMPLES:

Time	Duration (min.)	Meter Reading (G) Stroke	Flow Rate (lpm) ccpm	Aver. Flow (lpm) ccpm	Volume (L) cc
Start 09:21	39	85	3.10	3.07	119.7
off ~~Check~~ 10:00		83	3.04		
on ~~Check~~ 10:30	90	83	3.04	3.04	273.6
Stop 12:02		83	3.04		
					393.3

Total Time 129

Low Flow Vol. Calc. [____Str.] x [____cc/Str.] x [____ Str. Vol. Multi.] x 10^{-3} = Total Vol. (L)____

RESULTS: Material	Quantity	Sample Vol(L)	Conc(ppm) (mg/m3)	Std, TLV, OSHA, OTHER
Metal Fume		393.3	21 mg/m^3	

Lab. Serial No._____

Collected By: DM Date: 3/14/90 Calculated By: DM Date: 3/14/90 Checked By: DML Date: 3/21/90

2046B/OS

NOISE DOSIMETER DATA SHEET

Operation/location in plant B-329

Location on Person (L) SHOULDER

Monitor Serial No. 505953

Date 3/14/90 Job No. 21067

% Dose Per Day

Sampling Time

Conditions/Notes: B-329, PLASMA CUTTING, WATER TABLE & MUFFLER USED OPERATOR ABOUT 8'-10' FROM TORCH

Check List

Before Sampling

1. Check Batteries ✓
2. Check Calibration ✓ 120
3. Reset ✓
4. Monitor On ✓

End of Sampling

Check Batteries ✓
Take Reading ✓
Check Calibration ✓
Monitor on "Hold" ✓

DATA

	Time	% Reading
Initial	09:22	0.000
Intermediate (not required)		
Final	12:03	26.7
Totals	161 min.	
115 dBA exceeded (yes or no) ✓		
Equivalent 8-hr time-weighted average sound level (dBA)		88

Calculations:

$$16.61 \log\left[\left(\frac{26.7}{100}\right)\left(\frac{480}{161}\right)\right] + 90 = 88\ dB$$

Collected By: DM Date: 3/14 Calculated By: DM Date: 3/14 Checked By: DMC Date: 3/21/90

SUPPLEMENT 2

OSHA Non-Compliance Items at Lawrence Livermore National Laboratory

BUILDING 111

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.152(a)

a. General Requirements

1. Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved metal safety cans shall be used for the handling and use of flammable liquids in quantities greater than one gallon, except that this shall not apply to those flammable liquid materials which are highly viscid (extremely hard to pour), which may be used and handled in original shipping containers. For quantities of one gallon or less, only the original container or approved metal safety cans shall be used for storage, use, and handling of flammable liquids.
2. Flammable or combustible liquids shall not be stored in areas used for exits, stairways or normally used for safe passage of people.

Location: Building 111, Plaza Location, Seismic Upgrade

Hazard: Five-gallon fuel not stored in approved container.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.300(b)

b. Guarding

1. When power operated tools are designed to accommodate guards, they shall be equipped with such guards when in use.
2. Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating or moving parts of equipment shall be guarded if such parts are exposed to contact by employees or otherwise create a hazard. Guarding shall meet the requirements as set forth in American National Standards Institute B15.1-1953 (R1958), Safety Code for Mechanical Power-Transmission Apparatus.

Location: Building 111, Plaza Location, Seismic Upgrade

Hazard: Bosch Grinder #B451064 - No guard on grinding wheel.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.59(e)(1)(i-ii)(f)(1)(i-iii)(g)(1)(h)

(e) Written hazard communication program.
  (1) Employers shall develop, implement, and maintain at the workplace, a written hazard communication program for their workplaces which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, material safety data sheets, and employee information and training will be met, and which also includes the following:
    (i) A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate material safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,
    (ii) The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.
(f) Labels and other forms of warning.
  (1) The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked with the following information:
    (i) Identity of the hazardous chemical(s);
    (ii) Appropriate hazard warnings; and
    (iii) Name and address of the chemical manufacturer, importer, or other responsible party.
(g) Material safety data sheets.
  (1) Chemical manufacturers and importers shall obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Employers shall have a material safety data sheet for each hazardous chemical which they use.
(h) Employee information and training. Employers shall provide employees with information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new hazard is introduced into their work area.

Location: Building 111, Plaza Location, Siesmic Upgrade

Hazard: No written hazard communication program available on site.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.150(a)(4)

(a) General requirements.
(4) All firefighting equipment shall be periodically inspected and maintained in operating condition. Defective equipment shall be immediately replaced.

Location: Building 111, Plaza Location, Siesmic Upgrade

Hazard: Fire extinguisher is outdated (last checked in 1985).

BUILDING 131

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.101(b)

(b) Compressed gases. The in-plant handling, storage, and utilization of all compressed gases in cylinders, portable tanks, rail tank cars, or motor vehicle cargo tanks shall be in accordance with Compressed Gas Association Pamphlet P-1-1965.

Location: Building 131, Compressed gas storage sheds.

Hazard: Several small compressed gas cylinders tied together yet could still be knocked over, improper compressed gas storage.

BUILDING 151

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees.

Location: Building 151, Room B140D West wall receptacle 741A1A-5-6

Hazard: GFI was not functioning.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.304(f)(5)(v)

(v) Equipment connected by cord and plug. Under any of the conditions described in paragraphs (f)(5)(v)(A) through (f)(5)(v)(C) of this section, exposed non-current-carrying metal parts of cord- and plug-connected equipment which may become energized shall be grounded.

Location: Building 151, Room 1312

Hazard: Extension cord with four receptacle junction box did not have any ground.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.101(b)

(b) Compressed gases. The in-plant handling, storage, and utilization of all compressed gases in cylinders, portable tanks, rail tank cars, or motor vehicle cargo tanks shall be in accordance with Compressed Gas Association Pamphlet P-1-1965.

Location: Building 151, West Dock, compressed gas storage racks

Hazard: Full hydrogen cylinder was not adequately secured.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.23(c)(1)

(1) Every open-sided floor or platform 4 feet or more above adjacent floor or ground level shall be guarded by a standard railing (or the equivalent as specified in paragraph (e) (3) of this section) on all open sides except where there is entrance to a ramp, stairway, or fixed ladder. The railing shall be provided with a toeboard wherever, beneath the open sides.

Location: Building 151, Rear Dock

Hazard: Loading dock height 48.5 inches above grade. Dock was not properly guarded.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 151, Room 1033 Electrical outlet 741A1C8/1.

Hazard: GFI was not in proper working condition, it would not interrupt the circuit when tested.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 151, Room 1131B, Sample inlet processing system.

Hazard: Wiring from bake-out temperature control was not protected.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.304(f)(4)
(4) Grounding path. The path to ground from circuits, equipment, and enclosures shall be permanent and continuous.

Location: Building 151, Room 1131B, Sample inlet processing system.

Hazard: Wiring from bake out temperature control was not grounded.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 151, Room 1035

Hazard: GFI near sink was not functioning, it would not interrupt circuit when tested.

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.305(a)(2)(i)(A)

(i) Uses permitted, 600 volts, nominal, or less. Temporary electrical power and lighting installations 600 volts, nominal, or less may be used only:
(A) During and for remodeling, maintenance, repair, or demolition of buildings, structures, or equipment, and similar activities;

Location: Building 151, Room 1043, Precipitator panel in between glove box lines.

Hazard: Yellow hard service extension cord. Temporary wiring permanently installed.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.26(c)(3)(viii)

(viii) Users are cautioned to take proper safety measures when metal ladders are used in areas containing electric circuits to prevent short circuits or electrical shock.

Location: Building 151, Room 1043

Hazard: Metal step ladder with sticker stating "do not use near electrical equipment", was being used in front of electrical control panel.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(g)(2)(ii)

(2) Identification, splices, and terminations.
(ii) Flexible cords shall be used only in continuous lengths without splice or tap. Hard service flexible cords No. 12 or larger may be repaired if spliced so that the splice retains the insulation, outer sheath properties, and usage characteristics of the cord being spliced.

Location: Building 151, Northeast corner of room

Hazard: Power cord to "Boston Gear" motor was improperly spliced.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(1)

(b) Cabinets, boxes, and fittings-
(1) Conductors entering boxes, cabinets, or fittings shall also be protected from abrasion, and openings through which conductors enter shall be effectively closed. Unused openings in cabinets, boxes, and fittings shall be effectively closed.

Location: Building 151, Room 1034B

Hazard: Pump for sodium hydroxide scrubber. Power cord going into pump was not properly protected with right size bushing.

BUILDING 153

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.416(e)(1)

(e) Cords and cables.
(1) Worn or frayed electric cords or cables shall not be used.

Location: Building 153, East side Mechanical Room construction

Hazard: Rigid 300 pipe bender, electrical cable insufficiently spliced in three places, Serial No. 75379.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.416(e)(1)

(e) Cords and cables.
(1) Worn or frayed electric cords or cables shall not be used.

Location: Building 153, East side Mechanical Room construction

Hazard: Drop cord (orange fifty foot) insufficiently spliced.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1926.150(a)(1)

(a) General requirements.
(1) The employer shall be responsible for the development of a fire protection program to be followed throughout all phases of the construction and demolition work, and he shall provide for the firefighting equipment as specified in this subpart. As fire hazards occur, there shall be no delay in providing the necessary equipment.

Location: Building 153, East side Mechanical Room construction

Hazard: No fire extinguishers available in area.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.152(a)

(a) General Requirements

(1) Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved metal safety cans shall be used for the handling and use of flammable liquids in quantities greater than one gallon, except that this shall not apply to those flammable liquid materials which are highly viscid (extremely hard to pour), which may be used and handled in original shipping containers. For quantities of one gallon or less, only the original container or approved metal safety cans shall be used for storage, use, and handling of flammable liquids.

(2) Flammable or combustible liquids shall not be stored in areas used for exits, stairways or normally used for safe passage of people.

Location: Building 153, South side of building, Room Addition, Painters Area.

Hazard: Jerry can (5 gallon) unmarked, 1/2 full of gasoline, not ANSI-approved; sitting within one foot of 5 gallons of paint, one gallon of solvent, 3 gallons of paint thinner on open ground with no fire protection available at this site.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1926.150(a)(1)

(a) General requirements.
(1) The employer shall be responsible for the development of a fire protection program to be followed throughout all phases of the construction and demolition work, and he shall provide for the firefighting equipment as specified in this subpart. As fire hazards occur, there shall be no delay in providing the necessary equipment.

Location: Building 153, South side of building, Room Addition, Painters Area

Hazard: No fire protection available in this area.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.59(e)(1)(i-ii)(f)(1)(i-iii)(g)(1)(h)

(e) Written hazard communication program.
  (1) Employers shall develop, implement, and maintain at the workplace, a written hazard communication program for their workplaces which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, material safety data sheets, and employee information and training will be met, and which also includes the following:
    (i) A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate material safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,
    (ii) The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.
  (f) Labels and other forms of warning.
    (1) The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked with the following information:
      (i) Identity of the hazardous chemical(s);
      (ii) Appropriate hazard warnings; and
      (iii) Name and address of the chemical manufacturer, importer, or other responsible party.
  (g) Material safety data sheets.
    (1) Chemical manufacturers and importers shall obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Employers shall have a material safety data sheet for each hazardous chemical which they use.
  (h) Employee information and training. Employers shall provide employees with information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new hazard is introduced into their work area.

Location: Building 153, South side of building, Room Addition, Painters Area

Hazard: No hazard communication plan available from General Contractor for Painting Contractor.

BUILDING 154

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.152(a)

(a) General Requirements

(1) Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved metal safety cans shall be used for the handling and use of flammable liquids in quantities greater than one gallon, except that this shall not apply to those flammable liquid materials which are highly viscid (extremely hard to pour), which may be used and handled in original shipping containers. For quantities of one gallon or less, only the original container or approved metal safety cans shall be used for storage, use, and handling of flammable liquids.

(2) Flammable or combustible liquids shall not be stored in areas used for exits, stairways or normally used for safe passage of people.

Location: Building 154, Nuclear Chemistry Lab

Hazard: Mechanical plumbing, 5 gallon safety can (of gasoline), no "contents" label, not stored in an approved container.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.300(b)

(b) Guarding.
(1) When power operated tools are designed to accommodate guards, they shall be equipped with such guards when in use.
(2) Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating or moving parts of equipment shall be guarded if such parts are exposed to contact by employees or otherwise create a hazard. Guarding shall meet the requirements as set forth in American National Standards Institute, B15.1-1953 (R1958), Safety Code for Mechanical Power-Transmission Apparatus.

Location: Building 154, Nuclear Chemistry Lab

Hazard: Makita 5 inch Disc Grinder #67441 - no wheel guard.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.351(b)(4)

(b) Welding cables and connectors.
(4) Cables in need of repair shall not be used. When a cable, other than the cable lead referred to in paragraph (b)(2) of this section, becomes worn to the extent of exposing bare conductors, the portion thus exposed shall be protected by means of rubber and friction tape or other equivalent insulation.

Location: Building 154, Nuclear Chemistry Lab

Hazard: Welding cable improperly spliced in four places.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1926.416(e)(1)

(e) Cords and cables.
(1) Worn or frayed electric cords or cables shall not be used.

Location: Building 154, Nuclear Chemistry Lab

Hazard: General Contractor - Green Storage Shed
Drop cord used for permanent wiring, being run over by traffic, run through ragged hole in side of metal storage container.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.152(a)(1)

(a) General Requirements
(1) Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved metal safety cans shall be used for the handling and use of flammable liquids in quantities greater than one gallon, except that this shall not apply to those flammable liquid materials which are highly viscid (extremely hard to pour), which may be used and handled in original shipping containers. For quantities of one gallon or less, only the original container or approved metal safety cans shall be used for storage, use, and handling of flammable liquids.

Location: Building 154, Nuclear Chemistry Lab

Hazard: General Contractor
Two five-gallon containers (gasoline) unmarked.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1926.416(e)(1)

(e) Cords and cables.
(1) Worn or frayed electric cords or cables shall not be used.

Location: Building 154, Nuclear Chemistry Lab

Hazard: Two fifty-foot electrical drop cords - insulation cut through to conductors.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1926.405(g)(1)(iii)(B)(C)

(g) Flexible cords and cables.
(1) Use of flexible cords and cables.
(iii) Prohibited uses. Unless necessary for a use permitted in paragraph (g)(1)(i) of this section, flexible cords and cables shall not be used:
(B) Where run through holes in walls, ceilings, or floors;
(C) Where run through doorways, windows, or similar openings, except as permitted in paragraph (a)(2)(ii)(1) of this section.

Location: Building 154, Nuclear Chemistry Lab

Hazard: Del Monte - Gang Box #4 - electric cable run through rough cut hole in box.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1926.403(b)(1)(i)(iii)(vii)

(b) Examination, installation, and use of equipment.
(1) Examination. The employer shall ensure that electrical equipment is free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined on the basis of the following considerations:
(i) Suitability for installation and use in conformity with the provisions of this subpart. Suitability of equipment for an identified purpose may be evidenced by listing, labeling, or certification for that identified purpose.
(iii) Electrical insulation.
(vii) Other factors which contribute to the practical safeguarding of employees using or likely to come in contact with the equipment.

Location: Building 154, Nuclear Chemistry Lab

Hazard: Homemade Y on electrical cord.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.300(a)

(a) Condition of tools. All hand and power tools and similar equipment, whether furnished by the employer or the employee, shall be maintained in a safe condition.

Location: Building 154, Nuclear Chemistry Lab

Hazard: P/B erectors - Black and Decker 1/4 inch drill #2841 - electric cable damaged at handle, with jacket and cable damage.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.59(g)(1)(h)

(g) Material safety data sheets.
(1) Chemical manufacturers and importers shall obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Employers shall have a material safety data sheet for each hazardous chemical which they use.

(h) Employee information and training. Employers shall provide employees with information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new hazard is introduced into their work area.

Location: Building 154, Nuclear Chemistry Lab

Hazard: Although hazard communication program was not available from General Contractor, Subcontractor did have a written plan, however, no MSDSs were available.

BUILDING 223

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(2)

(2) Covers and canopies. All pull boxes, junction boxes, and fittings shall be provided with covers approved for the purpose. If metal covers are used they shall be grounded. In completed installations each outlet box shall have a cover, faceplate, or fixture canopy.

Location: Building 223, Engineering Room 120

Hazard: Electrical receptacle on SW wall had broken cover exposing conductors.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.215(a)(4)

(4) Work rests. On offhand grinding machines, work rests shall be used to support the work. They shall be of rigid construction and designed to be adjustable to compensate for wheel wear. Work rests shall be kept adjusted closely to the wheel with a maximum opening of one-eighth inch to prevent the work from being jammed between the wheel and the rest, which may cause wheel breakage. The work rest shall be securely clamped after each adjustment. The adjustment shall not be made with the wheel in motion.

Location: Building 223, Engineering Support Room 107

Hazard: Baldor grinder work rest had gap greater than 1/8 inch.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.215(a)(4)

(4) Work rests. On offhand grinding machines, work rests shall be used to support the work. They shall be of rigid construction and designed to be adjustable to compensate for wheel wear. Work rests shall be kept adjusted closely to the wheel with a maximum opening of one-eighth inch to prevent the work from being jammed between the wheel and the rest, which may cause wheel breakage. The work rest shall be securely clamped after each adjustment. The adjustment shall not be made with the wheel in motion.

Location: Building 223, Engineering Support Room 107

Hazard: Darix grinder/sharpener tool work rest gap greater than 1/8 inch.

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.157(c)(1)

(1) The employer shall provide portable fire extinguishers and shall mount, locate and identify them so that they are readily accessible to employees without subjecting the employees to possible injury.

Location: Building 223, Engineering Support Room 107

Hazard: Access to fire extinguisher was blocked.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 223, Engineering Support Building

Hazard: Conduit junction box was uncovered.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(f)(5)(ii)

(5) Except as provided in paragraphs (f)(6) and (f)(7) the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:
(ii) Appropriate hazard warnings.

Location: Building 223, Engineering Support, Room 107

Hazard: Chemical containers did not have warning information.

BUILDING 227

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(2)

(2) Covers and canopies. All pull boxes, junction boxes, and fittings shall be provided with covers approved for the purpose. If metal covers are used they shall be grounded. In completed installations each outlet box shall have a cover, faceplate, or fixture canopy.

Location: Building 227, Polymers Room 1036

Hazard: South wall electrical outlet covers missing.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(2)

(2) Covers and canopies. All pull boxes, junction boxes, and fittings shall be provided with covers approved for the purpose. If metal covers are used they shall be grounded. In completed installations each outlet box shall have a cover, faceplate, or fixture canopy.

Location: Building 227, Polymers Room 1046A, Utility Room

Hazard: Large conduit pull box on east side of "E" panel was not covered, exposing conductors.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(f)(5)(ii)

(5) Except as provided in paragraphs (f)(6) and (f)(7) the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:
(i) Identity of the hazardous chemical(s) contained therein; and
(ii) Appropriate hazard warnings.

Location: Building 227, Polymers Room 1044, Flammable Storage Cabinet

Hazard: Several chemical containers did not have appropriate hazard information.

BUILDING 233

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(2)

(2) Covers and canopies. All pull boxes, junction boxes, and fittings shall be provided with covers approved for the purpose. If metal covers are used they shall be grounded. In completed installations each outlet box shall have a cover, faceplate, or fixture canopy.

Location: Building 233, Classified storage, Room 1020.

Hazard: Conduit pull box on north wall was uncovered exposing conductor.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.22(a)

(a) Housekeeping.
(1) All places of employment, passageways, storerooms, and service rooms shall be kept clean and orderly and in a sanitary condition.

Location: Building 233, Classified Storage, Room 1011

Hazard: Inadequate housekeeping, cables on floor in area where work is required periodically.

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.37(q)(6)

(q) Exit marking.
(6) Every exit sign shall be suitably illuminated by a reliable light source giving a value of not less than 5 foot-candles on the illuminated surface. Artificial lights giving illumination to exit signs other than the internally illuminated types shall have screens, discs, or lenses of not less than 25 square inches area made of translucent material to show red or other specified designating color on the side of the approach.

Location: Building 233, Classified Storage, Room 1011.

Hazard: Exit sign not identifiable in the event that lights were off.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.37(f)(6)

(6) The minimum width of any way of exit access shall in no case be less than 28 inches.

Location: Building 233, Classified Storage, Room 1011

Hazard: Access through room "aisleway" was less than 28 inches.

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.37(q)(6)

(q) Exit marking.
(6) Every exit sign shall be suitably illuminated by a reliable light source giving a value of not less than 5 foot-candles on the illuminated surface. Artificial lights giving illumination to exit signs other than the internally illuminated types shall have screens, discs, or lenses of not less than 25 square inches area made of translucent material to show red or other specified designating color on the side of the approach.

Location: Building 233

Hazard: Exit signs throughout building do not have a provision for illumination.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 233, Room 120

Hazard: GFI on work bench power strip was not functioning, did not provide designed protection.

BUILDING 234

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.178(g)(10)

(10) Smoking shall be prohibited in the charging area.

Location: Building 234, outside battery charging station

Hazard: Area was not designated as "No Smoking".

BUILDING 243

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.101(b)

(b) Compressed gases. The in-plant handling, storage, and utilization of all compressed gases in cylinders, portable tanks, rail tank cars, or motor vehicle cargo tanks shall be in accordance with Compressed Gas Association Pamphlet P-1-1965.

Location: Building 243, Ice Creep

Hazard: Compressed gas cylinder inadequately secured.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.27(c)(1)

(1) Climbing side. On fixed ladders, the perpendicular distance from the centerline of the rungs to the nearest permanent object on the climbing side of the ladder shall be 36 inches for a pitch of 76 degrees, and 30 inches for a pitch of 90 degrees (fig. D-2 of this section), with minimum clearances for intermediate pitches varying between these two limits in proportion to the slope, except as provided in subparagraphs (3) and (5) of this paragraph.

Location: Building 243, High bay ladder to crane maintenance platform

Hazard: Insufficient (approximately 12 inch) clearance between front of ladder and cabinet.

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.305(a)(2)(i)(A)

(2) Temporary wiring. Temporary electrical power and lighting wiring methods may be of a class less than would be required for a permanent installation. Except as specifically modified in this paragraph, all other requirements of this subpart for permanent wiring shall apply to temporary wiring installations.

(i) Uses permitted, 600 volts, nominal, or less. Temporary electrical power and lighting installations 600 volts, nominal, or less may be used only:

(A) During and for remodeling, maintenance, repair, or demolition of buildings, structures, or equipment, and similar activities;

Location: Building 243, North passage door.

Hazard: Permanently mounted wall power strip powered through flexible, temporary cord.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-

(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 243, Ice Creep

Hazard: Extension cord insulation damaged (burned), through to conductors.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.215(a)(4)

(4) Work rests. On offhand grinding machines, work rests shall be used to support the work. They shall be of rigid construction and designed to be adjustable to compensate for wheel wear. Work rests shall be kept adjusted closely to the wheel with a maximum opening of one-eighth inch to prevent the work from being jammed between the wheel and the rest, which may cause wheel breakage. The work rest shall be securely clamped after each adjustment. The adjustment shall not be made with the wheel in motion.

Location: Building 243, High Bay Welding Area Grinder

Hazard: Work rest gap greater than 1/8 inch.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 243, High Bay, Washington press workbench.

Hazard: GFI was not functioning properly, it would not interrupt circuit when tested.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(2)

(2) Covers and canopies. All pull boxes, junction boxes, and fittings shall be provided with covers approved for the purpose. If metal covers are used they shall be grounded. In completed installations each outlet box shall have a cover, faceplate, or fixture canopy.

Location: Building 243, Room 2002, Workbench on east wall

Hazard: Cover plate over power strip was missing.

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.37(q)(2)

(q) Exit marking.
(2) Any door, passage, or stairway which is neither an exit nor a way of exit access, and which is so located or arranged as to be likely to be mistaken for an exit, shall be identified by a sign reading "Not an Exit" or similar designation, or shall be identified by a sign indicating its actual character, such as "To Basement," "Storeroom," "Linen Closet," or the like.

Location: Building 243, Room 2002, door from Room 2002 to fan platform

Hazard: Door was not posted "Not an Exit".

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.304(a)(3)

(3) Use of grounding terminals and devices. A grounding terminal or grounding-type device on a receptacle, cord connector, or attachment plug may not be used for purposes other than grounding.

Location: Building 243, Middle of High Bay receptacle served by No. Box 1532B-28

Hazard: Receptacle box under workbench had an open ground.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.22(b)(1)

(1) Aisles and passageways shall be kept clear and in good repairs, with no obstruction across or in aisles that could create a hazard.

Location: Building 243, Room 2010

Hazard: Parts of cords on floor uncovered, presented a tripping hazard.

BUILDING 251

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.304(b)(1)(ii)(D)(2)

(D) The following tests shall be performed on all cord sets, receptacles which are not a part of the permanent wiring of the building or structure, and cord- and plug-connected equipment required to be grounded:
(1) All equipment grounding conductors shall be tested for continuity and shall be electrically continuous.
(2) Each receptacle and attachment cap or plug shall be tested for correct attachment of the equipment grounding conductor. The equipment grounding conductor shall be connected to its proper terminal.

Location: Building 243, Room 1026A, Workbench

Hazard: One receptacle in workbench power strip had an open ground.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 243, Room 1024, Workbench on east.

Hazard: GFI was not functioning, it would not interrupt the circuit when tested.

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.305(a)(2)(i)(A)

(2) Temporary wiring. Temporary electrical power and lighting wiring methods may be of a class less than would be required for a permanent installation. Except as specifically modified in this paragraph, all other requirements of this subpart for permanent wiring shall apply to temporary wiring installations.

(i) Uses permitted, 600 volts, nominal, or less. Temporary electrical power and lighting installations 600 volts, nominal, or less may be used only:

(A) During and for remodeling, maintenance, repair, or demolition of buildings, structures, or equipment, and similar activities;

Location: Liquid nitrogen station south of Building 251.

Hazard: Extension cord, temporary wiring, "permanently installed" to power liquid nitrogen control panel.

BUILDING 253

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.101(b)

(b) Compressed gases. The in-plant handling, storage, and utilization of all compressed gases in cylinders, portable tanks, rail tank cars, or motor vehicle cargo tanks shall be in accordance with Compressed Gas Association Pamphlet P-1-1965.

Location: Building 253, Compressed gas storage shed south of 253.

Hazard: Compressed gas cylinders not properly secured.

BUILDING 261

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.37(q)

(q) Exit marking.

(1) Exits shall be marked by a readily visible sign. Access to exits shall be marked by readily visible signs in all cases where the exit or way to reach it is not immediately visible to the occupants.

(3) Every required sign designating an exit or way of exit access shall be so located and of such size, color, and design as to be readily visible. No decorations, furnishings, or equipment which impair visibility of an exit sign shall be permitted, nor shall there be any brightly illuminated sign (for other than exit purposes), display, or object in or near the line of vision to the required exit sign of such a character as to so detract attention from the exit sign that it may not be noticed.

(4) Every exit sign shall be distinctive in color and shall provide contrast with decorations, interior finish, or other signs.

(5) A sign reading "Exit", or similar designation, with an arrow indicating the directions, shall be placed in every location where the direction of travel to reach the nearest exit is not immediately apparent.

(6) Every exit sign shall be suitably illuminated by a reliable light source giving a value of not less than 5 foot-candles on the illuminated surface. Artificial lights giving illumination to exit signs other than the internally illuminated types shall have screens, discs, or lenses of not less than 25 square inches area made of translucent material to show red or other specified designating color on the side of the approach.

(7) Each internally illuminated exit sign shall be provided in all occupancies where reduction of normal illumination is permitted.

(8) Every exit sign shall have the word "Exit" in plainly legible letters not less than 6 inches high, with the principal strokes of letters not less than three-fourths-inch wide.

Location: Building 261, West wing, first floor.

Hazard: All exits were not properly marked with exit signs, illuminated with at least 5 foot candles.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.212(a)(5)

(5) Exposure of blades. When the periphery of the blades of a fan is less than seven (7) feet above the floor or working level, the blades shall be guarded. The guard shall have openings no larger than one-half (1/2) inch.

Location: Building 261, Mezzanine machinery fan 284A9

Hazard: Fan blades were not sufficiently protected to prevent accidental contact.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(f)(5)(i)

(5) Except as provided in paragraphs (f)(6) and (f)(7) the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:
(i) Identity of the hazardous chemical(s) contained therein

Location: Building 261, Mezzanine machinery

Hazard: Chemical container (1 gal) was not labeled as to contents.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.37(f)(6)

(6) The minimum width of any way of exit access shall in no case be less than 28 inches. Where a single way of exit access leads to an exit, its capacity in terms of width shall be at least equal to the required capacity of the exit to which it leads. Where more than one way of exit access leads to an exit, each shall have a width adequate for the number of persons it must accommodate.

Location: Building 261, Room 2520

Hazard: Office equipment/furniture was placed so that there was less than 28 inches egress access.

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.157(c)(1)

(1) The employer shall provide portable fire extinguishers and shall mount, locate and identify them so that they are readily accessible to employees without subjecting the employees to possible injury.

Location: Building 261, Room 1330

Hazard: Access to fire extinguisher was blocked.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.101(b)

(b) Compressed gases. The in-plant handling, storage, and utilization of all compressed gases in cylinders, portable tanks, rail tank cars, or motor vehicle cargo tanks shall be in accordance with Compressed Gas Association Pamphlet P-1-1965.

Location: Building 261, Room 1321

Hazard: Lab size compressed gas cylinder, connected to regulator, was not secured.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(c)

(c) Splices. Conductors shall be spliced or joined with splicing devices suitable for the use or by brazing, welding, or soldering with a fusible metal or alloy. Soldered splices shall first be so spliced or joined as to be mechanically and electrically secure without solder and then soldered. All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an insulating device suitable for the purpose.

Location: Building 261, Room 1115

Hazard: Electrical power cord was improperly spliced together in two places.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(f)

(f) Identification of disconnecting means and circuits. Each service, feeder, and branch circuit, at its disconnecting means or overcurrent device, shall be legibly marked to indicate its purpose, unless located and arranged so the purpose is evident. These markings shall be of sufficient durability to withstand the environment involved.

Location: Building 261, Room 1113A

Hazard: Disconnects not identified as to intended purpose.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.179(j)(2)(iii)

(iii) Hooks with deformation or cracks. Visual inspection daily; monthly inspection with a certification record which includes the date of inspection, the signature of the person who performed the inspection and the serial number, or other identifier, of the hook inspected. For hooks with cracks or having more than 15 percent in excess of normal throat opening or more than 10° twist from the plane of the unbent hook refer to paragraph (1)(3)(iii)(a) of this section.

Location: Building 261, Room 1100, 5 ton crane

Hazard: Hook throat opening was not checked for increased opening, cracks, or twists at least monthly.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(g)(8)

(8) The employer shall maintain copies of the required material safety data sheets for each hazardous chemical in the workplace, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s).

Location: Building 261, Room 1011, Receiving Area

Hazard: No MSDS was readily accessible for bead blast sand.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.215(a)(4)

(4) Work rests. On offhand grinding machines, work rests shall be used to support the work. They shall be of rigid construction and designed to be adjustable to compensate for wheel wear. Work rests shall be kept adjusted closely to the wheel with a maximum opening of one-eighth inch to prevent the work from being jammed between the wheel and the rest, which may cause wheel breakage. The work rest shall be securely clamped after each adjustment. The adjustment shall not be made with the wheel in motion.

Location: Building 261, Room 1100 High Bay, West end

Hazard: Baldor grinder had work rust gap greater than 1/8 inch.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.243(c)(3)

(3) Vertical portable grinders. Safety guards used on machines known as right angle head or vertical portable grinders shall have a maximum exposure angle of 180°, and the guard shall be so located so as to be between the operator and the wheel during use. Adjustment of guard shall be such that pieces of an accidentally broken wheel will be deflected away from the operator.

Location: Building 261, Room 1016

Hazard: Skill 7 inch portable grinder did not have any guarding.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 261, Room 1016, Bausch & Lomb instrument

Hazard: Power cord insulation was cut through to conductors.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 261, East dome

Hazard: GFI on workbench strip was not functioning.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 261, Room 1121, Bench top power strip

Hazard: GFI was not functioning, would not interrupt power when tested.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.304(a)(2)

(2) Polarity of connections. No grounded conductor may be attached to any terminal or lead so as to reverse designated polarity.

Location: Building 261, Room 1026B, South wall receptacle 622A 1/11

Hazard: Reversed polarity at receptacle.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.25(d)(1)(iv)

(1) Care. To insure safety and serviceability the following precautions on the care of ladders shall be observed:
(iv) Safety feet and other auxiliary equipment shall be kept in good condition to insure proper performance.

Location: Building 261, Room 1100, High Bay, wood stepladder

Hazard: Non-slip grip feet on bottom of stepladder loose, and not kept in good condition to assure proper performance.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.25(d)(1)(x)

(1) Care. To insure safety and serviceability the following precautions on the care of ladders shall be observed:
(x) Ladders shall be inspected frequently and those which have developed defects shall be withdrawn from service for repair or destruction and tagged or marked as "Dangerous, Do Not Use."

Location: Building 261, Room 1100, High Bay, wood stepladder

Hazard: Ladder was not inspected frequently for defects.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(g)(1)(i)

(i) Working clearances. Except as required or permitted elsewhere in this subpart, the dimension of the working space in the direction of access to live parts operating at 600 volts or less and likely to require examination, adjustment, servicing, or maintenance while alive may not be less than indicated in Table S-1. In addition to the dimensions shown in Table S-1, workspace may not be less than 30 inches wide in front of the electric equipment. Distances shall be measured from the live parts if they are exposed, or from the enclosure front or opening if the live parts are enclosed. Concrete, brick, or tile walls are considered to be grounded. Working space is not required in back of assemblies such as dead-front switchboards or motor control centers where there are no renewable or adjustable parts such as fuses or switches on the back and where all connections are accessible from locations other than the back.

Table S-1-Working Clearances

Nominal voltage to ground	Minimum clear distance for condition^2 (ft)		
	(a)	(b)	(c)
0-150	^1 3	^1 3	3
151-600	^1 3	3 1/2	4

^1 Minimum clear distances may be 2 feet 6 inches for installations built prior to April 16, 1981.

^2 Conditions (a), (b), and (c), are as follows:

(a) Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by suitable wood or other insulating material. Insulated wire or insulated busbars operating at not over 300 volts are not considered live parts.

(b) Exposed live parts on one side and grounded parts on the other side.

(c) Exposed live parts on both sides of the workspace [not guarded as provided in Condition (a)] with the operator between.

Location: Building 261, Room 1100, High Bay, West end

Hazard: Materials stored within 36 inches of eletrical panel 287A.

BUILDING 268

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(g)(8)

(8) The employer shall maintain copies of the required material safety data sheets for each hazardous chemical in the workplace, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s).

Location: Building 268, North fenced area

Hazard: No MSDS available for grit blast sand.

BUILDING 298

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.147(c)(5)(ii)(C)(1)

(C) Substantial
(1) Lockout devices. Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

Location: Building 298, North fenced area VAC pump 4 control panel

Hazard: Lock placed on control panel, yet it was not locked nor was it tagged.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.25(d)(1)(iv)

(iv) Safety feet and other auxiliary equipment shall be kept in good condition to insure proper performance.

Location: Building 298, Room 105, Team 1 plumbers ladder

Hazard: Rubber non-slip pads on bottom of wood ladder were loose.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.147(c)(5)(ii)(D)(iii)

(D) Identifiable. Lockout devices and tagout devices shall indicate the identity of the employee applying the device(s).

(iii) Tagout devices shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as the following: Do Not Start, Do Not Open, Do Not Close, Do Not Energize, Do Not Operate.

Location: Building 298, East hall lighting panel 1058A7B

Hazard: Circuit 8 locked out. Circuit was not labeled or tagged as to why it was locked out, nor with employee's name who locked it out.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.215(a)(4)

(4) Work rests. On offhand grinding machines, work rests shall be used to support the work. They shall be of rigid construction and designed to be adjustable to compensate for wheel wear. Work rests shall be kept adjusted closely to the wheel with a maximum opening of one-eighth inch to prevent the work from being jammed between the wheel and the rest, which may cause wheel breakage. The work rest shall be securely clamped after each adjustment. The adjustment shall not be made with the wheel in motion.

Location: Building 298, Room 125, Baldor Cup Grinder

Hazard: Gap between cup and work rest was greater than 1/8 inch.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.25(d)(1)(iv)

(iv) Safety feet and other auxiliary equipment shall be kept in good condition to insure proper performance.

Location: Building 298, Room 141, Coating group ladder

Hazard. One of the non-skid safety feet was missing.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.37(f)(6)

(6) The minimum width of any way of exit access shall in no case be less than 28 inches. Where a single way of exit access leads to an exit, its capacity in terms of width shall be at least equal to the required capacity of the exit to which it leads. Where more than one way of exit access leads to an exit, each shall have a width adequate for the number of persons it must accommodate.

Location: Building 298, Room 141

Hazard: Less than 28 inch egress available out of office panel area.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.184(i)(9)(iii)

(9) Removal from service. Synthetic web slings shall be immediately removed from service if any of the following conditions are present:
- (i) Acid or caustic burns;
- (ii) Melting or charring of any part of the sling surface;
- (iii) Snags, punctures, tears or cuts;
- (iv) Broken or worn stitches; or
- (v) Distortion of fittings.

[40 FR 27369, June 27, 1975, as amended at 40 FR 31598, July 28, 1975; 41 FR 13353, Mar. 30, 1976]

Location: Building 298, Room 160

Hazard: Nylon choker was cut and damaged.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.25(d)(1)(iv)

(iv) Safety feet and other auxiliary equipment shall be kept in good condition to insure proper performance.

Location: Building 298, Room 173, Carpenter's ladder

Hazard: Ladder was missing one of the non-skid safety feet.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.25(b)(1)

(b) Materials-
(1) Requirements applicable to all wood parts.
(i) All wood parts shall be free from sharp edges and splinters; sound and free from accepted visual inspection from shake, wane, compression failures, decay, or other irregularities. Low density wood shall not be used.

Location: Building 298, Room 173, Carpenter's ladder

Hazard: Ladder was not free of sharp edges and splinters.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(f)(5)(ii)

(5) Except as provided in paragraphs (f)(6) and (f)(7) the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:
(ii) Appropriate hazard warnings.

Location: Building 298, Room 173, loft west

Hazard: MEK chemical container was not labeled with appropriate hazard information.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(2)

(2) Covers and canopies. All pull boxes, junction boxes, and fittings shall be provided with covers approved for the purpose. If metal covers are used they shall be grounded. In completed installations each outlet box shall have a cover, faceplate, or fixture canopy. Covers of outlet boxes having holes through which flexible cord pendants pass shall be provided with bushings designed for the purpose or shall have smooth, well-rounded surfaces on which the cords may bear.

Location: Building 298, Room 173, loft east wall

Hazard: Junction box was missing cover plate.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 298, Room 173, Southwest corner, Quark Tower Electronics cabinet

Hazard: Insulation on two flexible power cords were damaged, exposing the conductors.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees.

Location: Building 298, Room 181, North wall panel 1063B

Hazard: Unprotected openings in electrical panel.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)(ii)

(ii) Mechanical strength and durability, including, for parts designed to enclose and protect other equipment, the adequacy of the protection thus provided.

Location: Building 298, Northeast enclosed area

Hazard: Junction box unsecured.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 298, West hallway electrical panel 924A1B2B

Hazard: Unprotected openings in electrical panel.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 298, Room 163, West wall

Hazard: Duplex 917A48-1-31 on wall-mounted power strip was not attached to strip allowing access to energized conductors and exposed parts.

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.37(q)(1)&(2)

(q) Exit marking.
(1) Exits shall be marked by a readily visible sign. Access to exits shall be marked by readily visible signs in all cases where the exit or way to reach it is not immediately visible to the occupants.
(2) Any door, passage, or stairway which is neither an exit nor a way of exit access, and which is so located or arranged as to be likely to be mistaken for an exit, shall be identified by a sign reading "Not an Exit" or similar designation, or shall be identified by a sign indicating its actual character, such as "To Basement," "Storeroom," "Linen Closet," or the like.

Location: Building 298, Throughout south portion

Hazard: Insufficient number of exit signs and directional exit signs.

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.37(q)(6)

(6) Every exit sign shall be suitably illuminated by a reliable light source giving a value of not less than 5 foot-candles on the illuminated surface. Artificial lights giving illumination to exit signs other than the internally illuminated types shall have screens, discs, or lenses of not less than 25 square inches area made of translucent material to show red or other specified designating color on the side of the approach.

Location: Building 298, Throughout south portion

Hazard: Insufficient illumination, exit signs require at least 5 foot candles illumination in event of power failure.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.23(a)(9)

(9) Every floor hole into which persons cannot accidentally walk (on account of fixed machinery, equipment, or walls) shall be protected by a cover that leaves no openings more than 1 inch wide. The cover shall be securely held in place to prevent tools or materials from falling through.

Location: Building 298, Room 173, West loft floor holes

Hazard: Floor holes had unprotected openings greater than 1 inch where tools or materials could fall.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.23(e)(1) and 23(e)(3)(i)

(1) A standard railing shall consist of top rail, intermediate rail, and posts, and shall have a vertical height of 42 inches nominal from upper surface of top rail to floor, platform, runway, or ramp level. The top rail shall be smooth-surfaced throughout the length of the railing. The intermediate rail shall be approximately halfway between the top rail and the floor, platform, runway, or ramp. The ends of the rails shall not overhang the terminal posts except where such overhang does not constitute a projection hazard.

(i) For wood railings, the posts shall be of at least 2-inch by 4-inch stock spaced not to exceed 6 feet; the top and intermediate rails shall be of at least 2-inch by 4-inch stock. If top rail is made of two right-angle pieces of 1-inch by 4-inch stock, posts may be spaced on 8-foot centers, with 2-inch by 4-inch intermediate rail.

Location: Building 298, room 173, West loft, Quark tower guard rail

Hazard: Sixteen inch platform was placed in loft next to standard rail. This made the standard rail too short to provide adequate protection. Rail must comply with standard railing requirements in relation to platform.

SITE 300

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.25(d)(1)(iv)

(iv) Safety feet and other auxiliary equipment shall be kept in good condition to insure proper performance.

Location: Site 300, Building 879, Cargo Container

Hazard: Six foot wood ladder was missing one rubber safety foot.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.25(d)(1)(i)

(i) Ladders shall be maintained in good condition at all times, the joint between the steps and side rails shall be tight, all hardware and fittings securely attached, and the movable parts shall operate freely without binding or undue play.

Location: Site 300, Building 879, Cargo Container

Hazard: Ten foot wood ladder had loose steps.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.37(f)(6)

(6) The minimum width of any way of exit access shall in no case be less than 28 inches. Where a single way of exit access leads to an exit, its capacity in terms of width shall be at least equal to the required capacity of the exit to which it leads. Where more than one way of exit access leads to an exit, each shall have a width adequate for the number of persons it must accommodate.

Location: Site 300, Building 874, East High Bay

Hazard: Access to north exit was partially obstructed by panel allowing 25 inch clearance.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.184(i)(9)(iii)

(9) Removal from service. Synthetic web slings shall be immediately removed from service if any of the following conditions are present:
(iii) Snags, punctures, tears or cuts;

Location: Site 300, Building 874, West Bay

Hazard: Nylon choker/sling was cut and damaged, it had not been removed from service.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.215(a)(4)

(4) Work rests. On offhand grinding machines, work rests shall be used to support the work. They shall be of rigid construction and designed to be adjustable to compensate for wheel wear. Work rests shall be kept adjusted closely to the wheel with a maximum opening of one-eighth inch to prevent the work from being jammed between the wheel and the rest, which may cause wheel breakage. The work rest shall be securely clamped after each adjustment. The adjustment shall not be made with the wheel in motion.

Location: Site 300, Building 874, West Bay

Hazard: Baldor cup grinder gap between wheel and work rest was greater than 1/8 inch.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.215(d)(3)

(3) Surface condition. All contact surfaces of wheels, blotters and flanges shall be flat and free of foreign matter.

Location: Site 300, Building 874, West Bay

Hazard: Welders area: face of grinding wheel was not flat.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees.

Location: Site 300, Building 875, Room 124, Welding Area, hand grinder

Hazard: Power cord was cut through insulation to metal wire.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees.

Location: Site 300, Building 875, Room 124, Welding Area, hand grinder

Hazard: Dayton Pedestal Fan, power cord insulation damaged.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(c)

(c) Splices. Conductors shall be spliced or joined with splicing devices suitable for the use or by brazing, welding, or soldering with a fusible metal or alloy. Soldered splices shall first be so spliced or joined as to be mechanically and electrically secure without solder and then soldered. All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an insulating device suitable for the purpose.

Location: Site 300, Building 875, Room 124, wall clock

Hazard: Power cord to wall clock was improperly spliced.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.25(d)(2)(xv)

(xv) No ladder should be used to gain access to a roof unless the top of the ladder shall extend at least 3 feet above the point of support, at eave, gutter, or roofline;

Location: Site 300, Building 875, Room 124, ladder access to computer room

Hazard: Top of fiber glass single ladder only extended about 8 inches above computer room roof.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.101(b)

(b) Compressed gases. The in-plant handling, storage, and utilization of all compressed gases in cylinders, portable tanks, rail tank cars, or motor vehicle cargo tanks shall be in accordance with Compressed Gas Association Pamphlet P-1-1965.

Location: Site 300, Building 874, Welders Bay

Hazard: Oxygen compressed gas cylinder was improperly secured.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.252(a)(2)(ii)(d)

(d) Valve protection caps, where cylinder is designed to accept a cap, shall always be in place, hand-tight, except when cylinders are in use or connected for use.

Location: Site 300, Building 874, Welders Bay

Hazard: Oxygen compressed gas cylinder was stored without valve cover cap.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.25(d)(i)

(i) Ladders shall be maintained in good condition at all times, the joint between the steps and side rails shall be tight, all hardware and fittings securely attached, and the movable parts shall operate freely without binding or undue play.

Location: Site 300, Building 874, Welders Bay

Hazard: Wooden stepladder had loose step.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.25(d)(iv)

(iv) Safety feet and other auxiliary equipment shall be kept in good condition to insure proper performance.

Location: Site 300, Building 874, Welders Bay

Hazard: Wooden stepladder was missing one safety foot.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(g)(1)(i)

(i) Working clearances. Except as required or permitted elsewhere in this subpart, the dimension of the working space in the direction of access to live parts operating at 600 volts or less and likely to require examination, adjustment, servicing, or maintenance while alive may not be less than indicated in Table S-1. In addition to the dimensions shown in Table S-1, workspace may not be less than 30 inches wide in front of the electric equipment. Distances shall be measured from the live parts if they are exposed, or from the enclosure front or opening if the live parts are enclosed. Concrete, brick, or tile walls are considered to be grounded. Working space is not required in back of assemblies such as dead-front switchboards or motor control centers where there are no renewable or adjustable parts such as fuses or switches on the back and where all connections are accessible from locations other than the back.

Table S-1-Working Clearances

Nominal voltage to ground	Minimum clear distance for condition^2 (ft)		
	(a)	(b)	(c)
0-150	^1 3	3	3
151-600	^1 3	3 1/2	4

Location: Site 300, Building 873, Carpenter Shop, south wall panel 480A-34-3.

Hazard: Inadequate working clearance. Clear access to panel was obstructed by Delta sander.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees.

Location: Site 300, Building 873, Room 100, Bosch power sander.

Hazard: Power cord had been damaged, insulation frayed through to conductors.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees.

Location: Site 300, Building 873, Room 100, Bosch power sander.

Hazard: Heat gun power cord was damaged near handle bushing.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees.

Location: Site 300, Building 873, Room 100, South Dock, pedestal fan.

Hazard: Power cord was cracked and frayed through insulation to conductors.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(g)(8)

(8) The employer shall maintain copies of the required material safety data sheets for each hazardous chemical in the workplace, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s).

Location: Site 300, Building 873, Room 100.

Hazard: No MSDS readily accessible for formaldehyde-containing glue powder.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.23(b)(1)(i)

(i) Rail, roller, picket fence, half door, or equivalent barrier. Where there is exposure below to falling materials, a removable toe board or the equivalent shall also be provided. When the opening is not in use for handling materials, the guard shall be kept in position regardless of a door on the opening. In addition, a grab handle shall be provided on each side of the opening with its center approximately 4 feet above floor level and of standard strength and mounting.

Location: Site 300, Building 873, room 146X.

Hazard: Wall opening was not provided with removable toe board. Additionally, grab handles were not located on each side of the opening.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees.

Location: Site 300, Building 873, Electrician's Dock, parts washer.

Hazard: Frayed power cord on parts washer.

BUILDING 311

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.157(e)(1) and/or 157(e)(3)

(e) Inspection, maintenance and testing.

(1) The employer shall be responsible for the inspection, maintenance and testing of all portable fire extinguishers in the workplace.

(3) The employer shall assure that portable fire extinguishers are subjected to an annual maintenance check. Stored pressure extinguishers do not require an internal examination. The employer shall record the annual maintenance date and retain this record for one year after the last entry or the life of the shell, whichever is less. The record shall be available to the Assistant Secretary upon request.

Location: Building 311, Room 101, near exit door.

Hazard: Fire extinguisher #5-1008-D has not been checked since December, 1987.

BUILDING 321

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.215(a)(2)

(2) Guard design. The safety guard shall cover the spindle end, nut, and flange projections. The safety guard shall be mounted so as to maintain proper alignment with the wheel, and the strength of the fastenings shall exceed the strength of the guard.

Location: Building 321C, Room 1318, East Wall, Black & Decker bench grinder (PG-37).

Hazard: Guard did not completely cover spindle end nut.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.215(b)(3)

(3) Bench and floor stands. The angular exposure of the grinding wheel periphery and sides for safety guards used on machines known as bench and floor stands should not exceed 90° or one-fourth of the periphery. This exposure shall begin at a point not more than 65° above the horizontal plane of the wheel spindle. (See Figures O-6 and O-7 and paragraph (b)(9) of this section.) {Figure No. O-6 Figure No. O-7} Wherever the nature of the work requires contact with the wheel below the horizontal plane of the spindle, the exposure shall not exceed 125°. (See Figures O-8 and O-9.) {Figure No. O-8 Figure No. O-9 }

Location: Building 321C, Room 1318, East Wall, Black & Decker bench grinder.

Hazard: Side guard opening was more than 90 Degrees.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(1)

(1) Conductors entering boxes, cabinets, or fittings. Conductors entering boxes, cabinets, or fittings shall also be protected from abrasion, and openings through which conductors enter shall be effectively closed. Unused openings in cabinets, boxes, and fittings shall be effectively closed.

Location: Building 321C, Room 1318, northeast corner.

Hazard: Power cord entering box was pulled out of bushings.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(f)

(f) Identification of disconnecting means and circuits. Each disconnecting means required by this subpart for motors and appliances shall be legibly marked to indicate its purpose, unless located and arranged so the purpose is evident. Each service, feeder, and branch circuit, at its disconnecting means or overcurrent device, shall be legibly marked to indicate its purpose, unless located and arranged so the purpose is evident. These markings shall be of sufficient durability to withstand the environment involved.

Location: Building 321C, Room 1318, northwest corner, panel 575A7-1434

Hazard: Disconnects not properly labeled.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.219(d)(1)

(1) Guarding. Pulleys, any parts of which are seven (7) feet or less from the floor or working platform, shall be guarded in accordance with the standards specified in paragraphs (m) and (o) of this section. Pulleys serving as balance wheels (e.g., punch presses) on which the point of contact between belt and pulley is more than six feet six inches (6 ft. 6 in.) from the floor or platform may be guarded with a disk covering the spokes.

Location: Building 321C, Room 1318, Router SE47.

Hazard: Power transmission V-belt - belt was not properly guarded.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.243(c)(1)

(c) Portable abrasive wheels-
(1) General requirements. Abrasive wheels shall be used only on machine provided with safety guards as defined in paragraph (c) (1) through (4) of this section.

Location: Building 321C, Room 1318, tool cabinet.

Hazard: 7" disk sander had no guard in place - it was in a drawer.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees.

Location: Building 321C, Room 1318, tool cabinet

Hazard: Hard service extension cord insulation had been cut.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.23(b)(1)(i)

(i) Rail, roller, picket fence, half door, or equivalent barrier. Where there is exposure below to falling materials, a removable toe board or the equivalent shall also be provided. When the opening is not in use for handling materials, the guard shall be kept in position regardless of a door on the opening. In addition, a grab handle shall be provided on each side of the opening with its center approximately 4 feet above floor level and of standard strength and mounting.

Location: Building 321C, Room 1318C, loft.

Hazard: Wall floor opening (lift access) was not protected by standard rail. Additionally, it did not have hand/grab bars on each side.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(g)(8)

(8) The employer shall maintain copies of the required material safety data sheets for each hazardous chemical in the workplace, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s).

Location: Building 321C, Room 1318, Assembly.

Hazard: MSDS not readily accessible in workplace.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.184(i)(9)(iii)

(9) Removal from service. Synthetic web slings shall be immediately removed from service if any of the following conditions are present:
(iii) Snags, punctures, tears or cuts.

Location: Building 321C, Room 1318, Assembly.

Hazard: Nylon web sling had several cuts.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(f)(5)(i)

(5) Except as provided in paragraphs (f)(6) and (f)(7) the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:
(i) Identity of the hazardous chemical(s) contained therein.

Location: Building 321C, Room 1318, Assembly.

Hazard: Contents of chemical containers were not identified.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(f)(5)(ii)

(5) Except as provided in paragraphs (f)(6) and (f)(7) the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:
(ii) Appropriate hazard warnings.

Location: Building 321C, Room 1318, Assembly.

Hazard: Appropriate hazard labels were not placed on chemical containers.

BUILDING 323

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.150(a)(4)

(a) General Requirements
(4) All firefighting equipment shall be periodically inspected and maintained in operating condition. Defective equipment shall be immediately replaced.

Location: Building 323, Mezzanine Floor, Mechanical Room

Hazard: Fire extinguisher has been discharged and has not been replaced.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.416(e)(1) and 1926.405(a)(2)(ii)(I)

(e) Cords and cables.
(1) Worn or frayed electrical cords or cables shall not be used.
(I) Flexible cords and cables shall be protected from damage. Sharp corners and projections shall be avoided. Flexible cords and cables may pass through doorways or other pinch points, if protection is provided to avoid damage.

Location: Building 323, Mezzanine Floor, Mechanical Room

Hazard: Drop cord stretched between rooms and door closed on worn cord.

BUILDING 329

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 329, plasma cutting Makita disk grinder.

Hazard: Power cord was cut through insulation to conductors.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.242(a)

(a) General requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

Location: Building 329, plasma cutting 7" Black and Decker disk sander.

Hazard: Disk sander had operational "hold" button.

BUILDING 331

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(1)

(1) Conductors entering boxes, cabinets, or fittings. Conductors entering boxes, cabinets, or fittings shall also be protected from abrasion, and openings through which conductors enter shall be effectively closed. Unused openings in cabinets, boxes, and fittings shall be effectively closed.

Location: Building 331, Room 1124, South wall, square conduit box.

Hazard: Unused openings in box containing electrical wiring.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(1)

(1) Conductors entering boxes, cabinets, or fittings. Conductors entering boxes, cabinets, or fittings shall also be protected from abrasion, and openings through which conductors enter shall be effectively closed. Unused openings in cabinets, boxes, and fittings shall be effectively closed.

Location: Building 331, Room 1124, South wall of spray booth, Duplex 588A/3.

Hazard: Unused openings in box container GFI.

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(1)

(1) Conductors entering boxes, cabinets, or fittings. Conductors entering boxes, cabinets, or fittings shall also be protected from abrasion, and openings through which conductors enter shall be effectively closed. Unused openings in cabinets, boxes, and fittings shall be effectively closed.

Location: Building 331, Room 1128, South wall conduit pull box.

Hazard: Cover plate on pull box containing electrical wiring was uncovered.

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.305(a)(2)(i)(A)

(2) Temporary wiring. Temporary electrical power and lighting wiring methods may be of a class less than would be required for a permanent installation. Except as specifically modified in this paragraph, all other requirements of this subpart for permanent wiring shall apply to temporary wiring installations.

(i) Uses permitted, 600 volts, nominal, or less. Temporary electrical power and lighting installations 600 volts, nominal, or less may be used only:

(A) During and for remodeling, maintenance, repair, or demolition of buildings, structures, or equipment, and similar activities;

Location: Building 331, East side of building extension cord run from outlet 587A21/3 to vacuum area.

Hazard: Temporary wiring used in place of permanently installed wiring.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.101(b)

(b) Compressed gases. The in-plant handling, storage, and utilization of all compressed gases in cylinders, portable tanks, rail tank cars, or motor vehicle cargo tanks shall be in accordance with Compressed Gas Association Pamphlet P-1-1965.

Location: Building 331, East side north end compressed gas rack for Room 158.

Hazard: Improperly secured compressed gas cylinder.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees.

Location: Building 331, Room 161, Maverick 300 floor buffer/sander.

Hazard: Power cord was cut through the insulation to the conductors.

University of California

Type of Violation	Inspection Number	Inspection Site
De Minimis	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(1)

(1) Conductors entering boxes, cabinets, or fittings. Conductors entering boxes, cabinets, or fittings shall also be protected from abrasion, and openings through which conductors enter shall be effectively closed. Unused openings in cabinets, boxes, and fittings shall be effectively closed.

Location: Building 331, Room 161, Pull box immediately north of entrance door.

Hazard: Cover missing from conduit pull box containing electrical wiring.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(1)

(1) Conductors entering boxes, cabinets, or fittings. Conductors entering boxes, cabinets, or fittings shall also be protected from abrasion, and openings through which conductors enter shall be effectively closed. Unused openings in cabinets, boxes, and fittings shall be effectively closed.

Location: Building 331, Room 158, 100 ton press GE controller 782H15/3.

Hazard: Uncovered opening to box containing electrical wiring box had sticker stating "Danger, lethal shock hazard"

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(g)(1)(i)

(i) Working clearances. Except as required or permitted elsewhere in this subpart, the dimension of the working space in the direction of access to live parts operating at 600 volts or less and likely to require examination, adjustment, servicing, or maintenance while alive may not be less than indicated in Table S-1. In addition to the dimensions shown in Table S-1, workspace may not be less than 30 inches wide in front of the electric equipment. Distances shall be measured from the live parts if they are exposed, or from the enclosure front or opening if the live parts are enclosed. Concrete, brick, or tile walls are considered to be grounded. Working space is not required in back of assemblies such as dead-front switchboards or motor control centers where there are no renewable or adjustable parts such as fuses or switches on the back and where all connections are accessible from locations other than the back.

Table S-1-Working Clearances

Nominal voltage to ground	Minimum clear distance for condition^2 (ft)		
	(a)	(b)	(c)
0-150	^1 3	3	3
151-600	^1 3	3 1/2	4

Location: Building 331, Room 145, Southeast corner electrical panel 782A5, clearance between the panel and fixed cabinet.

Hazard: A fixed cabinet was less than the 36 inch minimum clearance.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.181(j)(2)(ii)

(ii) Safety latch type hooks shall be used wherever possible.

Location: Building 331, Room 149D, 1500 lb. chain fail.

Hazard: Hook did not have the required safety latch.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.101(b)

(b) Compressed gases. The in-plant handling, storage, and utilization of all compressed gases in cylinders, portable tanks, rail tank cars, or motor vehicle cargo tanks shall be in accordance with Compressed Gas Association Pamphlet P-1-1965.

Location: Building 331, Room 144B, Northwest corner of room.

Hazard: Gas cylinders (small size) were unsecured.

University of California

Type of Violation	Inspection Number	Inspection Site
NONE GIVEN--PLEASE PROVIDE	21067	Lawrence Livermore National Laboratory

Description

1910.23(e)(5)(i)

(i) A handrail shall consist of a lengthwise member mounted directly on a wall or partition by means of brackets attached to the lower side of the handrail so as to offer no obstruction to a smooth surface along the top and both sides of the handrail. The handrail shall be of rounded or other section that will furnish an adequate handhold for anyone grasping it to avoid falling. The ends of the handrail should be turned in to the supporting wall or otherwise arranged so as not to constitute a projection hazard.

Location: Building 331, VERS Tank Room, Stairway to tank platform.

Hazard: Right side hand rail (when descending) was obstructed by pressure vessel certification plate.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.24(d)

(d) Stair width. Fixed stairways shall have a minimum width of 22 inches.

Location: Building 331, VERS Tank Room, Stairway to tank platform.

Hazard: Stair width was less than minimum of 22 inches (17 inches).

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.22(a)(3)

(3) To facilitate cleaning, every floor, working place, and passageway shall be kept free from protruding nails, splinters, holes, or loose boards.

Location: Building 331, rooftop boardwalk.

Hazard: Several boards in the raised 1" by 4" boardwalk were broken, causing a tripping hazard.

BUILDING 391

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.152(a)

(a) General Requirements

(1) Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved metal safety cans shall be used for the handling and use of flammable liquids in quantities greater than one gallon, except that this shall not apply to those flammable liquid materials which are highly viscid (extremely hard to pour), which may be used and handled in original shipping containers. For quantities of one gallon or less, only the original container or approved metal safety cans shall be used for storage, use, and handling of flammable liquids.

Location: Building 391, Laser Building Construction (391 Lansa Project)

Hazard: 500 Gallon Diesel Tank - There is not a "Contents" label for identification of tank contents, not stored in an approved container.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.151(a)(3)

(3) Smoking shall be prohibited at or in the vicinity of operations which constitute a fire hazard, and shall be conspicuously posted: "No Smoking or Open Flame".

Location: Building 391, Laser Building Construction (391 Lansa Project)

Hazard: "No Smoking" signs are not posted at diesel tank.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.150(c)(1)(vi)

(vi) A fire extinguisher, rated not less than 10B, shall be provided within 50 feet of wherever more than 5 gallons of flammable or combustible liquids or 5 pounds of flammable gas are being used on the jobsite. This requirement does not apply to the integral fuel tanks of motor vehicles.

Location: Building 391, Laser Building Construction (391 Lansa Project)

Hazard: Fire extinguishers not posted within required distance.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.152(a)(1)

(a) General Requirements
(1) Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved metal safety cans shall be used for the handling and use of flammable liquids in quantities greater than one gallon, except that this shall not apply to those flammable liquid materials which are highly viscid (extremely hard to pour), which may be used and handled in original shipping containers. For quantities of one gallon or less, only the original container or approved metal safety cans shall be used for storage, use, and handling of flammable liquids.

Location: Building 391, Laser Building Construction (391 Lansa Project)

Hazard: Five gallon portable fuel containers - Jerry cans:
- o Are not ANSI-approved.
- o Are not labeled (for contents).

BUILDING 411

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.242(a)

(a) General requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

Location: Building 411, Room 1600, Shipping Dept. of Warehouse and Distribution

Hazard: Black & Decker Saw #41000645 - Electrical cord is cut through insulation near motor housing.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.242(a)

(a) General requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

Location: Building 411, Room 1600, Shipping Dept. of Warehouse and Distribution

Hazard: Black & Decker Saw (radial) #41800038 Electrical cord - elbow bushing pulled out of back of saw motor.

BUILDING 418

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.242(a)

(a) General requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

Location: Building 418, Paint Shop, Room 121

Hazard: Drop cord, wall receptacle - cap missing from plug.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(g)(1)(iii)

(iii) Unless specifically permitted in paragraph (g)(1)(i) of this section, flexible cords and cables may not be used:
(A) As a substitute for the fixed wiring of a structure;
(B) Where run through holes in walls, ceilings, or floors;

Location: Building 418, Paint Shop, Emergency Response Paging System

Hazard: This system is plugged into a drop cord. There should be a hard-wired/conduit running to system.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

Description:

General Duty Clause, Public Law 91-596, Section 5(a)(1)

5(a) Each employer (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees.

Location: Building 418, Paint Shop, Shed #2

Hazard: Broken conduit at electrical outlet box #494A21/2, Rear of shed (right side-floor).

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.242(a)

(a) General requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

Location: Building 418, Paint Shop, Shed #4

Hazard: Electrical drop cord/light should have bulb protectors on each cord.

BUILDING 482

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.416(e)(1)

(e) Cords and cables.
(1) Worn or frayed electric cords or cables shall not be used.

Location: Building 482, East Addition

Hazard: Electrical drop cord - orange soft-cable pulled out.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1926.350(f)(4)

(4) Hose which has been subject to flashback, or which shows evidence of severe wear or damage, shall be tested to twice the normal pressure to which it is subject, but in no case less than 300 p.s.i. Defective hose, or hose in doubtful condition, shall not be used.

Location: Building 482, East Addition

Hazard: East connector - acetylene hose: damaged (worn through to inner lining) at gauge connection.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.300(a)

(a) Condition of tools. All hand and power tools and similar equipment, whether furnished by the employer or the employee, shall be maintained in a safe condition.

Location: Building 482, East Addition

Hazard: North addition - Milwaukee 1/2 inch drill - electrical cord insulation pulled out of handle.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.300(a)

(a) Condition of tools. All hand and power tools and similar equipment, whether furnished by the employer or the employee, shall be maintained in a safe condition.

Location: Building 482, East Addition

Hazard: Black & Decker saw, Serial #15507 - Electrical cord damaged. Jacket frayed at handle and damaged about 1/2 way down length of case.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.300(a)

(a) Condition of tools. All hand and power tools and similar equipment, whether furnished by the employer or the employee, shall be maintained in a safe condition.

Location: Building 482, North Addition

Hazard: Hitachi Mitre Saw #H580769 - Damaged (nicked) electrical cord.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.416(e)(1)

(e) Cords and cables.
(1) Worn or frayed electric cords or cables shall not be used.

Location: Building 482, North Addition

Hazard: Drop cable (with a pigtail attached) is damaged and not correctly repaired.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.59(e)(1)(i-ii)(f)(1)(i-iii)(g)(1)(h)

(e) Written hazard communication program.
  (1) Employers shall develop, implement, and maintain at the workplace, a written hazard communication program for their workplaces which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, material safety data sheets, and employee information and training will be met, and which also includes the following:
    (i) A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate material safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,
    (ii) The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.
(f) Labels and other forms of warning.
  (1) The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked with the following information:
    (i) Identity of the hazardous chemical(s);
    (ii) Appropriate hazard warnings; and
    (iii) Name and address of the chemical manufacturer, importer, or other responsible party.
(g) Material safety data sheets.
  (1) Chemical manufacturers and importers shall obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Employers shall have a material safety data sheet for each hazardous chemical which they use.
(h) Employee information and training. Employers shall provide employees with information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new hazard is introduced into their work area.

Location: Building 482, North Addition

Hazard: No Hazard Communication Program on-site (not even aware of the requirement).

BUILDING 490

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1926.300(a)

(a) Condition of tools. All hand and power tools and similar equipment, whether furnished by the employer or the employee, shall be maintained in a safe condition.

Location: Building 490, Highbay, concrete modification

Hazard: Greenlee Vacuum - (Givens Contracting)
Electrical cable dislodged from housing.
National concrete (UIN NCC-18) equipment truck.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.416(e)(1)

(e) Cords and cables.
(1) Worn or frayed electric cords or cables shall not be used.

Location: Building 490, Highbay, concrete modification

Hazard: Drop cord has damaged connection (female connection) cord pulled from connection.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.152(a)(1)

(a) General Requirements

(1) Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved metal safety cans shall be used for the handling and use of flammable liquids in quantities greater than one gallon, except that this shall not apply to those flammable liquid materials which are highly viscid (extremely hard to pour), which may be used and handled in original shipping containers. For quantities of one gallon or less, only the original container or approved metal safety cans shall be used for storage, use, and handling of flammable liquids.

Location: Building 490, Highbay, concrete modification

Hazard: Two five-gallon Jerry can does not have "contents" label, not ANSI-approved.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.152(a)(1)

(a) General Requirements
(1) Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved metal safety cans shall be used for the handling and use of flammable liquids in quantities greater than one gallon, except that this shall not apply to those flammable liquid materials which are highly viscid (extremely hard to pour), which may be used and handled in original shipping containers. For quantities of one gallon or less, only the original container or approved metal safety cans shall be used for storage, use, and handling of flammable liquids.

Location: Building 490, Highbay, concrete modification

Hazard: Two five-gallon Jerry cans do not have "contents" label and are not ANSI-approved.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.416(e)(1)

(e) Cords and cables.
(1) Worn or frayed electric cords or cables shall not be used.

Location: Building 490, Highbay, concrete modification

Hazard: Orange-soft drop cord:
- o Jacket/Grounding damaged and taped over
- o Male receptacle - ground plug damaged
- o Female receptacle - taped covering cable "pull" from receptacle

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University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1926.52(b)

(b) When employees are subjected to sound levels exceeding those listed in Table D-2 of this section, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of the table, personal protective equipment as required in Subpart E, shall be provided and used to reduce sound levels within the levels of the table.

Location: Building 490, Highbay, concrete modification

Hazard: "Hearing Protection Required" signs should be posted.

BUILDING 511

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.243(a)(5)

(5) Grounding. Portable electric powered tools shall meet the electrical requirements of subpart S of this part.

Location: Building 511, Sheet Metal Shop, Room #139, Tool Cabinet #9

Hazard: Skil Nibbler, Serial No. 371530, 2 cuts/tears in electrical cable; cover plate missing from electrical plug.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.106(e)(9)(i)

(9) Housekeeping-
(i) General. Maintenance and operating practices shall be in accordance with established procedures which will tend to control leakage and prevent the accidental escape of flammable or combustible liquids. Spills shall be cleaned up promptly.

Location: Building 511, Room 117, Carpenter Shop

Hazard: (Extremely) flammable oils and greases kept/stored in metal storage cabinet; liquids spilled in cabinet; improper quantities.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.242(a)

(a) General requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

Location: Building 511, Room 117, Carpenter Shop, South end of shop

Hazard: Electrical drop cord - both ends of cord were frayed at connection.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.243(a)(2)(ii)

(ii) All hand-held powered drills, tappers, fastener drivers, horizontal, vertical, and angle grinders with wheels greater than 2 inches in diameter, disc sanders with discs greater than 2 inches in diameter, belt sanders, reciprocating saws, saber, scroll, and jig saws with blade shanks greater than a nominal one-fourth inch, and other similarly operating powered tools shall be equipped with a constant pressure switch or control, and may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

Location: Building 511, Room 101, Electrical Department

Hazard: Hand-held drill used with trigger lock.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.252(b)(4)(ix)(c)

(c) Cables with damaged insulation or exposed bare conductors shall be replaced. Joining lengths of work and electrode cables shall be done by the use of connecting means specifically intended for the purpose. The connecting means shall have insulation adequate for the service conditions.

Location: Building 511, Welding Shop Area, Miller Welder # W232

Hazard: Ground cable - 3 inch split in jacket insulation.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.243(a)(5)

(5) Grounding. Portable electric powered tools shall meet the electrical requirements of subpart S of this part.

Location: Building 511, Welding Shop, Room 159A

Hazard: Black & Decker 7-inch heavy duty angle sander - ground wire removed from electrical plug.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.243(c)(4)

(4) Other portable grinders. The maximum angular exposure of the grinding wheel periphery and sides for safety guards used on other portable grinding machines shall not exceed 180° and the top half of the wheel shall be enclosed at all times.

Location: Building 511, Welding Shop, Room 159A

Hazard: Black & Decker 7 inch heavy duty angle sander - grinding wheel guard removed.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.132(a)

(a) Application. Protective equipment, including personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers, shall be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact.

Location: Building 511, Welding Shop, Locker #116, Fall Protection Lanyard

Hazard: Nylon Lanyard currently available for use with 1-inch tear in (nylon) lanyard.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.25(b)(1) and/or 1910.25(d)(1)(x)

(b) Materials-
(1) Requirements applicable to all wood parts.
(i) All wood parts shall be free from sharp edges and splinters; sound and free from accepted visual inspection from shake, wane, compression failures, decay, or other irregularities. Low density wood shall not be used.

(x) Ladders shall be inspected frequently and those which have developed defects shall be withdrawn from service for repair or destruction and tagged or marked as "Dangerous, Do Not Use."

Location: Building 511, Air Conditioning Shop, Ladder Storage Area

Hazard: Seven-foot wooden ladder - 14-inch split in wooden (back) leg.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.243(a)(2)(ii)

(ii) All hand-held powered drills, tappers, fastener drivers, horizontal, vertical, and angle grinders with wheels greater than 2 inches in diameter, disc sanders with discs greater than 2 inches in diameter, belt sanders, reciprocating saws, saber, scroll, and jig saws with blade shanks greater than a nominal one-fourth inch, and other similarly operating powered tools shall be equipped with a constant pressure switch or control, and may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

Location: Building 511, Air Conditioning Shop

Hazard: Miller-Falls 1/4 inch drill, Serial No. 25942
Trigger lock.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.243(a)(5)

(5) Grounding. Portable electric powered tools shall meet the electrical requirements of subpart S of this part.

Location: Building 511, Air Conditioning Shop

Hazard: Miller-Falls 1/4 inch drill, Serial No. 25942
Frayed cable (electrical) at handle.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.243(a)(2)(ii)

(ii) All hand-held powered drills, tappers, fastener drivers, horizontal, vertical, and angle grinders with wheels greater than 2 inches in diameter, disc sanders with discs greater than 2 inches in diameter, belt sanders, reciprocating saws, saber, scroll, and jig saws with blade shanks greater than a nominal one-fourth inch, and other similarly operating powered tools shall be equipped with a constant pressure switch or control, and may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

Location: Building 511, Air Conditioning Shop

Hazard: Skil - 1/4 inch drill - trigger lock.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.243(a)(5)

(5) Grounding. Portable electric powered tools shall meet the electrical requirements of subpart S of this part.

Location: Building 511, Air Conditioning Shop

Hazard: Skil - 1/4 inch drill - damaged electrical cable at handle.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

General Duty Clause, Public Law 91-596, Section 5(a)(1)

5(a) Each employer (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees.

Location: Building 511, Air Conditioning Shop

Hazard: Flammable hazards cabinet - 1/2 gallon plastic container of unlabeled materials (liquids) (left cabinet).

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

General Duty Clause, Public Law 91-596, Section 5(a)(1)

5(a) Each employer (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees.

Location: Building 511, Air Conditioning Shop

Hazard: Flammable hazards cabinet - unlabeled containers of hazardous materials (MAPP gas).

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.243(a)(2)(ii)

(ii) All hand-held powered drills, tappers, fastener drivers, horizontal, vertical, and angle grinders with wheels greater than 2 inches in diameter, disc sanders with discs greater than 2 inches in diameter, belt sanders, reciprocating saws, saber, scroll, and jig saws with blade shanks greater than a nominal one-fourth inch, and other similarly operating powered tools shall be equipped with a constant pressure switch or control, and may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

Location: Building 511, Air Conditioning Shop

Hazard: Miller-Falls 1/4 inch portable drill - Serial No. 26262 - trigger lock.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.242(a)

(a) General requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

Location: Building 511, Air Conditioning Shop, Extension Cord Cabinet

Hazard: #1 drop cord/light - electrical cable is damaged (insulation broken).

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.242(a)

(a) General requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

Location: Building 511, Air Conditioning Shop, Extension Cord Cabinet

Hazard: #2 drop cord/light - electrical cord is damaged (insulation broken).

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

General Duty Clause, Public Law 91-596, Section 5(a)(1)

5(a) Each employer (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees.

Location: Rigger Truck #90946, Labor-Rigger Shop, Building 511

Hazard: Two 3/4 ton come alongs:
Serial No. C226GU
Serial No. 7052X - Safety clips missing from hooks.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

General Duty Clause, Public Law 91-596, Section 5(a)(1)

5(a) Each employer (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees.

Location: Rigger Truck #90743, Labor-Rigger Shop, Building 511

Hazard: Two come alongs, both 3/4 ton:
Serial No. B436FV and Serial No. 40825 -
Safety clips missing from hooks.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.36(b)(5)

(5) Every exit shall be clearly visible or the route to reach it shall be conspicuously indicated in such a manner that every occupant of every building or structure who is physically and mentally capable will readily know the direction of escape from any point, and each path of escape, in its entirety, shall be so arranged or marked that the way to a place of safety outside is unmistakable. Any doorway or passageway not constituting an exit or way to reach an exit, but of such a character as to be subject to being mistaken for an exit, shall be so arranged or marked as to minimize its possible confusion with an exit and the resultant danger of persons endeavoring to escape from fire finding themselves trapped in a dead-end space, such as a cellar or storeroom, from which there is no other way out.

Location: Interior Offices of Building 511

Hazard: Interior offices do not necessarily have a pathway to an exit (offices lead to offices, storage areas, etc.). Confusion in a fire situation could result.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

General Duty Clause, Public Law 91-596, Section 5(a)(1)

5(a) Each employer (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees.

Location: Maintenance Mechanical - Thompson Surface Grinder I.D. No. G104, Building 511, Room 118

Hazard: Oil and grease running down from table top onto electrical fittings and conduit.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.242(a)

(a) General requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

Location: Building 511, Room 118, Maintenance Mechanical

Hazard: Black & Decker 3/8 inch drill - Serial No. 84693 - electrical cord needs repair, near plug.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.242(a)

(a) General requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

Location: Building 511, Room 118, Maintenance Mechanical

Hazard: Skil - Serial No. 72062 - Drill
Damaged electrical cord - housing end of electric cord.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(g)(1)(iii)

(iii) Unless specifically permitted in paragraph (g)(1)(i) of this section, flexible cords and cables may not be used:
(A) As a substitute for the fixed wiring of a structure;
(B) Where run through holes in walls, ceilings, or floors;

Location: Building 511, Maintenance Mechanical, Room 118-D

Hazard: Refrigerator in Break Room is connected into a drop cord; refrigerator plug/cable should be direct connected or connection box cable should be hard wired/conduit.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(g)(8)

(8) The employer shall maintain copies of the required material safety data sheets for each hazardous chemical in the workplace, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s).

Location: Building 511, Room 102, Pump Room for Heavy Equipment

Hazard: MSDS not available for this work area - nearest MSDS for this area approximately 200 yards (nearest access).

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(g)(1)(iii)

(iii) Unless specifically permitted in paragraph (g)(1)(i) of this section, flexible cords and cables may not be used:
(A) As a substitute for the fixed wiring of a structure;
(B) Where run through holes in walls, ceilings, or floors;

Location: Building 511, Air Conditioning Shop, Room 136

Hazard: Soft wire cable wired through top of metal cabinet; should be hard-wired to cabinet top (3 lockers).

BUILDING 519

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.242(a)

(a) General requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

Location: Building 519, Gardener Shop, Tool Storage

Hazard: One 25-foot drop cord - insulation jacket damaged (cut) near/at female receptacle.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.242(a)

(a) General requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

Location: Building 519, Gardener Shop, Tool Storage

Hazard: One 50-foot drop cord - insulation jacket damaged (pulled away from) female receptacle.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(g)(1)(iii)

(iii) Unless specifically permitted in paragraph (g)(1)(i) of this section, flexible cords and cables may not be used:
(A) As a substitute for the fixed wiring of a structure;
(B) Where run through holes in walls, ceilings, or floors;

Location: Building 519, Gardener Shop, Tool Storage

Hazard: Drop cord used in place of hard wiring on refrigerator in office area.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

1910.242(a)

(a) General requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

Location: Building 519, Room 100B, Heavy Equipment Repair

Hazard: Floor fan - male receptacle on electric cord: cable damage - end cover plate missing. Cable damaged in numerous locations from plug to about 18 inches up the length of cord.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.106(e)(9)(i)

(9) Housekeeping-
(i) General. Maintenance and operating practices shall be in accordance with established procedures which will tend to control leakage and prevent the accidental escape of flammable or combustible liquids. Spills shall be cleaned up promptly.

Location: Building 519, Room 100B, Special Equipment Locker

Hazard: Flammable materials storage cabinet has oil and other materials spilled onto six cabinet shelves.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

General Duty Clause, Public Law 91-596, Section 5(a)(1)

5(a) Each employer (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees.

Location: Building 519, Heavy Equipment Repair
Truck E-90963 Service Vehicle

Hazard: Oil and grease on posts of battery used to start Honda G-400 compressor, as well as on/in compressor compartment.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.157(e)(3)

(e) Inspection, maintenance and testing.
(3) The employer shall assure that portable fire extinguishers are subjected to an annual maintenance check. Stored pressure extinguishers do not require an internal examination. The employer shall record the annual maintenance date and retain this record for one year after the last entry or the life of the shell, whichever is less. The record shall be available to the Assistant Secretary upon request.

Location: Building 519, Heavy Equipment Repair, Fuel Tank # E-90536, Fuel Service Truck

Hazard: Both (2) fire extinguishers are not in compliance - outdated - no tags.

University of California

Type of Violation	Inspection Number	Inspection Site
Serious	21067	Lawrence Livermore National Laboratory

Description

General Duty Clause, Public Law 91-596, Section 5(a)(1)

5(a) Each employer (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees.

Location: Building 519, Heavy Equipment Repair, Fuel Service Truck # E-90563

Hazard: Hose reel and control box had 1/2 dozen fuel-soaked rags stored/piled inside fuel box near fuel dispensing nozzle and hardware.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

General Duty Clause, Public Law 91-596, Section 5(a)(1)

5(a) Each employer (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees.

Location: Building 519, Heavy Equipment Repair, Chevrolet Suburban Service Vehicle # E-90254

Hazard: One-gallon container of unidentified liquids (in red hazard can).

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.157(d)(1)

(1) Portable fire extinguishers shall be provided for employee use and selected and distributed based on the classes of anticipated workplace fires and on the size and degree of hazard which would affect their use.

Location: Building 519, Heavy Equipment Repair, Chevrolet Suburban Vehicle # E-90254

Hazard: No fire extinguisher for service truck.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

General Duty Clause, Public Law 91-596, Section 5(a)(1)

5(a) Each employer (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees.

Location: Building 519, Heavy Equipment Repair, Chevrolet Pick-Up # E-90732

Hazard: Five-gallon container (95% empty at this time) for waste oils - no label of any type.

BUILDING 611

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees.

Location: Building 611, Auto Fleet Maintenance, Room 1110, AMMCO Drum lathe

Hazard: Insulation on electrical power cord to light, was damaged.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(f)(5)(i)

(5) Except as provided in paragraphs (f)(6) and (f)(7) the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:
(i) Identity of the hazardous chemical(s) contained therein; and

Location: Building 611, Auto Fleet Maintenance, Room 1048, Janitor's closet

Hazard: Chemical container not labeled as to contents.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(f)(5)(ii)

(5) Except as provided in paragraphs (f)(6) and (f)(7) the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:
(ii) Appropriate hazard warnings.

Location: Building 611, Auto Fleet Maintenance, Room 1048, Janitor's closet

Hazard: Chemical container was not labeled with the appropriate hazard information.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.215(a)(4)

(4) Work rests. On offhand grinding machines, work rests shall be used to support the work. They shall be of rigid construction and designed to be adjustable to compensate for wheel wear. Work rests shall be kept adjusted closely to the wheel with a maximum opening of one-eighth inch to prevent the work from being jammed between the wheel and the rest, which may cause wheel breakage. The work rest shall be securely clamped after each adjustment. The adjustment shall not be made with the wheel in motion.

Location: Building 611, Auto Fleet Maintenance, Room 1035, Bicycle Repair

Hazard: Layton grinder had a gap greater than 1/8 inch between work rest and grinding wheel.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.215(d)(3)

(3) Surface condition. All contact surfaces of wheels, blotters and flanges shall be flat and free of foreign matter.

Location: Building 611, Auto Fleet Maintenance, Room 1035, Dayton Grinder

Hazard: Grinding wheel surface was not flat, it had a groove worn in to the surface so that it could catch on a tool, breaking the wheel.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(f)(5)(i)

(5) Except as provided in paragraphs (f)(6) and (f)(7) the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:
(i) Identity of the hazardous chemical(s) contained therein; and

Location: Building 611, Auto Fleet Maintenance, Room 1044

Hazard: Chemical container was not labeled with information identifying contents.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.303(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 611, Auto Fleet Maintenance, Room 1100

Hazard: Extension cord used on metal cutoff saw had the insulation cut through to conductors.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(g)(8)

(8) The employer shall maintain copies of the required material safety data sheets for each hazardous chemical in the workplace, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s).

Location: Building 611, Auto Fleet Maintenance, Room 1110

Hazard: MSDS was not readily accessible for bead blasting sand.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.212(b)

(b) Anchoring fixed machinery. Machines designed for a fixed location shall be securely anchored to prevent walking or moving.

Location: Building 611, Auto Fleet Maintenance, Room 1110

Hazard: Dayton pedestal belt sander was not securely mounted to floor.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(f)(5)(i)

(5) Except as provided in paragraphs (f)(6) and (f)(7) the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:
(i) Identity of the hazardous chemical(s) contained therein; and

Location: Building 611, Auto Fleet Maintenance, Room 1100, Chemical storage cabinet

Hazard: Chemical container was not labeled with information describing contents.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(f)(5)(ii)

(5) Except as provided in paragraphs (f)(6) and (f)(7) the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:
(ii) Appropriate hazard warnings.

Location: Building 611, Auto Fleet Maintenance, Room 1100, Chemical storage cabinet

Hazard: Chemical container was not labeled with hazard information.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.305(b)(1)

(b) Examination, installation, and use of equipment-
(1) Examination. Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees. Safety of equipment shall be determined using the following considerations:

Location: Building 611, Auto Fleet Maintenance, Mezzanine

Hazard: Conduit junction box had an unused opening which allowed access to conductors.

University of California

Type of Violation	Inspection Number	Inspection Site
Other-Than-Serious	21067	Lawrence Livermore National Laboratory

Description

1910.1200(g)(8)

(8) The employer shall maintain copies of the required material safety data sheets for each hazardous chemical in the workplace, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s).

Location: Building 611, Auto Fleet Maintenance, Mezzanine, chemical storage cabinet

Hazard: An MSDS was not readily accessible for two component urethane paint

APPENDIX G

LLNL BUDGET AND FINANCIAL SYSTEMS

IMPACT ON

ENVIRONMENT, SAFETY AND HEALTH ACTIVITIES

APPENDIX G

LLNL BUDGET AND FINANCIAL SYSTEMS IMPACT ON ENVIRONMENT, SAFETY AND HEALTH ACTIVITIES

1.0 OBJECTIVES OF THE FINANCE REVIEW

The objectives of this review were to:

- o Understand the management process utilized at LLNL to develop budgets for institutional activities, with particular emphasis on budgeting for ES&H activities.
- o Determine if ES&H initiatives are separately funded and liquidated via an indirect charging rate or are directly charged to programs.
- o Determine if ES&H budgets are developed based on a need for ES&H services or by the need to maintain a target overhead rate.
- o Determine how special/unanticipated ES&H requirements are funded.
- o Determine how ES&H expenses are managed and controlled at LLNL.
- o Understand how ES&H line managers perceive the budget process and the extent of their participation in that process.

2.0 OBSERVATIONS

OBSERVATION NO. 1

LLNL charges the preponderance of its institutional and general and administrative (G&A) type costs to final cost objectives via an overhead liquidation rate that is applied to a direct labor base. The overhead liquidation rate for the FY 90 budget is 75.5 percent. A significant portion of LLNL's ES&H expenses (FY 90's overhead rate included approximately $32.8 million of ES&H-related expenses) are included in the overhead pool. The key elements of LLNL's overhead budgeting process are:

- o Budget call issued by the Controller.
- o Controller's Office develops budget guidance (signed-off by senior LLNL management) to all Division/Department managers.
- o Associate Directors are requested to submit incremental (to baseline guidance) funding requests. Detailed justification in support of incremental requests are required.
- o Senior LLNL management reviews requests and recommends an overhead budget to the LLNL Director.
- o LLNL Director approves the overhead budget.

- Division management reviews the budget package with Department-level management.
- Incremental funding requests are analyzed by the Controller's staff.
- LLNL management reviews incremental budget requests; final budgets are signed-off based on a "balancing-of-needs" between programmatic and institutional objectives.
- SAN is briefed when budget sign-offs are complete.
- Actual costs are monitored and reviewed against budgets during the fiscal year.
- A formal mid-year review is held to determine budget modifications; unanticipated requirements receive incremental funding.
- A contingency is built into the overhead budget (FY 90 contingency = $3.4 million) to fund unanticipated requirements.

ES&H activities that are funded through the overhead rate utilize the above-mentioned process in budgeting/managing their resources. Division-level management reviews their incremental budget requests with their Department manager; the Department manager reviews the Department budget submission with D.K. Fisher (Associate Director, Administration and Operations). After the Fisher sign-off, the ES&H budgets are submitted to be reviewed by the Controller's staff and senior LLNL management.

OBSERVATION NO. 2

ES&H resources are funded by several sources: (1) they are funded in the overhead pool; (2) they are charged directly to final cost objectives (programs); and (3) they are directly funded. Enumerated below is a summary of ES&H resources budgeted for FY 90.

	($ millions)
o Environmental Protection	$17.1
o Hazards Control	13.1
o Health Services	2.6
Subtotal - Indirect Funded (OH Rate)	$32.8
o Corrective Actions (GF71)	$ 1.1
o Environmental Restoration (GF72)	17.3
o Technical Development	2.4
Subtotal - Directly Funded	$20.8
o Hazards Control-Directly Charged(Programs)	$ 6.7

It is also likely that there are ES&H-related activities directly charged to LLNL programs (in addition to the $6.7 million identified above) that cannot be easily quantified. An example of this would be where a physicist/engineer

performs an ES&H function as part of his/her normal routine and the charge is to a shop order/work package that is not clearly designated as an ES&H task.

OBSERVATION NO. 3

Special ES&H requirements that surface during the fiscal year (but which were not anticipated in the budget) are generally funded during the mid-year budget review described supra. The sources of the incremental funding needed to cover these needs are the contingency built into the overhead budget and any efficiencies/improvements achieved/expected to be achieved during the fiscal year. The FY 90 overhead budget provided the following contingency:

	($ millions)
Institution Reserve	$ 1.0
Director's Reserve	2.4
Total Contingency	$ 3.4

Interviews with ES&H line-management revealed they apparently understood that any unanticipated needs would be funded. This is noteworthy. In fact, the Environmental Protection Department is planning to submit a $4.6 million incremental request at the mid-year budget review. (The Environmental Protection Department received mid-year funding adjustments of $290 thousand and $1,112 thousand for FY 88 and FY 89 respectively.)

OBSERVATION NO. 4

The opinion of several of the Department managers and resource managers of overhead departments was, that, prior to the FY 90 planning process, the budget reviews with the Laboratory's senior management resulted in mandated resource reductions based on senior management's desire to minimize the overhead rate rather than decisions based on whether a particular service was needed. An analysis of historical financial data supports this viewpoint. An examination of LLNL's overhead expenses as a percentage of total operating costs yields the following percentages:

- FY 1984: 23.8%
- FY 1985: 24.2%
- FY 1986: 21.1%
- FY 1987: 20.7%
- FY 1988: 21.1%
- FY 1989: 22.5%
- FY 1990: 25.4%

Clearly, both FY 89 and FY 90 show an increase in the percentage of the overhead expenses to total LLNL operating expenses, when compared to the prior years, during which time the percentage remained relatively constant. In the area of ES&H overhead funding, FY 90's budget level of $32.8 million was 31 percent higher than FY 89's budget and 51 percent higher than FY 88's budget.

OBSERVATION NO. 5

The funding level for the Environmental Protection Department increased significantly during the FY 88-FY 90 period, rising from $9.6 million in 1988 to $17.1 million in 1990. Nevertheless, LLNL management, in an effort to control total sitewide manpower, was reluctant to authorize the hiring of career personnel (full-time, permanent LLNL staff) to staff the organization, mandating instead that the manpower requirement be met through the retraining of existing, redundant LLNL staff or through the utilization of subcontracted and non-career personnel. Changes in funding and affordable staffing have now allowed LLNL management to reverse its position on this matter, and LLNL now is aggressively attempting to hire the required career employees. The residual impact of the prior policy, however, is that there are approximately 50 unfilled positions in the Environmental Protection Division.

OBSERVATION NO. 6

Resources from the Safety Services, the Health and Safety, and the Operating Safety Divisions within the Hazards Control Department are charged to final cost objectives both directly (through direct charging of labor) and indirectly (through the overhead rate). The resources that are charged directly to final cost objectives (programs) are also fully burdened with LLNL's overhead rate.

3.0 SUMMARY

The management process that is employed at LLNL to budget resources for institutional activities, is designed to result in an equitable balancing of programmatic and institutional needs. The budget process provides adequate, but not restrictive guidance, to Division/Department managers to allow them to adequately articulate their requirements for resources. The process requires uniform formats that are designed to provide senior management with the necessary information to help them understand the justification needed to support requests for resources.

The execution of the institutional budgeting process by LLNL management has improved significantly with the FY 89 and FY 90 budget cycles. Prior to the FY 89 budget process, the execution of the budget process was characterized by more focus being placed on minimizing the overhead rate than on providing adequate resources to such institutional functions as ES&H and plant maintenance. The management review process was characterized by prioritizing competing requirements for funds and then allocating the amount of overhead expense that LLNL believed it could "afford" to the highest priority projections. This approach probably caused insufficient allocation of resources to ES&H and plant maintenance activities than was necessary to assure compliance with applicable DOE Orders and other governmental regulations. Examination of historical financial data revealed that overhead expenses as a percentage of total operating costs declined from 24 percent in FY 85 to 21 percent in FY 86 and then remained essentially stable through FY 88.

The execution of the FY 90 management process for budgeting institutional activities was significantly improved. The management focus during the FY 90 budget process was on providing the resources required to perform

institutional functions efficiently, while assuring compliance with applicable DOE Orders and governmental regulations. The FY 90 process resulted in senior management meeting on seven different occasions before developing their final proposal for LLNL's overhead budget. In addition, the LLNL Director reviewed the FY 90 overhead budget submitted by the senior management team during three separate meetings before finally approving the budget. This rigorous process was recognized and appreciated by Division/Department management, and consequently increased the credibility of the entire budgeting process. The change in the management focus during the FY 90 planning process is clearly apparent in an examination of LLNL's overhead expenses as a percentage of total operating costs, which showed this percentage increasing from approximately 22 percent in FY 89 to approximately 25 percent in FY 90. The budgets for the key ES&H Departments also showed healthy increases in FY 90 as indicated:

($ Millions)	FY 89	FY 90	V %
Environmental Protection	$12.1	$17.1	41%
Hazards Control	10.5	13.1	25%
Health Services	2.4	2.6	8%
Total ES&H	$25.0	$32.8	31%

The ES&H Division/Department managers recognized that a significant change had occurred during the execution of the FY 90 budget process. The FY 89/90 budget comparisons reveal a significant increase in the resources allocated to ES&H initiatives. However, it is noteworthy that the increase received by the ES&H Departments in FY 90 represented approximately 82 percent of the budget requested by the Department managers, and 95 percent of the budget officially requested by the Associate Director for Administration and Operations to the Controller's Office. Nevertheless, the ES&H Departments were funded at the level required for them to meet applicable DOE Orders and other governmental regulations. The variance between the requested and the budgeted amounts related to the elimination of certain productivity and proactive initiatives that, in the view of the Department managers, would have been beneficial, but were not required to achieve compliance. However, Department managers may choose to fund certain productivity initiatives by sacrificing what is, in their opinion, a low-level compliance requirement. At least one manager has chosen this approach.

The FY 90 overhead budget included approximately $3.4 million for contingencies. The purpose of these contingencies was to make available funding for requirements that surface during the fiscal year but which were not anticipated during the budget process. LLNL Division/Department management understands that unanticipated needs for funding are to be proposed at the mid-year financial reviews, and they believe it is likely that resources will be made available to meet these needs. This management mindset is important, because it makes it less likely that ES&H-related requirements which surface after the budget is finalized will be deferred due to the lack of adequate budget. Indeed, the Environmental Protection Department is planning to request $4.6 million of additional funding during the mid-year budget review; approximately $4.0 million of this amount is for waste disposal initiatives that arose as a result of preparation for the scheduled Tiger Team review.

The cultural change described above also eliminated a significant constraint placed upon the line management of the Environmental Protection Department in its attempts to staff their respective divisions to meet prescribed goals and objectives. The budget for the Environmental Protection Department increased from $9.6 million in FY 88 to $12.1 million in FY 89 (a 26 percent increase) and to $17.1 million in FY 90 (a 41 percent increase). During this period, however, because of a sitewide hiring freeze, the Environmental Protection Department was not permitted to actively recruit new career employees; instead, they were required to meet their manpower needs by retraining existing, redundant LLNL employees, and by using subcontract personnel and non-career personnel. Although this constraint has been eliminated recently and the organization is actively recruiting career personnel, the net impact of this management policy is that there are now approximately 50 unfilled positions in the Environmental Protection Division and, hence, the capacity to meet the Department's mission is reduced.

The practice of charging Hazards Control Department resources to final cost objectives both directly and indirectly through the overhead rate is problematic. The Safety Services Division serves all programs at LLNL and, with the exception of one program, charges its expenses to final cost objectives through the overhead program. The single exception relates to services needed by this program which could not be provided within the Safety Services Division's budget because the related resources were cut during the budget review process. Since the program could afford to pay for the needed services as a direct charge, those services were provided and charged directly to the program. The direct charges, which themselves were burdened with overhead, were in addition to the normal Safety Services Division expense charged to that program via the overhead rate. This represents a clear instance where the execution of the budget process dictated which required services LLNL could buy, instead of having the needs of LLNL define the overhead budget. In the instant case, the subject program was able to "afford" the required resources; if the program was unable to afford the needed services, the net result would likely have been that the required safety services would not have been made available. Management should investigate this matter as a potential cost accounting violation of CAS 401 and CAS 402.

A similar case (of charging Department resources both directly to the program and indirectly through the overhead rate) exists for both the Health and Safety Division and the Operations Safety Division. The decision to charge Division resources directly in these instances was the result of a conscious management decision instead of as a means to solve a budget shortfall, as was the case with the Safety Services Division. Management believes that charging a portion of these resources directly to the projects will result in program managers being more responsible for health and safety-related resources and consequently will increase their "ownership" of health and safety issues related to their programs. The second benefit that management believes results from this practice is that those programs requiring unique health and safety resources are made to pay for these unique services directly. This practice should be evaluated and consideration given to charging all services,

provided by the Health and Safety Division and the Operations Safety Division, to final cost objectives via the overhead rate. This is based on the following:

- The existing practice could result in a decision that an under-funded program will forego required safety and health services, in order to utilize scarce resources on direct programmatic objectives.

- The efficiency of the subject Divisions would be improved as a result of Division personnel being able to focus on their jobs instead of spending time deciding how to charge their time.

- Charging a similar resource both directly and indirectly, even under these circumstances, could be a CAS 401/CAS 402 violation.

- Improving program management's awareness of and responsibility for ES&H issues should be accomplished by changing the "corporate culture" and reflecting the need for that responsibility in the performance evaluation process, not by manipulating the institution's cost charging practices.

There is another potential cost accounting issue that may ultimately impact management's ability to allocate resources to environmental protection and waste management initiatives. DOE will, commencing in FY 90, directly fund environmental protection and waste management initiatives. This direct funding will be delegated to LLNL under a specific environmental protection/waste management B&R line (i.e., EW or EM). The funding that will be delegated to LLNL under the EW/EM B&R line, in essence, represents funding that has been reprogrammed from other LLNL programs (i.e., DP and ER). However, direct funding will not cover safety and health-related initiatives, which will continue to be funded through the overhead rate.

This proposed action could, potentially, limit the amount of environmental protection/waste management initiatives undertaken by the Laboratory. Adherence to government cost accounting standards (specifically CAS-402) would require that normal LLNL indirect burdens be added to all direct charges incurred on environmental protection/waste management initiatives. The burdening of direct expenses would clearly increase the expense of doing environmental protection/waste management projects, relative to charging those projects indirectly. The key limitation, however, results when/if the need for environmental protection/waste management spending is in excess of the effective EW/EM funding. Assuming those circumstances, LLNL management would be placed in the position of having to decide whether to defer/cancel environmental protection/waste management projects (because their current year's funding is inadequate to meet existing needs) or exceed their current year's budget authority. This dilemma would not occur under the current cost accounting/charging structure where additional needs for environmental protection/waste management initiatives can be budgeted by deferring other, less-critical classes of indirect expenses, or, by simply increasing the overhead burden percentage.

LLNL has a program in place (referred to as "Dialogue") where employees are encouraged to make management aware of instances of non-compliance with DOE Orders and regulations, instances of waste, fraud, and abuse regarding Federal assets, etc. This program encourages an employee to sign his/her name to any alleged complaint that he/she inputs into the system. This "encouragement" may inhibit employees from surfacing potential problems, since they may fear management retribution. Anonymous submittals may be just as effective, as long as employees have confidence that anonymously submitted complaints will be thoroughly investigated. It is likely that encouraging anonymous submissions will result in a significant increase in total submissions (particularly in the number of petty submissions). An "open" program will result in better feedback to LLNL management regarding instances of non-compliance in the ES&H area (as well as other compliance areas). This should offset the costs associated with the resulting increase in the number of petty submissions.

APPENDIX H

GLOSSARY OF INITIALISMS AND ACRONYMS

APPENDIX H

Glossary of Initialisms and Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
ACM	Asbestos Containing Materials
AD	Associate Director
ADM	Action Description Memoranda
AEA	Atomic Energy Act
ALARA	As Low As Reasonably Achievable
ANS	American Nuclear Society
ANSI	American National Standards Institute
ARAC	Air Release Advisory Capability
ARAR	Applicable or Relevant and Appropriate Requirements
ATA	Advanced Test Accelerator
ASME	American Society of Mechanical Engineers
AST	Aboveground Storage Tank
AVLIS	Atomic Vapor Laser Isotope Separation
BAAQMD	Bay Area Air Quality Management District
Be	Beryllium
BMP	Best Management Practice
BMR	Baseline Monitoring Reports
BSS	Building Safety Systems
CAA	Clean Air Act
CAC	California Administrative Code
CAM	Continuous Air Monitor
CAR	Corrective Action Reporting
CAS	Cost Accounting Standards
CCR	California Code of Regulations

CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CF	Compliance Finding
CFR	Code of Federal Regulations
CHWMR	California Hazardous Waste Management Regulations
COD	Chemical Oxygen Demand
CPAF	Cost Plus Award Fee
CPCWQCA	California Porter-Cologne Water Quality Control Act
CRWQCB	California Regional Water Quality Control Board
CRWQCB-CV	California Regional Water Quality Control Board - Central Valley
CWA	Clean Water Act
D-38	Depleted Uranium (U-238)
DAP	Discipline Action Plan
DAS, SHQA	Deputy Assistant Secretary for Safety, Health and Quality Assurance
DER	Department of Environmental Regulations
DHS	Department of Health Services
DOE	U.S. Department of Energy
DOELAP	DOE Laboratory Accreditation Program
DOHS	California Department of Health Services
DOL	U.S. Department of Labor
DOP	Dioctylphthalate
DOT	U.S. Department of Transportation
D&D	Decontamination and Decommissioning
EA	Environmental Assessment
EAL	Emergency Action Level
EAP	Employee Assistant Program

EASL	Environmental Analytical Sciences Laboratory
ECL	Environment Chemistry Laboratory
EDD	Employee Development Division
EDS	Engineering Demonstration System
EH&SP	Environmental Health and Safety Program
EIS	Environmental Impact Statement
EM	Environmental Monitoring
EMP	Environmental Monitoring Program
EMT	Emergency Medical Technician
ECC	Emergency Operation Center
EP	Extraction Procedure
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPD	Emergency Planning Department
EPIP	Emergency Plan Implementing Procedures
ER	Environmental Restoration
ERDA	Energy Research and Development Agency
ES&H	Environment, Safety and Health
ES&HP	Environment, Safety and Health Program
ESQA	Environment, Safety and Quality Assurance
FFA	Federal Facility Agreement
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FMRC	Factory Mutual Research Corporation
FONSI	Finding of No Significant Impact
FR	Federal Register
FSAR	Final Safety Analysis Report
FSP	Facility Safety Procedures

FTE	Full-Time Employee
FY	Fiscal Year
GFCI	Ground Fault Circuit Interrupter
GMW	General Metal Works
GPM	Gallons per Minute
GSA	General Services Area
HAZWRAP	Hazardous Waste Remedial Action Programs
HCD	Hazards Control Department
HE	High Explosives
HEAF	High Explosives Application Facility
HEPA	High-Efficiency Particulate Air
HESQA	Health, Environment, Safety and Quality Assurance
HETB	Hardened Engineering Test Building
HIRAC	Hazardous Information Record and Control
HMCP	Hazardous Materials Control Policy
HP	Health Physics
H&S	Health and Safety
HSM	Health and Safety Manual
HST	Health and Safety Technicians
HSWA	Hazardous and Solid Waste Amendment of 1984
HT	Tritiated Hydrogen Gas
HTO	Tritiated Water
HWM	Hazardous Waste Management
HWMD	Hazardous Waste Management Division
IA	Integrity Assessment
IEEE	Institute of Electrical and Electronic Engineers
IH	Industrial Hygienist

INEL	Idaho National Engineering Laboratory
INPO	Institute of Nuclear Power Operations
LCO	Limiting Conditions of Operation
LDF	Laser Demonstration Facility
LDR	Land Disposal Restrictions
LEDO	Laboratory Emergency Duty Officer
LEPC	Local Emergency Planning Commission
LLD	Lower Limit of Detection
LLNL	Lawrence Livermore National Laboratory
LLW	Low-level Waste
LSA	Low Specific Activity
LWRP	Livermore Water Reclamation Plant
MD	Management Directive
MDA	Minimum Detectable Activity
MDD	Materials Distribution Division
MEEI	Manufacturing Engineering Equipment Instruction
mg/l	Milligram per Liter
MI	Manufacturing Instruction
MICN	Mobile Intensive Care Nurse
MMD	Materials Management Division
MOCVD	Metal Oxide Chemical Vapor Deposition
MOU	Memorandum of Understanding
MSDS	Material Safety Data Sheets
MTF	Memo-to-File
MWTA	Medical Waste Tracking Act
NCP	National Contingency Plan
NCR	Nonconformance Reporting

NDE	Nondestructive Evaluation
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
NIST	National Institute of Standards and Technology
NP	Noteworthy Practice
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NQA	Nuclear Quality Assurance
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
NVO	U.S. Department of Energy Nevada Operations Office
OI	Operating Instructions
OJT	On-the-Job Training
ORR	Operational Readiness Review
OS	Occupational Safety
OSA	Office of Safety Appraisals
OSHA	Occupational Safety and Health Administration/Act
OSP	Operational Safety Procedure
OSR	Operational Safety Requirement
OSWER	Office of Solid Waste and Emergency Response
PA	Public Address
PCB	Polychlorinated Biphenyl
PFD	Protective Force Division
ppb	Parts per Billion
ppm	Parts per Million

PSAR	Preliminary Safety Analysis Report
PT	Packaging and Transportation
Pu	Plutonium
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAM	Quality Assurance Manual
QAO	Quality Assurance Office
QAP	Quality Assurance Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RQ	Reportable Quantity
RSDRS	Retention System Disposition Record System
RSO	Responsible Supervisory Official
RWP	Radiation Work Permit
RWQCB	Regional Water Quality Control Board
SA	Safety Appraisal
SAA	Satellite Accumulation Area
SAD	Safety Analysis Document
SAG	Safety Analysis Guide
SAN	U.S. DOE San Francisco Operations Office
SAR	Safety Analysis Report
SARA	Superfund Amendments and Reauthorization Act
SCBA	Self-contained Breathing Apparatus
SDWA	Safe Drinking Water Act
SEG	Standby Emergency Generator

SEN	Secretary of Energy Notice
SEPC	State Emergency Planning Commissions
SERT	Security Emergency Response Team
S&H	Safety and Health
SHPO	State Historic Preservation Officer
SILAS	Secure Interactive Livermore Alarm System
SIS-EDS	Special Isotope Separation Engineering Demonstration System
SJCAPCD	San Joaquin County Air Pollution Control District
S&OH	Safety and Occupational Health
SOP	Standard Operating Procedures
SPCC	Spill Prevention Control and Countermeasures Plan
SRC	Safety Review Committee
SRL	Site Rehabilitation Levels
SWMU	Solid Waste Management Unit
TAP	Training Accreditation Program
TCE	Trichloroethylene or Trichloroethene
TEGD	Technical Enforcement Guidance Document
TLD	Thermoluminescent Dosimeter
TRU	Transuranic
TSA	Technical Safety Appraisal
TSCA	Toxic Substances Control Act
TTA	Tiger Team Assessment
UC	University of California
$ug/100cm^2$	Microgram per/100 Square Centimeters
ug/g	Microgram per Gram
ug/m^3	Microgram per Cubic Meter
UL	Underwriters Laboratories

UOR	Unusual Occurrence Report
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	Underground Storage Tank
UV	Ultraviolet
VOC	Volatile Organic Compound
V&V	Verification and Validation
WAA	Waste Accumulation Area
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant
WMP	Waste Management Plan
WTSG	Wastewater and Tank Systems Group