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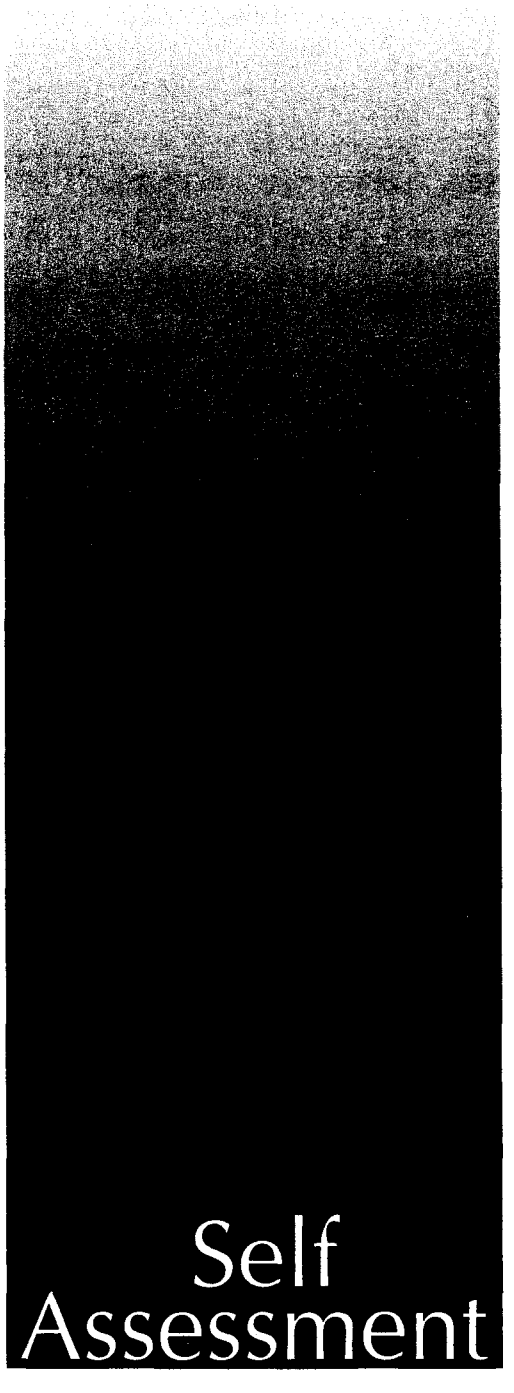

Environmental Safety and Health Management and Organization Self Assessment

Executive Summary

This report presents the results of the Laboratory's* environment, safety, and health self assessment which was carried out in preparation for a Tiger Team Assessment in October 1991, and starts an ongoing, institutional self–assessment process. Normally an "assessment" is based on a mixture of both positive and negative findings. It is important to note that in this report *only* those factors needing improvement are documented. There were frequent examples of areas which met or exceeded the criteria used, but they were not recorded in the report. When assessing whether a particular criterion was met laboratory wide, it was often found that it was met in some programmatic areas, but not in others. If this occurred, a negative finding identifying the local deficiency resulted. Thus this "self assessment" is not a *net* assessment of the environment, safety, and health program of the Laboratory, and should *not* be so interpreted.

The assessment was managed and coordinated by a Self–Assessment Task Force (SATF), which consisted of at least one senior manager from each of the five divisions of the Laboratory. Besides performing the self assessment reported here, a major goal of the task force was to structure a basis for an ongoing, institutionalized self–assessment program. More than 200 people from throughout the Laboratory had a substantial role in conducting this self assessment. That, by itself, has been extremely useful in increasing awareness in the Safety Program and environment, safety, and health.

The assessment was conducted from mid–February through mid–June 1991, followed by a two–month period of validating findings and report writing. After a major house cleaning effort, the SATF first organized an inspection of all Laboratory facilities and buildings which was followed immediately by a program to correct the many OSHA–type deficiencies that had been found. Once the site inspection was underway, the SATF organized three committees for environment, safety and health, and management and organization. The work and resulting findings of each of these committees is summarized below.

Environment

The Environmental Assessment is based on and measured against performance objectives and standards defined by Department of Energy (DOE) Orders and federal, state, and local regulations for the following programmatic areas: air, surface water, industrial wastewater, waste management, quality assurance, inactive waste sites, soil/sediments and biota, ground water, toxic chemicals materials, radiation, and NEPA.

The assessment was conducted in two phases. First, teams composed of Laboratory personnel and consultants conducted a site–wide evaluation of programmatic elements at the operations level. Second, the consultants assessed the programs and management in the Environmental Protection and Waste Management Department of the ES&H Division. The results of Phase (2) are based on interviews with key ES&H Division personnel and inspection and review of all applicable reports, procedures, files, permits, inspection reports, audits, and correspondence.

Using the consultants' report and their own knowledge of the Laboratory, the Environmental Committee prepared the Findings, Discussions, and Proposed Actions that are presented in Chapter 2, "Environmental

* The *Laboratory* is defined to include all of SLAC and SSRL, which was assumed to be a division of SLAC for the purpose of this assessment.

Assessment." It identified a total of 61 environmental programmatic findings and 10 environmental management findings, many of which fall under one of the following key findings:

- Environmental programs are not adequately planned and implemented.
- There is not enough environmental training for Hazardous Waste and Materials Coordinators, generators of hazardous waste, and line managers.
- There is a lack of written procedures for carrying out environmental programs, regulations, and DOE Orders.
- Quality assurance has not been incorporated into environmental programs.

Safety and Health

The Safety and Health Assessment was conducted according to the performance objectives and supporting criteria detailed in DOE/EH-0135, June 1990, *Performance Objectives and Criteria for Technical Safety Appraisals at DOE Facilities and Sites*. The functional areas assessed were: organization and administration, quality verification, operations, maintenance, training and certification, auxiliary systems, emergency preparedness, technical support, packaging and transportation, safety/security interface, experimental activities, site/facility review, radiological protection, personnel protection, worker safety and health (OSHA) compliance, industrial hygiene, occupational safety, fire protection, and medical services. Teams of reviewers from the Laboratory addressed the applicable performance objectives of each of the above categories. The Findings of the teams and their comments were collated and reviewed by the Safety and Health Committee. Each Finding was further researched as necessary. Additional Findings were generated from comprehensive reviews of internal and other Laboratory and DOE/government documentation, the site inspection, input from the other self-assessment Committees, and other appraisals of the Laboratory. All Findings were assembled into a standardized format, Discussions appended as needed, and a Proposed Action developed. The result of this work is presented in Chapter 3, "Safety and Health Assessment."

The Safety and Health Committee identified a total of 227 Findings, many of which fall under one of the following key findings:

- The Laboratory does not have in place a fully implemented self-assessment program for safety and health issues. Consequently numerous safety-related problems have persisted.
- The ES&H Division is a recent creation, and thus has not yet had the opportunity to develop and coordinate the appropriate training and advisory activities essential for an integrated, laboratory-wide environment, safety, and health program.
- Communication and training in the essential areas of staff responsibilities, and attention to compliance with applicable environment, safety, and health standards, is not uniformly established throughout the Laboratory.
- Formality in addressing and implementing safety and health policy has been lacking in the line organization. Therefore, in many areas, there is a lack of documentation of procedures and actions.
- The large number of OSHA-type deficiencies found in the site inspection indicates numerous electrical system concerns and a lack of attention towards good housekeeping practices.
- The manner in which the Laboratory addresses the safety and health indoctrination of its many visitors participating in scientific programs and on-site subcontractors is not in conformance with the programs now planned and/or implemented for its employees.

Management and Organization

The Management and Organization Assessment covered performance objectives in the programmatic areas of commitment, organization, planning, human resource management, and public and institutional interactions. The Management and Organization Committee used as a guide *Recommended Management Performance Objectives and Criteria for Tiger Team Management Assessment*, dated June 14, 1990. The Committee developed questions, based on criteria in the above document, and distributed them to senior Laboratory managers who were then interviewed by members of the Committee. In addition, a multi-level questionnaire was used to conduct vertical slice interviews through various Laboratory groups. Based on the results of these interviews and the review of various Laboratory documents, the Committee developed 18 Findings. The findings can be summarized as follows:

- Authority and responsibility for environment, safety, and health in the Laboratory has not, until recently, been adequately defined or understood.
- Staff training necessary to implement environment, safety, and health policies has been inadequate.
- Integration of environment, safety, and health issues into Laboratory management, planning, and related activities has only recently been undertaken and its results are not yet apparent.

The results of the work of the Management and Organization Committee are presented in Chapter 4, "Management and Organization Assessment."

Root Causes

Each Finding from both the Environmental, and the Safety and Health Assessments (a total of 298 Findings) was analyzed to determine one or more Causal Factors. The most prevalent Causal Factors are (in order of frequency):

1. Lack of written procedures to implement Laboratory policy, DOE requirements, and federal, state, and local laws.
2. Failure to implement or communicate written policies and procedures.
3. Inadequate personnel training for implementing policies and procedures.
4. Ineffective or insufficient appraisals, audits, and reviews, and/or inadequate follow up.

These Causal Factors, together with the Findings of the Management and Organization Assessment, suggest the following Root Causes:

Causal Factors 1 and 3: Lack of written procedures to implement Laboratory policy, DOE requirements, and federal, state, and local laws. Inadequate personnel training for implementing policies and procedures.

Root Cause 1: **DOE has not provided, and the Laboratory management has until recently not allocated, sufficient resources to develop and communicate environment, safety, and health procedures and provide comprehensive safety training to the Laboratory staff.**

Discussion: Success of the Laboratory's program has been measured by the quality of its research results. This will continue to be a principal goal of the Laboratory, but it must be coupled with increased attention to achievement of excellence in environment, safety, and health. The Laboratory and the DOE must accept the fact that in-

creased emphasis on environment, safety, and health, without increased funding from DOE, will impact the research program.

More resources are now being devoted to complying with environment, safety, and health requirements for written procedures and putting in place a comprehensive safety training program. However, it will take time to catch up, so that many deficiencies in these areas have yet to be corrected. The Laboratory is in a transition period with regard to environment, safety, and health funding; only time will tell what level of funding will be necessary to meet the environment, safety, and health requirements once equilibrium has been reached.

Causal Factor 2: Failure to implement or communicate written policies and procedures.

Root Cause 2: **Senior management has not taken sufficiently seriously its responsibility for implementing the Laboratory's Environment, Safety, and Health Program.**

Discussion: Many senior managers have viewed safety as an activity which is secondary to research and accelerator operation. Consequently, the Laboratory's Safety Program has been carried out with an informality relative to that now required. Until recently, senior management has not instilled in the first line managers and supervisors a sense of urgency for implementing environment, safety, and health requirements, and has not held them accountable for compliance through oversight, performance appraisals, and job descriptions.

Managers at all levels are becoming aware of their environment, safety, and health responsibilities and are being trained on how to best carry them out. The Laboratory has now formed an ES&H Division that is providing advice and support in the areas of worker safety, emergency preparedness, training, environment protection, waste management, and radiation physics, as well as oversight in the areas of quality assurance and compliance. It is of course very important that, when resources are limited, there be a balance between enforcement of environment, safety, and health compliance and risk.

Causal Factor 4: Ineffective or insufficient appraisals, audits, and reviews, and/or inadequate follow up.

Root Cause 3: **The development of an ongoing self-assessment program, reviews and audits of various programmatic elements, and the response to deficiencies uncovered by internal and external reviews have not been pursued vigorously enough by the Laboratory management.**

Discussion: Completion of the existing, yearly self assessment, called the Safety Self Audit, is essentially voluntary. There are no comprehensive guidelines or training for how to perform it. Not all Associate Directors have been intimately involved and have not held the Group Leaders accountable for reviewing the performance of their operations and the timely completion of the Safety Self Audit. Not all Groups ensure that the correction of findings and deficiencies is planned, implemented, and tracked.

Using the experience gained by the large number of staff who participated in this self assessment, the Laboratory must now develop a much more comprehensive self-assessment program, give it a higher priority than in the past, and provide the resources necessary to correct findings and deficiencies in a timely manner.

Table of Contents

2

Environmental Assessment

3

Safety and Health Assessment

1
Introduction

I. Facility and Research Program Description

The Stanford Linear Accelerator Center (SLAC) is a national facility operated by Stanford University for the US Department of Energy. SLAC is a single–purpose laboratory, devoted to experimental and theoretical research in elementary particle physics, and to the development of new techniques in high–energy accelerators and elementary particle detectors. SLAC is located on 426 acres of Stanford University land which is leased to the government. For over 25 years, SLAC has been in continuous use in a national research program that has made major contributions to the understanding of nature. SLAC is one of a handful of laboratories worldwide that stands at the forefront of research in the study of the basic constituents of matter and of the forces that act between them.

Scientists from all parts of the United States and throughout the world participate in the experimental program. Since its inception in 1962, SLAC has supported the research activities of scientists from more than 100 different institutions. SLAC presently has a staff of about 1300, 150 of whom are Ph.D. physicists engaged in particle physics research. In addition, there are typically 300–400 physicists from other institutions who are involved in carrying out experiments at SLAC at any given time.

Experimental research began at SLAC in 1966 with the completion of the two–mile–long linear electron accelerator, a machine capable of producing an electron beam with energy up to 20 GeV. Initial experiments directed these electrons onto stationary targets to study the structure of matter. Since that time, three other major research facilities have been built at SLAC, each based on the use of the electron–positron collisions rather than fixed–target electron beam experiments: the 8 GeV center–of–mass SPEAR storage ring (1972), the 30 GeV center–of–mass PEP storage ring (1980), and the 100 GeV center–of–mass Stanford Linear Collider or SLC (1989).

Another research facility, the Stanford Synchrotron Radiation Laboratory (SSRL), is also located on the SLAC site. SSRL is a National Synchrotron Radiation Users' Facility funded by the US Department of Energy and operated by Stanford University. It utilizes the SPEAR and PEP storage rings as sources of extremely intense electromagnetic radiation over a large spectral range in a broad ranging program of basic and applied research in such fields as materials science, protein crystallography, catalytic chemistry, surface science, and diagnostic radiology. The SSRL staff numbers about 120, including 19 Ph.D. scientists. There are 50–100 visiting scientists at any given time, and as many as 600 scientists from more than 100 institutions who use SSRL in a given year.

The Two–Mile Linac

During the period from 1966 to 1972 the physics research program at SLAC was based solely on fixed–target experiments carried out with the two–mile linear electron accelerator, or *linac*. Early experiments with this machine were the first to show that the constituents of the atomic nucleus, the *proton* and *neutron*, are themselves composed of smaller, more fundamental objects called *quarks*. This work was recognized in 1990 with

the award of the Nobel Prize in Physics to Jerome Friedman and Henry Kendall of MIT, and Richard Taylor of SLAC.

Later, in 1978, the SLAC linac was used in an experiment of exceptionally high precision that established a clear relationship between the weak and electromagnetic forces. This work was a critical verification of the theoretical prediction that the weak and electromagnetic forces were in fact different manifestations of a single, more basic force now known as the electroweak force.

The linac continues to be used for fixed–target experiments in particle and nuclear physics using the spectrometers in End Station A and as the key element for producing electron–positron collisions in the SLC. The maximum energy of the linac has been gradually increased over the years to 50 GeV as a part of the extensive remodeling that was required for its use in the SLC. This combination of a high–energy and high–intensity electron beam cannot be found anywhere else in the world.

The SPEAR Storage Ring

Stanford University has a long history of involvement in the development and use of colliding–beam storage rings for particle physics research. The first such machine at Stanford was a 500 MeV electron–electron machine located on the main campus. This project was a collaborative effort between physicists from Princeton and Stanford Universities, and it produced the first physics results ever obtained with the colliding–beam technique. The next in the succession of Stanford colliders was the SPEAR machine at SLAC, completed in 1972. SPEAR consists of a single ring some 80 meters in diameter, in which counter–rotating beams of electrons and positrons circulate at energies up to about 4 GeV each. In terms of the rich harvest of discoveries it has yielded, SPEAR is generally believed to be one of the most cost–effective machines ever built in the field of high–energy physics.

Two of these achievements stand out in particular. The first was the 1974 discovery of a particle called the *psi* that was a made up of a combination of a quark and an antiquark of an entirely new kind. Before that time, only three types of quarks were known, but the discovery of this new, fourth type of quark (called the *charm*) served as convincing evidence that the basic idea of the quark substructure of matter was in fact valid. This work was recognized with the award of the 1976 Nobel Prize in Physics to Burton Richter of SLAC, an award he shared with Samel C.C. Ting of MIT for a similar discovery of this new particle at the Brookhaven National Laboratory.

The second revolutionary discovery made at SPEAR was that of a new particle called the *tau*, which turned out to be the third in the sequence of electrically charged elementary particles called *leptons*. The first of these was the *electron*, discovered in 1897; the second was the *muon* (1937); and the third was the *tau* (1975). Martin Perl of SLAC was awarded the Wolfe Prize in 1983 for his discovery of the *tau lepton*.

In 1990, the SPEAR facility became fully dedicated to synchrotron radiation research.

The PEP Storage Ring

After SPEAR and several other machines around the world had demonstrated the great power of electron–positron colliding beams to produce important new physics results, the next logical step was to increase the energy of such colliders by a factor of three or more. Both the American and European particle physics communities undertook such a step with the construction of the PETRA storage ring at the DESY Laboratory in Hamburg, Germany and the PEP storage ring at SLAC. The Positron–Electron Project (PEP), was a collaborative effort of SLAC and the Lawrence Berkeley Laboratory (LBL). PEP was completed in 1980

and has been used since that time to support the research activities of several hundred physicists and graduate students.

PEP is about 800 meters in diameter and can produce electron–positron collisions up to center–of–mass energies of about 30 GeV in six Interaction Regions (IR). The PEP physics program has done important work in measuring the lifetimes of certain elementary particles, in studying how the quarks that are initially produced in the collision then *fragment* or evolve into the various kinds of particles that are actually observed in the detection apparatus, and in tests of the theory (called *Quantum Chromodynamics* or QCD) that is presently believed to describe the strong force that binds quarks together.

Two undulator beam lines on PEP have been used for pioneering work in synchrotron radiation research. Experiments carried out in parasitic mode during colliding beam experiments have demonstrated the extreme capability of PEP as a high brightness X–ray source. Measurements made with PEP operated in a low emittance optics show that PEP can exceed the brightness of third generation sources now in construction around the world.

A group of scientists from SLAC, LBL, and the Lawrence Livermore National Laboratory (LLNL) has proposed the construction of a new facility at SLAC called an Asymmetric *B* Factory. This would be an extensive modification and upgrade of the present PEP machine, making use of much of the existing equipment and infrastructure. The prospective research program for such a facility is very rich; a central theme of this program will be the detailed study of one of the most puzzling phenomena (called CP violation) ever observed in the behavior of matter. This program requires the copious production of the particles known as *B* mesons, and this in turn means that the *B* Factory must operate at very high luminosity (production rate). In the meantime, the PEP ring and four large detectors are shut down. Assuming the government approves funding for the *B* Factory, the detectors will be moved off the beam line and dismantled.

The Stanford Linear Collider

Construction of the SLC began in 1983 and was completed in 1989. This frontier device is a novel kind of machine that serves both as a test bed for a new accelerator technique and as a facility to reach the energy region where the recently discovered Z^0 particle can be produced in quantity and in a simple environment. The key elements of the SLC are an extensive upgrade to the existing two–mile linear accelerator to produce 50 GeV beams of both electrons and positrons, two small storage rings that are used to *damp* the beams down to suitable dimensions, two long curving arcs of magnets that are used to transport the separate electron and positron beams around to a single collision point, an elaborate focusing system that reduces the sizes of the colliding beams down to dimensions that are smaller than a human hair, and a system for creating positrons and transporting them back for injection into the two–mile linac.

The European community has chosen to achieve 100 GeV electron–positron collisions through the use of the more conventional storage–ring technique at the CERN Laboratory near Geneva, Switzerland. Their LEP machine is a large storage ring, some 16 miles in circumference; it has the advantage of four interaction regions (rather than one at the SLC) and the possibility of a higher ultimate energy, but the SLC also has several advantages over LEP that can be exploited in future years. Thus SLC and LEP are in a sense complementary facilities.

The first detector system used with the SLC is called the Mark II, which was upgraded after earlier use at both SPEAR and PEP. For the longer term, a more elaborate and complete detector system was needed at the SLC, so a new detector system called the Stanford Large Detector (SLD), was installed at the SLC in 1991. The

SLD will ensure that the SLC experimental program will remain productive through the 1990s.

Early research results from the SLC at SLAC and from the LEP storage ring at CERN have already begun to prove the value of these machines. The mass and other properties of the vital Z^0 particle have been determined to unprecedented precision. Even more importantly, this early work has determined with high probability that the universe is in fact made up of not more than the three *generations* of elementary particles of the type already discovered, each with two kinds of *leptons* and two kinds of *quarks*, and each with the special property of including a very light neutral lepton or neutrino.

Advanced Accelerator Development

As noted earlier, electron–positron colliding beams have proved to be an exceptionally fruitful method for studying the elementary particles and the forces that act between them. The very large LEP machine is almost certainly the largest conventional storage ring for electrons and positrons that will ever be built, because electrons and positrons emit synchrotron radiation when they are accelerated around a curved path, and the rate of such energy losses increases very rapidly as the beam energies go up. Eventually there must come a point at which it is more economical to accelerate the electrons and positrons in a straight line (a linear collider) than in a circular path. A major reason for building the SLC was to test the concept of a linear collider, and the successful production of competitive physics results has shown it to be a viable idea.

It is of great interest to SLAC to continue with this exploration of the potential of the linear collider, and much of the activity in advanced accelerator R&D at SLAC is devoted to this end. The next logical step would be to build a full–fledged linear collider that can collide electrons and positrons at a combined energy of about 500 GeV, perhaps later expandable to 1 TeV or more. Advanced R&D in accelerator physics now taking place at SLAC is aimed at just such a project. New power sources, accelerator structures, and beam–focusing systems must be developed to make this dream a reality.

The Stanford Synchrotron Radiation Laboratory

SPEAR produces intense beams of synchrotron radiation— X–ray photons emitted by the circulating electron beams. Beginning in 1973 a group from Stanford began using this synchrotron radiation for research. Over the years the program grew to the point where the SPEAR ring is dedicated to full–time synchrotron radiation research in atomic and solid state physics, chemistry, biology, and medicine. More than 100 Ph.D. theses have been completed based on research carried out at SSRL. Until recently, the two–mile linear accelerator was used to fill SPEAR with electrons. A new 3 GeV electron synchrotron has been constructed and is now being commissioned to replace the linac as a source of electrons for SPEAR.

Specific research performed at SSRL is extremely varied and includes, in the vacuum ultraviolet area: ionization properties of small molecules, structural and electronic properties of microstructures, properties of ultra–thin layers and small clusters, kinetic processes in laser materials, lithography and microscopy, and static properties and dynamic processes of chemisorbed gases.

Presently, research in the chemical and biological sciences includes: the structure and function of homogeneous and heterogeneous catalysts, the structure of metal, metal oxide and semiconductor surfaces and their interactions with small molecules, chemical reactivities in the gas phase, the structure of general chemical compounds through Extended X–ray Absorption–edge Fine Structure (EXAFS), multiple wavelength imaging, protein structures and functions through diffraction studies in the crystalline state, protein structures through EXAFS studies, dynamics and fluctuations in biological systems, the nature of membrane

structures and membrane protein interactions, the structure and function of metal sites in metalloproteins and metalloenzymes.

Medical research is aimed at eliminating the dangerous catheterization in X–ray diagnoses of blockages in the coronary arteries.

X–ray physics and materials sciences are represented by research in the following areas: structure of amorphous materials, coordination of impurities and alloying species, structures of and phase transitions in surfaces and thin surface layers, kinetics of structural changes in materials, phase transitions at high pressure, structure of crystalline materials, electronic structure of materials through edge absorption studies, fundamental X–ray scattering and absorption physics, and atomic physics.

In addition to scientific research, SSRL has a commitment to the development of advanced insertion devices for the enhancement of synchrotron radiation and the development of state–of–the–art instrumentation for the utilization of synchrotron radiation. A program in accelerator physics concentrates on improvements to and designs for future synchrotron radiation storage rings.

II. Laboratory Organization

The Laboratory is defined to include all of SLAC and SSRL, which was assumed to be equivalent to a SLAC Division for the purpose of this assessment.

Figure 1 shows the SLAC organization chart. SLAC has four divisions, each headed by an Associate Director. Senior managers are called Group Leaders in the Research Division, Department Heads in the Technical and ES&H Divisions, and Group Leaders and Officers in the Business Services Division. Throughout this report, the terms Group Leader and Department Head are used interchangeably to refer to the head of a group, department, or office.

The Research Division consists of seven experimental physics groups, five technical support groups, a theoretical physics group, and a computation research group. These groups:

- Conduct experimental research in elementary particle physics utilizing the accelerator facilities of the Laboratory.
- Promote future experimental programs through developments in detector, accelerator, and computing technologies.
- Conduct theoretical studies in elementary particle physics.
- Provide laboratory support services in the areas of experimental activities, library, and computing.
- Support collaborating institutions which chose to conduct research at the Laboratory's facilities.

The Technical Division has eleven groups which:

- Operate, maintain, and upgrade all accelerator systems to maximize their high–energy physics output.
- Develop the conceptual framework and technology needed for the next generation of accelerators and advance the science of accelerator physics.
- Manage the construction and commissioning of new accelerator systems.
- Contribute to the development of the technology needed for the next generation of detectors.

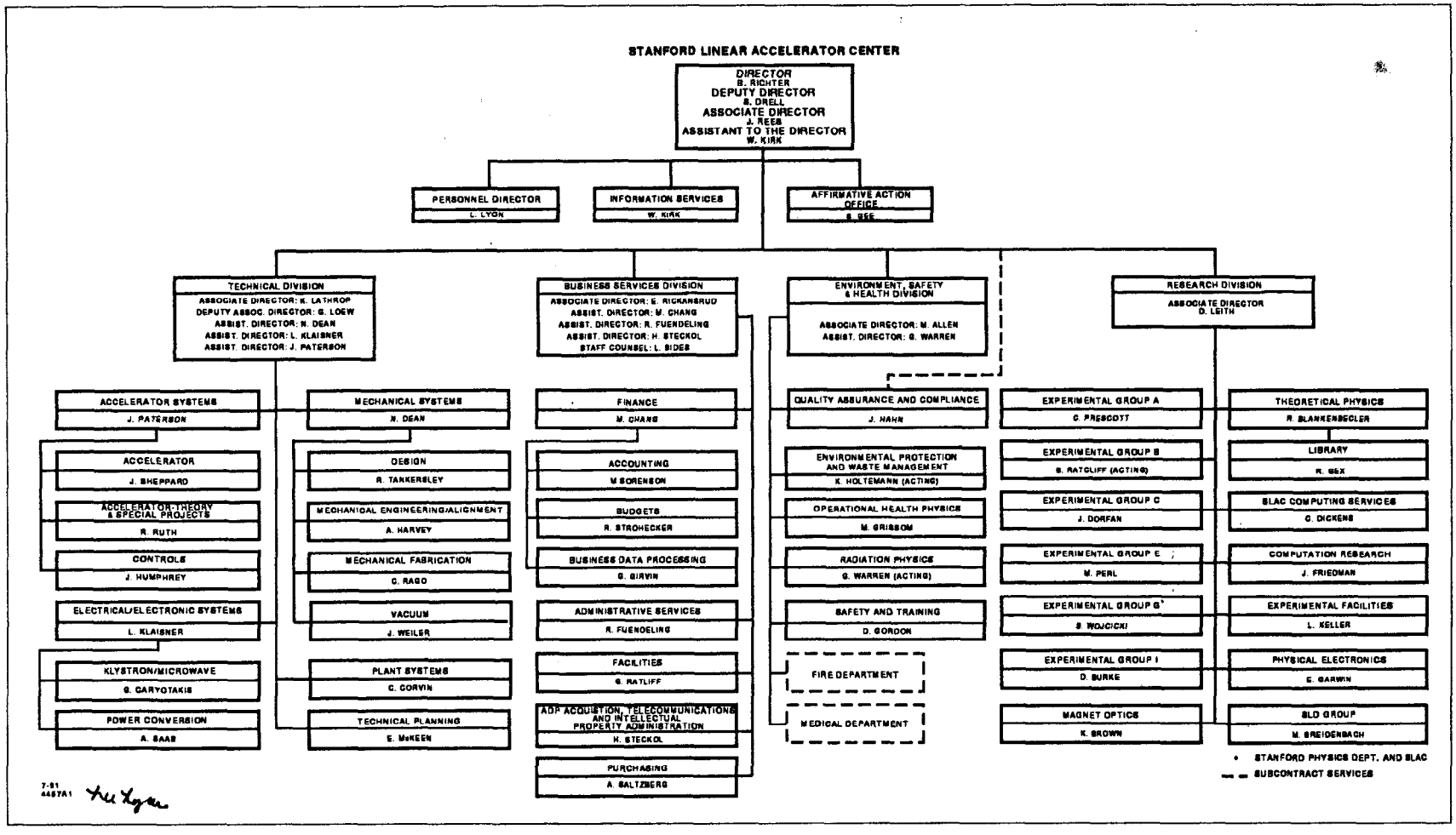

Figure 1: SLAC Organization Chart

- Provide laboratory support services in areas of scientific, engineering, and technical expertise.

The Business Services Division (BSD) administers and operates various services, and functions to support the overall mission of the Laboratory. It is responsible for management and oversight functions relative to the prime contract with DOE, and policies of the University. BSD provides services in the areas of finance, budgeting, accounting, purchasing, facilities, communications, technology transfer, and data processing. It conducts liaison activities with staff, other laboratories, universities, industry, and DOE.

In December 1990, the former Environment and Safety Office and Radiation Physics Group were moved from other divisions and supplemented with the Quality Assurance and Compliance Department and additional new staff to form the ES&H Division. The new division is responsible for:

- Receiving and interpreting regulations, and proposing, where applicable, Laboratory policies for implementing those regulations.
- Providing technical assistance to the line organizations to enable them to carry out their environment, safety, and health responsibilities.
- Creating, updating, and distributing manuals related to Laboratory environment, safety, and health rules and practices, and assisting line managers in creating manuals specific to their own environment, safety, and health activities.
- Promoting an understanding of environment, safety, and health policies and practices by training and educating the Laboratory staff.
- Responding to outside audits and monitoring internal follow up of audit findings.
- Providing operational services to the Laboratory in the areas of waste management, radiation dosimetry, contract management of medical and fire departments, and design of radiation shielding for experiments and new facilities.
- Monitoring for compliance with environment, safety, and health standards and regulations through inspections and internal audits, and following up to ensure that appropriate corrective action is taken.

The Personnel Department, the Information Services Office, and the Affirmative Action Office report to the Director's Office.

Figure 2 shows how SSRL is organized. SSRL has three divisions: the Accelerator Research and Operations Division (AROD), the Photon Research and Operations Division (PROD), and the Computing and Administrative Resources Division (CARD).

The AROD has three groups, whose members:

- Operate, maintain, and develop the 3 GeV injector booster and storage ring, SPEAR.
- Perform accelerator physics research on these and future machines.

PROD has four groups, whose members:

- Manage and develop the experimental beam lines.
- Provide user support.
- Perform in-house research using synchrotron radiation.
- Provide Plant/Facilities management for SSRL.

CARD has four groups, whose members:

- Manage business services and contract administration.
- Manage personnel services.

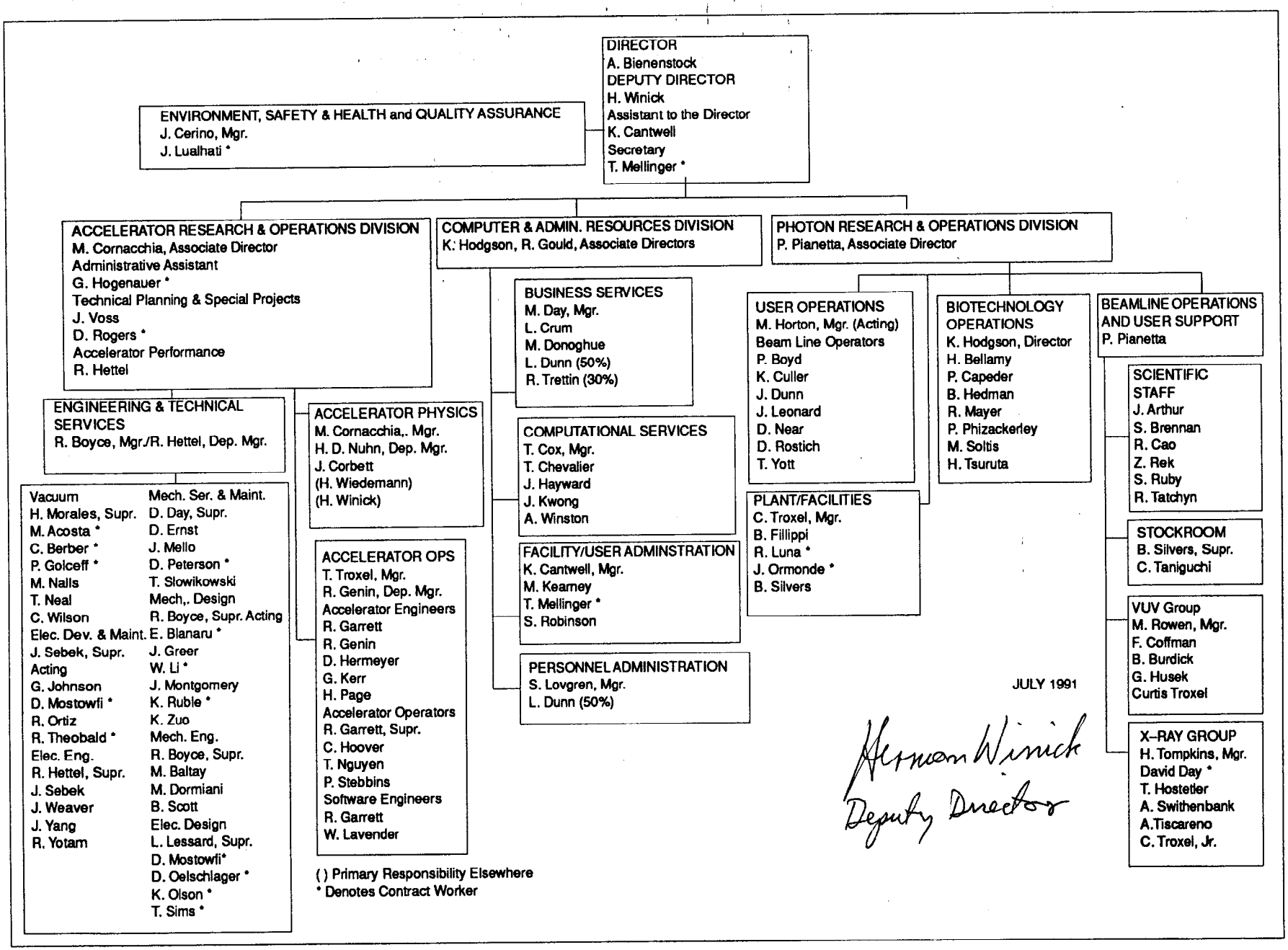

Figure 2: SSRL Operations Organization

- Manage and develop computational resources for SSRL.
- Provide facility and user research administration.

SSRL has an Environment, Safety, and Health and Quality Assurance Office which reports to the SSRL Director.

Figure 3 shows the Stanford University/SLAC environment, safety, and health relationship. The Board of Trustees of Stanford University is responsible for University environment, safety, and health policies, contract approval, and, through the President of the University, assurance that University policies support full implementation of environment, safety, and health policies and contractual requirements. The President has delegated to the SLAC Director all environment, safety, and health responsibility for the site. For the purpose of environment, safety, and health, the separately-contracted SSRL operation is treated like a division of SLAC. This is reflected in the SLAC/SSRL Memorandum of Understanding.

The safety management organization of the Laboratory is shown schematically in Figure 4. Responsibility for safety flows from the SLAC Director through the Associate Directors to the Group Leaders. Note that since SLAC is responsible for safety at SSRL, the SSRL Director reports to the SLAC Director in matters of safety.

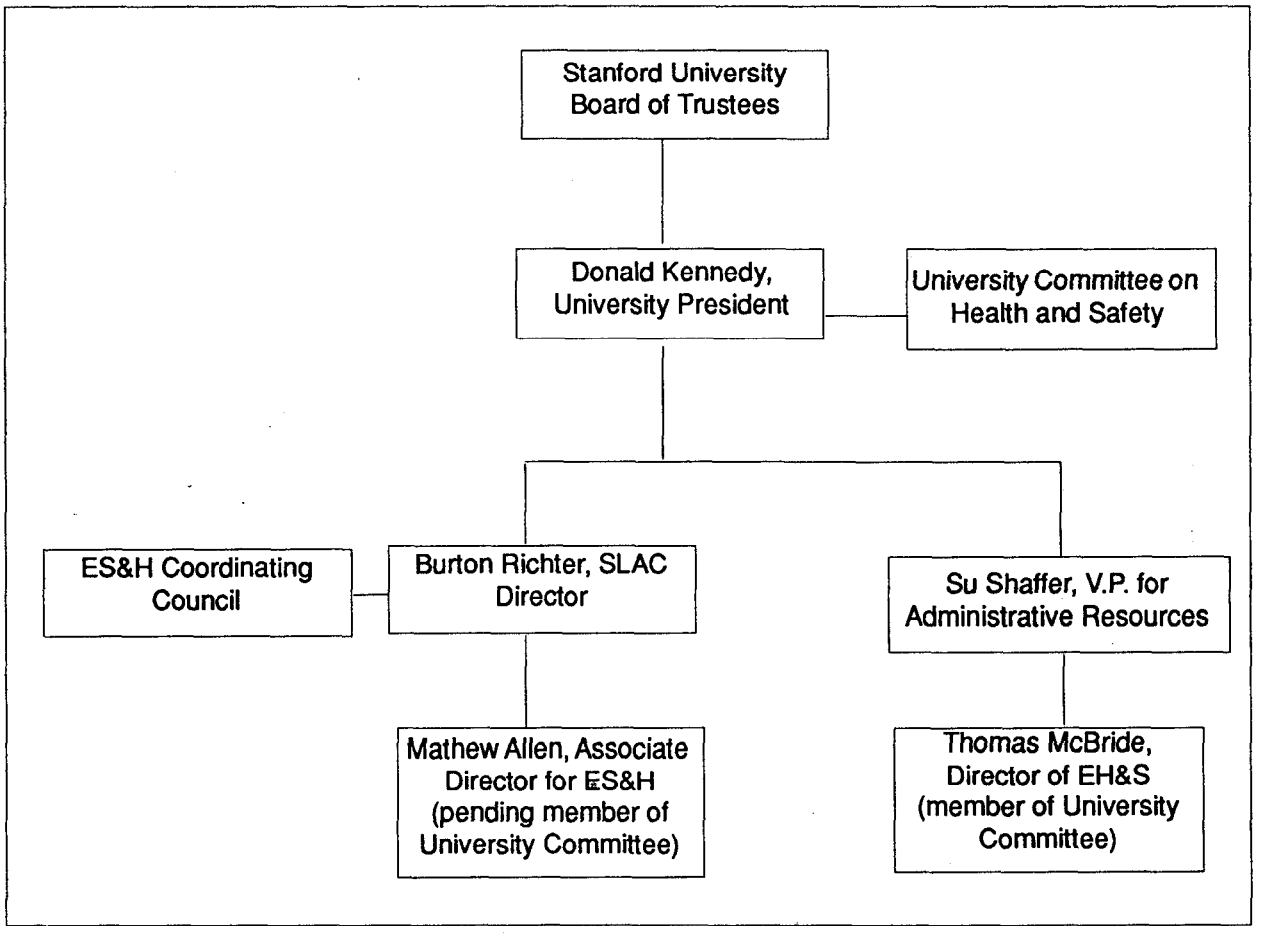

Figure 3: Stanford University/SLAC ES&H Relationships

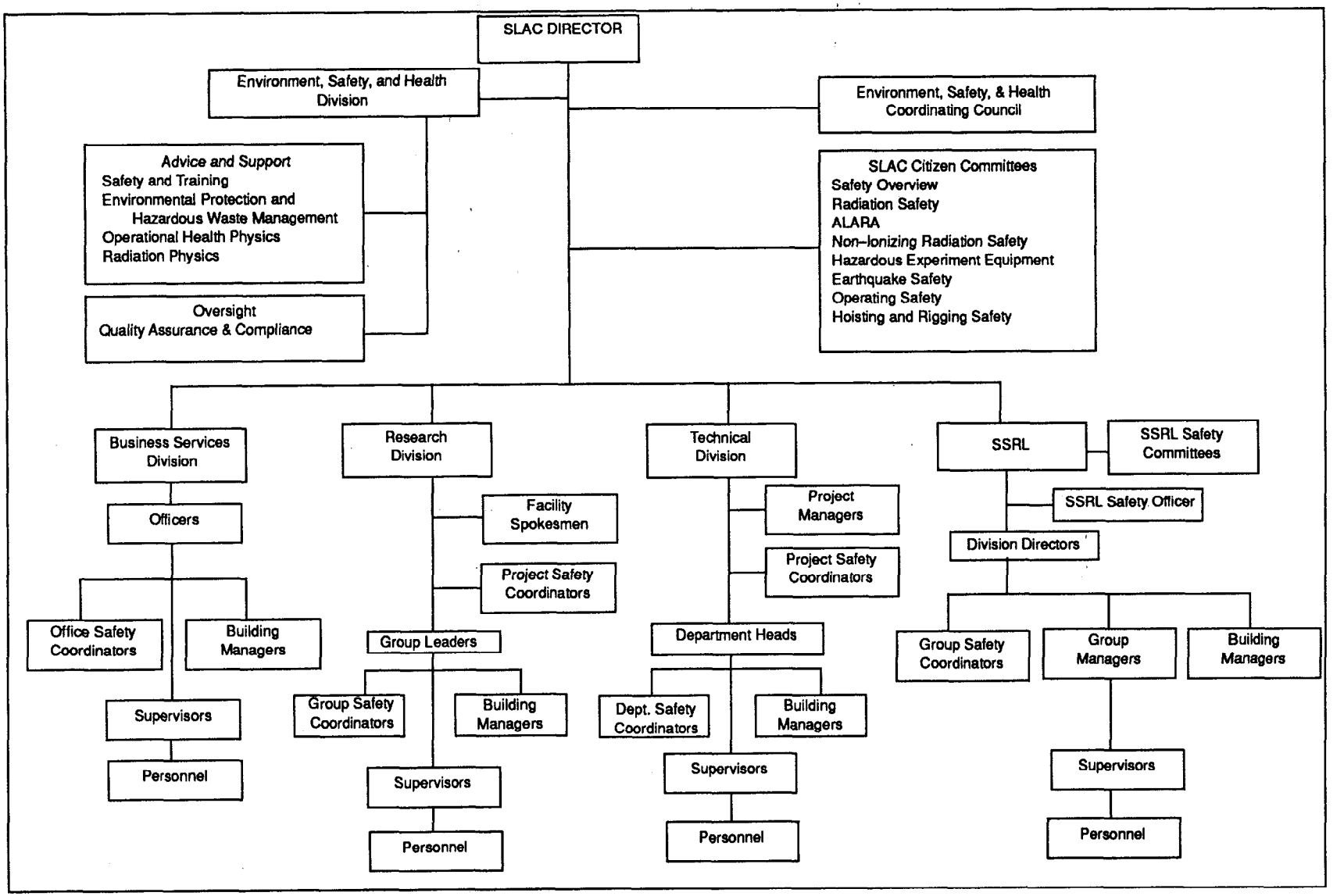

Figure 4: Safety Management at SLAC

III. Description of the Environment, Safety, and Health Program

It is the Laboratory's policy to provide safe and healthful working conditions for its employees, visitors, and the public, and to protect its property from damage. This section describes the SLAC safety management structure and the safety responsibilities which flow through the Director to all other levels of management.

Committees

Safety and health concerns with site–wide impact are addressed by the Environment, Safety, and Health Coordinating Council (ES&HCC). This committee is chaired by the Deputy Director of SLAC and is composed of the SLAC Associate Directors and the Deputy Director of SSRL. The ES&HCC:

- Formulates and recommends to the Director laboratory policies with regard to environment, safety, and health. New policies may be proposed by the ES&H Division or by any other unit of the Laboratory, including the ES&HCC itself.
- Reviews the status of the environment, safety, and health programs in the Laboratory to keep the Associate Directors fully and currently informed.
- Recommends actions to the Director that will ensure that the necessary resources are applied to the environment, safety, and health program.

Because of the complexity of Laboratory's operations and the variety of technical problems encountered in research, no one person or group of individuals is sufficiently knowledgeable to establish universally valid regulations or to appraise difficult technical situations which might result in safety hazards. Therefore, the following "Citizen Committees" composed of experts in various disciplines and appointed by the Laboratory Director have been established:

- ALARA Committee.
- Earthquake Safety Committee.
- Electrical Safety Committee.
- Hazardous Experimental Equipment Committee (HEEC).
- Hoisting and Rigging Safety Committee.
- Non–ionizing Radiation Safety Committee.
- Operating Safety Committee.
- Radiation Safety Committee.
- Safety Overview Committee.

The Committees' functions are to assure that major research projects and apparatus are reviewed for safety and health concerns from the inception of the project. In order to gain as much independence as possible while still maintaining technical expertise, each committee has members from Departments around the Laboratory, including SSRL and the ES&H Division. The Safety Overview Committee is composed of the Chairs of the other Citizen Committees and conducts an overall appraisal of each new major project to determine which Citizen Committees should review that project.

As an adjunct to the primary safety inspection responsibilities of the operating groups, several of the Citizen Committees also conduct safety inspections of the Laboratory on a periodic basis. HEEC inspects each new facility before it is allowed to begin commissioning. Within their area of expertise, the Chairs of most of the

Citizen Committees have the authority to stop activities which are considered unsafe.

The Citizen Committees are also available to the Director, Associate Directors, Group Leaders, and the ES&H Division to assist them in evaluating hazards, identifying remedial actions, interpreting policy and identifying relevant DOE mandated or statutory requirements pertinent to their activities. The Operating Safety Committee is unique among the Citizen Committees in that it serves as a forum within which all groups may express concerns about any area of safety and health at the Laboratory.

Large Projects and Facilities

Large projects and facilities in the Technical and Research Divisions have Project Managers or Facility Spokesmen who report to the appropriate Associate Director. It is up to each Associate Director to decide at the outset which activities will be defined as large projects or facilities. The Project Manager, Facility Spokesman, or the designated Safety Coordinator are responsible for:

- Ensuring the safety of people during project activities.
- Meeting safety standards for the equipment and facilities they use or construct, obtaining the necessary safety approvals and seeing that appropriate safety reviews are conducted.
- Ensuring that project activities or a construction process do not create an unsafe condition (for example, by blocking emergency exits, rendering fire alarms inoperable).
- Cooperating on safety matters with the Building Managers (and the line managers to whom these building managers report) for any buildings or facilities used.

In the Technical Division, a current example of a large project is the construction of a Polarized Source for the SLC. In the Research Division, examples of large facilities are SLD and End Station A. Current examples of large projects are the Final Focus Test Beam (FFTB) and the *B* Factory. For smaller experiments and test beam activities, the experiment spokesman acts as the safety coordinator and reports in matters of safety to the Head of the Experimental Facilities Department (EFD), within the Research Division.

Group Leaders and Supervisors

Group Leaders have broad responsibilities for safety and have been assigned specific environment, safety, and health tasks by the Director. They are charged with implementing safety policy within their areas, including arranging for and maintaining various elements of the Safety Program, which includes providing for periodic inspections, design reviews, employee indoctrination and training, emergency preparedness, fire prevention, and record keeping.

Group Leaders have created several safety and health positions to aid them in carrying out their responsibilities. They are authorized to designate a Safety Coordinator who will assist them in carrying out their responsibilities. The intent is that every group or major project should have an explicitly designated Safety Coordinator who represents and speaks for the Group Leader in matters of safety and health. Electrical Safety Coordinators are designated by groups involved in any (research or conventional) electrical or electronic work. The Electrical Safety Coordinator is a person who is capable of recognizing potential electrical problems and initiating remedial action. Hazardous Waste and Materials Coordinators are designated by all groups that generate hazardous waste to work with the ES&H Division to assure systematic control of all aspects of waste disposal.

Because Group Leaders are responsible for the elements of the Safety Program, they frequently discharge

their responsibility through the supervisors working for them. Those functions are assigned as follows:

- Document the orientation and training of new and transferred employees.
- Issue appropriate safety orientation materials and answer any questions.
- Provide appropriate orientation about the hazards associated with the tasks to be performed.
- Maintain a log recording the name of the new employee, the date of the initial safety indoctrination, and the name of the supervisor who provided it.
- Review and continue training on safety and health matters as conditions change within the Laboratory.

The activities of these various persons in no way relieve the Group Leaders, Project Managers, and Facility or Experiment Spokesmen of their responsibility for safety.

Building Managers

Associate Directors appoint Building Managers who may in turn designate an Assistant. Building Managers serve primarily to coordinate with Group Leaders those local activities essential to the prevention of fires and accidents, the response to emergencies, the maintenance of high standards of orderliness and cleanliness, and the conservation of energy. The performance of these duties by the Building Manager, however, in no way relieves any Group Leader of his or her fundamental responsibilities. Building Managers are the primary contact person for Citizen Committees, the City of Palo Alto Fire Department (PAFD), and the ES&H Division when soliciting corrections to environment and safety deficiencies related to a building, its contents, the immediate surrounding area, and the groups working with the building.

Other Environment, Safety, and Health Responsibilities

The Facilities Office and Plant Engineering (PE) Department have responsibilities for maintaining the physical plant and many of their activities involve safety systems. Since many safety standards include specific intervals for inspecting, servicing, renovating, and recording these activities, their usual activities are *de facto* safety functions. For example, the Facilities Office administers the Government Driver's License Program. PE provides training for forklift operators and crane operators. Since the Laboratory utilizes many pressure and vacuum vessels, the Director has created the Mechanical Engineering and Safety Inspection (MESI) to certify these vessels for use. There is also a Laser Safety Officer who has the authority and responsibility to monitor and enforce the control of laser hazards.

The Laboratory has contracts with three outside organizations—the PAFD, the Palo Alto Medical Clinic, and a Workers' Compensation insurance administrator—to provide elements of the Environment, Safety, and Health Program. The PAFD provides fire fighting, hazardous material spill, and medical emergency response, and operates a station on site. They conduct a fire safety inspection and citation program, issue hot work permits, and provide training in the use of fire extinguishers. The Palo Alto Medical Clinic operates the Medical Department. The Medical Department maintains occupational health records, provides routine and emergency medical services, conducts the medical monitoring program, and provides for an employee assistance program. The Workers' Compensation administrator provides those services associated with compensation due employees injured in the course of their work.

All Laboratory and contract employees, users, and visitors are expected to contribute to safety and assume

responsibility for their own health and safety and protection of the environment by:

- Working defensively and looking for physical and chemical hazards before starting any job.
- Complying with applicable safety and health standards.
- Reporting promptly to supervisors any condition believed to be unsafe or unhealthful.
- Responding to warning signals which may be sounded in the event of fire, radiation, oxygen deficiency, hazardous material release, or other emergencies.
- Preparing for an emergency by knowing how to summon aid and what actions to take when an emergency arises.

IV. Scope and Approach of the Self Assessment

In preparation for the Tiger Team Assessment, the Laboratory conducted a comprehensive environment, safety, and health self assessment in the categories of Environment, Safety and Health, and Management and Organization.

The assessment process formally began with a Laboratory All Hands Meeting on January 14, 1991 at which the Laboratory Director announced the formation of a Self–Assessment Task Force (SATF). The SATF was aided by, among other documents, the *Tiger Team Guidance Manual*, dated February 1990, and used the self assessment reports of other laboratories and facilities. The DOE/EH-0191 report, *Analysis of Findings from the First Sixteen Tiger Team Assessments*, also proved useful.

In planning the comprehensive self assessment, the SATF decided to assess the Laboratory as a whole as opposed to separately by Division, with the focus on safety–related activities. Except for the very specialized, technical environmental area, it was decided to use personnel from throughout the Laboratory, and rely very little on outside consultants. This has the major advantage of preparing the Laboratory to initiate an ongoing, institutionalized, self–assessment program.

The actual assessment was carried out from mid–February to mid–June 1991. After a major housecleaning effort, the SATF organized an inspection of all Laboratory facilities and buildings. This decision was motivated by the desire to have free access to the SLC, the SSRL injector, and the SPEAR storage ring before a five–month run of these facilities which was scheduled to begin early March 1991. Appendix A, "Site Inspection" is a description of the process and the results of the inspection.

Once the site inspection was under way, the SATF organized committees for environment, safety, and health, and management and organization.

The Environmental Committee consisted primarily of staff members from the ES&H Division. Because of the Laboratory's ongoing environment, safety, and health responsibilities and the additional special expertise needed, the committee decided to procure the services of a subcontractor, Science Applications International Corporation (SAIC), to complement the in–house capability. Surveys of selected Laboratory facilities, operations, and processes were conducted by two–person teams each comprised of one Laboratory employee and one subcontractor employee. Some of the Laboratory escorts were Hazardous Waste and Materials Coordinators in their respective Groups or Departments. The environmental assessment of the programmatic and management areas of the ES&H Division and its EP&WM Department consisted of interviews of key ES&H Division and EP&WM personnel and inspection and review of applicable documents.

The Safety and Health Committee consisted of an SATF member, and with the addition of an expert from the ES&H Division, represented each Laboratory Division. For each of the nineteen functional areas re-

viewed, a team consisting of a committee member and 1–4 Laboratory personnel interviewed staff, performed site visits, and reviewed documents to collect information and verify findings.

The Management and Organization Committee consisted of two members of the SATF and a representative of each Laboratory Division. Interviews were conducted with Laboratory and Stanford University upper management and vertical slice interviews through various Laboratory Groups verified management findings. When conducting interviews of management and staff, the committee split up into teams with 2–3 members each. Document reviews included environment, safety, and health policies and procedures, job descriptions, performance appraisals, and training materials and records.

Chapters 2, 3, and 4 give a more detailed description of how the three committees performed their portion of the self assessment and the results of their work.

In addition to the SAIC help with the environmental self assessment, the Laboratory has had several other appraisals of various aspects of its ES&H program within the past year which include:

- County of San Mateo Hazardous Waste Inspection Report, October, 1990.
- IT Corporation Report, November, 1990.
- High Energy and Nuclear Physics/Basic Energy Science On–Site ES&H Review of the Laboratory, May 29-30, 1991.
- Scientific Applications International Corporation, Safety Compliance Assessment, July 1991.

The SATF has used these reports as a source of information in performing this self assessment. In addition the Laboratory procured the services of IFC Kaiser Engineers to help with the site inspection (see Appendix A, "Site Inspection"). Not all of the specific findings of these or any other internal or external reviews are included in this *Self Assessment Report* if they were not applicable here or otherwise clearly characterized independently.

2
Environmental Assessment

I. Scope and Approach

The Laboratory's environmental assessment is based on and measured against objectives and standards defined by DOE Orders and federal, state, and local regulations. Performance objectives and standards were evaluated in the following areas:

- Air.
- Surface Water.
- Industrial Wastewater.
- Waste Management.
- Quality Assurance.
- Inactive Waste Sites.
- Soil/Sediments and Biota.
- Ground Water.
- Toxic Chemical Materials.
- Radiation.
- NEPA.

These environmental programs, applicable regulations and DOE Orders, and regulatory agencies governing the Laboratory are listed in Table 1.

In addition to the documents listed in Table 1, performance objectives and standards are described in the *SLAC Hazardous Materials Management Handbook* (Draft), *SLAC's Environmental Protection and Implementation Plan*, and other policy statement documents issued jointly by the Laboratory Director and the Associate Director of the ES&H Division.

The Environmental Committee consisted primarily of staff members from the ES&H Division. Because of the Laboratory's ongoing environment, safety, and health responsibilities and the additional special expertise needed, the Committee decided to procure the services of a subcontractor, Science Applications International Corporation (SAIC) to compliment the in–house capability.

The assessment was mounted in two phases. The first phase consisted of surveys of selected Laboratory facilities, operations, and processes by two–person teams each comprised of one Laboratory employee and one subcontractor employee. The second phase was focused exclusively at the programmatic and management areas of the ES&H Division and its Environmental Protection and Waste Management (EP&WM) Department and consisted of interviews with key ES&H Division and EP&WM Department personnel, and inspection and review of all applicable documents such as reports, procedures, files, permits, inspection reports, audits, and correspondence.

Table 1: Environmental Programs, Regulations, DOE Orders and Agencies Governing SLAC

Air	• Air Toxics (SB 2588) • BAAQMD • California Air Resources Act • DOE 5400, 6430.1 • CAA	**Soils/Sediments and Biota**	• County of San Mateo • DFG Endangered Species Act
Surface Water and Industrial Wastewater	• California Oil Pollution Control Act • California Porter–Cologne Water Act • CWA • FSDWA • RWQCB • State Water Resources Control Board	**Ground Water**	• DHS • RWQCB • County of San Mateo • CERCLA • FSDWA • RCRA • DOE Orders 5400, 5484.1, 6430.1
Waste Management	• EPA • DHS • County of San Mateo • DOT 49 CFR • RCRA • CCR Title 22 • California Health and Safety Code • TSCA • DOE Orders 5400, 5484.1 • DOE Order 5820.2A	**Toxic Chemical Materials**	• EPA • DHS • County of San Mateo • RCRA • TSCA • DOT 49 CFR • CCR Title 22 • California Health and Safety Code • DOE Orders 5400.1, 5400.5, 5484.1, 6340.1
Quality Assurance	• DOE Orders 5400.1, 5700.1B, 5484.1, 6430.1 • EPA Analytical Methods	**Radiation**	• Atomic Energy Act • DOE Orders 5400.1, 5400.5, 5400.YY, 5480.2A, 5480.11, 5482.1, 6430.1
Inactive Waste Sites	• CERCLA • SARA • DOE Orders 5400.1, 5484.1 • RCRA	**NEPA**	• NEPA • DOE Order 5440.1C

II. Summary and Key Findings

Summary

A summary of the findings for each environmental program area evaluated is provided below:

Air

The Laboratory's Air Quality Program is not comprehensive. It lacks adequate documentation, including procedures internal to EP&WM, and in the external operating work areas on site. Operators are not uniformly trained or knowledgeable of air–reporting and operational requirements. The ES&H Division is not consistently involved in evaluating new operations for compliance with air quality regulations. A systematic review has not been conducted to determine if all sources have been identified and permitted.

Surface Water

The Laboratory does not have a comprehensive Surface Water Monitoring Program and, therefore, does not have sufficient information to assess potential off–site discharge of contaminants. Many off–site discharge points are not routinely monitored or sampled. Until recently, training was not routinely provided to appropriate staff as required by the SPCC Plan. Documentation on maintenance, clean out, and repair of pollution–prevention equipment is lacking or nonexistent.

Industrial Wastewater

There are no formal written procedures for operating the Industrial Wastewater Treatment Plant and operator training for the Plant is not current. No quality control procedures exist for discharges of treated wastewater to the sanitary sewer. The ES&H Division has not taken an aggressive role in assuming that discharges to the sanitary sewer meet discharge limitations.

Waste Management

The Laboratory does not fully comply with all the requirements contained in RCRA/HSWA, the California Waste Control Law and DOE Orders 5400.1 and 5484.1. Procedures and training required for adequate waste characterization, handling, labelling, storing, shipping, and required documentation are incomplete or lacking. Site wide, there is a clear inability to properly manage hazardous waste, including spilled materials. There is inadequate waste stream characterization by waste generators. There is a lack of policies, procedures, and training for operating Satellite and Waste Accumulation Areas.

Quality Assurance

A Quality Assurance and Compliance Department was formed during the past year, however, quality assurance has not yet been formally incorporated into environmental programs. Complete, accurate, verifiable, or traceable data, and data management cannot be assured. Program compliance through audits, evaluation, and inspection are not routinely conducted at the present time.

Inactive Waste Sites

The Laboratory has several inactive waste sites that have not been confirmed or fully characterized. The closure of the former hazardous waste storage yard was not well documented. Background or baseline soil

studies for comparisons with soil cleanup activities are lacking.

Soil/Sediments and Biota

The Laboratory does not have a biotic baseline survey. Non–routine sampling is not adequate to characterize the Laboratory's soils and sediments and the documentation is incomplete. There are no formalized procedures or documentation policies in this program area. Insufficient staffing is a contributing factor for these deficiencies.

Groundwater

The Groundwater Protection Plan has not been updated to include work performed in 1990. There is a lack of information regarding water levels, groundwater–level contours, perched areas, and subdrains. There is insufficient information to determine the relationship between surface waters and groundwater at the Laboratory and adjoining property wells. Potential contaminant sources are not fully identified in the Plan. The Plan does not address procedures or policies that prevent contamination or chemical spills, or sampling procedures and methods. There is no formalized and documented maintenance and inspection program for above–ground tanks. Personnel are not trained on spill prevention and spill response.

Toxic Chemicals Materials

Discussions relative to this section are included in the Waste Management section above and in appropriate sections of Chapter 3, "Safety and Health Assessment."

Radiation

The Laboratory policies, procedures, and operations do not fully comply with the radiation protection requirements and regulations established by federal law, DOE Orders, and applicable state and local regulations. The Laboratory maintains plans, operating programs, controls, and documentation for the management of activated material, radiological constituents of waste streams, and the characterization of the environment. However, the Laboratory's compliance with DOE environmental radiation protection programs, including DOE General Design Criteria (Order 6430.1), Reporting (Order 5484.1), and Environmental Protection Standards (Order 5482.1), and with OSHA and EPA guidelines and standards, is inconsistent. Informality in the handling of radiological programs has led to inconsistent operations in terms of proper posting and procedures.

NEPA

There are no formal procedures in place to ensure that new projects are evaluated to determine NEPA documentation requirements. The Laboratory's process for preparing NEPA documentation and for tracking the approval status of NEPA documentation has not been formalized.

Environmental Management

The EP&WM Department has not fully established good communication channels or provided adequate guidance and training for line managers who are responsible for managing and implementing EP&WM requirements. Interaction and communications with the DOE/SAN site office has been insufficient to assure tracking of action items identified by both organizations. Document management is not structured or formalized. There are no formalized methods for numbering, issuing, updating, or disseminating (internally or externally) information, procedures, and guidelines.

Key Findings

The Environmental Assessment identified a total of 61 programmatic findings and 10 environmental management findings. Many of these individual findings fall under one of the following categories:

- Environmental programs are not adequately planned and implemented.
- There is not enough environmental training for Hazardous Waste and Materials Coordinators, generators of hazardous waste, and line managers.
- There is a lack of written procedures for carrying out environmental programs, regulations, and DOE Orders.
- Quality Assurance has not been formally incorporated into environmental programs.

III. Findings, Discussions, Proposed Actions

The Findings, Discussions, and Proposed Actions in the remainder of this chapter are summaries of the detailed research performed to accomplish the assessment. Most Findings are followed by a brief Discussion and always include a Proposed Action to address the Finding. As this *Self Assessment Report* is being prepared, the Laboratory is planning the preparation of a detailed Corrective Action Plan to address the Tiger Team Findings. Preliminary work toward the development of the Corrective Action Plan is being undertaken based on the Laboratory's Findings. Further, the implementation of corrective actions has already begun, and in some cases has been completed for many of the Findings described in this chapter.

Environmental Programs

AR Air

Performance Objective: The Laboratory is required to fully comply with the federal Clean Air Act (CAA), the California Air Resources Act, the Bay Area Air Quality Management District (BAAQMD) Rules and Regulations, and DOE Orders 5400.1 and 6430.1.

Finding AR.1: Current air permits or notification of locations of air permits are not posted near air pollution sources.

Discussion: BAAQMD permits are required to be posted near the permitted source or easily available during an inspection. Currently, the permits are not posted, or the permits that are posted are not current.

Proposed Action: The ES&H Division should remove out–dated permits, post on each source notifications that air permits are available in the EP&WM Department office, and distribute copies to the appropriate Building Managers and line managers.

Finding AR.2: New operations at the Laboratory are not properly evaluated to determine the need for a permit.

Discussion: There is no formal method for notifying the EP&WM Department of new construction or projects which may require review for a permit.

Proposed Action: Personnel should be informed about what types of operations require air permits. Formal review of new projects should be evaluated to determine permit requirements.

Finding AR.3: No formal training, guidance, or procedures have been provided to line managers or air–pollution equipment operators to advise them of how to comply with air quality regulations.

Discussion: Line managers and personnel operating equipment with air–pollution permits have not been formally instructed on permit conditions or operating and maintenance procedures. Additionally, staff are not informed of general operation requirements for operations which emit air pollutants.

Proposed Action: The ES&H Division should provide formal training on permit conditions and maintenance procedures to designated line managers and operating staff according to appropriate rules.

Finding AR.4: Air–pollution sources which potentially require permits have not had formal review by EP&WM Department staff or BAAQMD.

Discussion: There are many air–pollution sources throughout the facility which may require permits. There is no documentation that these sources have been reviewed to determine whether they require an air permit. A systematic review of existing operations has not been performed to determine whether there are facilities on site that are operating without a permit when one is required. NESHAP requirements (other than NESHAP for radionuclides) are not currently incorporated.

Proposed Action: The ES&H Division should conduct a search for sources which may require an air permit, and submit permit applications for non–exempt processes.

Finding AR.5: Permit conditions are not monitored to assure that equipment is operating in compliance.

Discussion: Many air–pollution sources have permit conditions and operating restrictions. Throughputs are not monitored to flag when maximum allowances are being reached.

Proposed Action: The Laboratory should monitor equipment usage and on a regular basis compare usage to permit conditions.

Finding AR.6: There is no quality control to assure that air pollution abatement device inspections are being properly performed.

Discussion: Air pollution abatement devices are inspected quarterly by the using organization. Information reported on the inspection forms may be reported incorrectly. There is no follow up or documentation on correction of deficiencies noted during the inspections.

Proposed Action: The Laboratory should train personnel conducting inspections on how to properly perform and document the inspections and correction of deficiencies.

Finding AR.7: There are no quality control procedures to assure that solvent usage records required by air permits are properly maintained.

Discussion: Solvent usage records are required for many solvent sources. The records are maintained by the user of the equipment and sent to the EP&WM Department on a quarterly basis. Some records i n the EP&WM office did not match those records maintained in the users' files. Additionally, solvent usage records are often sent to the EP&WM Department past the required due date.

Proposed Action: The Laboratory should provide periodic quality control inspections to assure that operators are properly completing the solvent usage records. Line managers should assure that the records are properly maintained and submitted to the EP&WM Department on time.

Finding AR.8: Air regulation changes and their effect on operations at the facility are not properly reviewed and transmitted to affected parties.

Discussion: Regulatory changes effecting air–pollution sources occur frequently. Notification of proposed changes and actual changes are sent by the BAAQMD to the EP&WM Department. There is no formal review process to determine whether changes affect the Laboratory. When changes in the regulations are transmitted to personnel, it is often verbally. This method of notification has proven ineffective in informing all affected parties.

Proposed Action: The ES&H Division should develop a formal review process to document that regulation changes have been reviewed and affected parties notified of changes. Line management must be informed of changes, and inform affected personnel.

Finding AR.9: There is no documentation that equipment or processes exempt from air permits have been reviewed.

Discussion: Many types of equipment and processes are exempt from air–pollution permits as defined in the BAAQMD Rules and Regulations. Documentation of exempt processes is not available.

Proposed Action: A survey of exempt sources should be performed by the ES&H Division and documented as to which rule specifically exempts it from a permit.

Finding AR.10: Rags and paper towels used for solvent–wipe cleaning operations are not properly contained or disposed. (See also Finding WM.8.)

Discussion: Rags and paper towels used for solvent–wipe cleaning operations are required to be stored in a covered container and disposed of as a hazardous waste. The majority of these items are currently being disposed of in violation of air regulations.

Proposed Action: The ES&H Division should develop a policy and procedures for the proper disposal of solvent–contaminated rags and paper towels. This information should be included in the Hazardous Waste Generators Training.

Finding AR.11: Maintenance of air–pollution equipment is lacking.

Discussion: Many pieces of equipment which emit air pollutants have controls that are not maintained or calibrated. Examples include manometers on bag houses, temperature controls on vapor degreasers, and filters on spray paint booths. There is no evidence that the equipment is inspected or maintained.

Proposed Action: The Laboratory should institute a maintenance program to assure that equipment is operating properly, and that all inspections and work are performed and properly documented.

Finding AR.12: There is no evidence that an effort has been made to apply for or receive permits for TAC emissions.

Proposed Action: The ES&H Division should review the need for additional permits or written exemptions for substances on the TAC list issued May 29, 1991 by the BAAQMD in the new Regulation 2, Rule 5.

Finding AR.13: The 1991 NESHAP report did not include data for Ar^{41}. (See also Finding RP.9-1 in Chapter 3, "Safety and Health Assessment.")

Discussion: One of the radioactive gases produced by the accelerator is Ar^{41}. The 1991 report provided calculated values for several positron emitting gases, but did not indicate Ar^{41} levels.

Proposed Action: The NESHAP report should include Ar^{41}.

SW Surface Water

Performance Objective: The Laboratory is required to comply with the federal Clean Water Act (CWA), the Safe Drinking Water Act, the California Oil Pollution Control Act, permitting requirements specified in the California Porter–Cologne Water Quality Act, and the Federal National Pollution Discharge Elimination System (NPDES) which is administered by California State Water Resources Control Board through the San Francisco Bay Regional Water Quality Control Board (RWQCB).The Laboratory is also required to comply with performance objectives and requirements delineated in DOE Orders 6430.1 and 5400.1.

Finding SW.1: Staff collecting water samples required by the NPDES permit have not received formal training on proper sampling procedures.

Proposed Action: The ES&H Division should update sampling procedures to include sampling techniques, and provide formal training to personnel collecting the samples.

Finding SW.2: There are no quality control samples collected for the monitoring performed under the NPDES permit.

Discussion: The frequency and types of samples required to be collected are specified under the NPDES permit. There are no quality control samples collected to validate the data.

Proposed Action: Quality control should be incorporated into the NPDES Program.

Finding SW.3: There are no procedures or schedule for maintenance of the oil–water separators for the surface water run–off discharges.

Discussion: Oil–water separator clean–out procedures do not exist. Clean outs are not documented. There is no QA to assure clean outs are being done prior to inclement weather or if the removed materials are disposed of properly.

Proposed Action: The ES&H Division should develop a maintenance schedule and procedures for the oil–water separators.

Finding SW.4: The Laboratory does not have a comprehensive Surface Water Monitoring Program.

Discussion: There are several locations throughout the site where surface water discharges and eventually enters San Francisqito Creek. Surface water discharges are not consistently monitored to determine whether hazardous pollutants are being discharged off site.

Proposed Action: The ES&H Division should institute a monitoring program to periodically sample and analyze surface water discharges for hazardous pollutants. The program should include procedures and quality control elements.

Finding SW.5: **Not all employees have not been trained on SPCC as required by the Clean Water Act (CWA).**

Discussion: Training on the SPCC Plan began in July 1991, but not all appropriate employees have received the training.

Proposed Action: Training should be continued until all relevant personnel have been trained.

Finding SW.6: **Soils in drainage ditches are not routinely characterized to determine whether they contain pollutants which may contaminate surface water discharges.**

Discussion: One drainage ditch at the site is known to be contaminated with PCBs. Other drainage ditches at the site have not been characterized to determine whether similar conditions exist.

The ditch that is known to be contaminated with PCBs is being fully characterized and will be remediated. A comprehensive investigation of other drainage ditch soils has been initiated.

Proposed Action: The drainage ditch soil characterization process should be continued.

Finding SW.7: **Cognizant employees are not aware of the difference between storm drain catch basins and sanitary sewer manholes.**

Discussion: Employees do not know how to identify storm drain catch basins, and are unaware that the basins feed into San Francisqito Creek. This could lead to improper surface water discharges.

Proposed Action: The SPCC training should include instruction on how to identify storm drain catch basins and information on their restricted use.

Finding SW.8: **Lead storage practices could contribute to lead in the surface water discharges.**

Discussion: Throughout the site, lead (primarily bricks) is stored on the ground or unprotected from the elements. The potential exists for surface and groundwater contamination from lead. Though a lead policy has been communicated, it is not uniformly followed.

Proposed Action: Lead storage practices should be included in training and documented in operational procedures. Inspection of lead storage areas should be included in the ongoing self-assessment program.

IW Industrial Wastewater

Performance Objectives: The Laboratory is required to comply with federal pretreatment standards for metal finishing discharges, DOE standards for radiation protection, and local regulations of the South Bayside System Authority (SBSA) and the West Bay Sanitary District (WBSD).

Finding IW.1: No formal written procedures exist for operating the Industrial Wastewater Treatment Plant.

Discussion: The Industrial Wastewater Treatment Plant treats heavy metal bearing rinsewaters from the plating shop. There are checklists to guide operation of the plant, but no formal procedures.

Proposed Action: The Laboratory should develop formal written procedures for operation of the Industrial Wastewater Treatment Plant.

Finding IW.2: Operator training for the Industrial Wastewater Treatment Plant is not current and does not address permit conditions.

Discussion: A training certification course was completed several years ago, but the training has not been updated or repeated.

The Laboratory does not have a permit to treat hazardous waste; therefore, only non-hazardous rinsewaters are treated. The operators have not been given adequate training or written guidance on what can and cannot be treated, or what discharge limitations must be met.

Proposed Action: Operator training for the Industrial Wastewater Treatment Plant should be expanded to address permit conditions and to include written guidance on those conditions. Refresher training should be provided at appropriate intervals.

Finding IW.3: No quality control procedures exist for discharge of treated wastewater to the sanitary sewer.

Discussion: Quarterly monitoring of the discharge, as required by the federal Clean Water Act Pretreatment Standards, is performed and reported to the EPA by the SBSA. The Laboratory receives a report of SBSA's analyses, but it does not receive a copy of the report submitted to the EPA. Split samples are not obtained from SBSA.

Proposed Action: The ES&H Division should monitor reports sent to the EPA regarding compliance with pretreatment standards.

Finding IW.4: **There is a lack of EP&WM involvement for ensuring compliance with industrial wastewater discharges.**

Discussion: EP&WM involvement in the operation of the treatment systems is minimal. This involvement has been limited to occasional walk–through inspections and inclusion of the treatment system tanks in the SPCC Plan. Additionally, the EP&WM Department is not involved with assuring that radioactive discharges are within discharge limitations.

Proposed Action: The ES&H Division should take a more aggressive role in assuring that discharges to the sanitary sewer meet discharge limitations. Radiological data should be evaluated to ensure that discharge limitations are met.

Finding IW.5: **Many discharges to the sanitary sewer are not listed on the discharge permit or documented in any other way.**

Discussion: The Laboratory has not been required to submit an updated discharge permit application for five years. Although the SBSA has verbally been informed of discharges not listed on the existing permit, there is little or no documentation to prove they have been approved by the SBSA. SLAC is required to submit a new permit application in 1991.

Proposed Action: The ES&H Division should detail all discharges on the new permit application.

Finding IW.6: **Data was not found to validate that discharge of tritiated water occurred at levels within the limits of the sanitary sewer discharge permit.**

Discussion: SLAC is required to keep the discharge of tritium in water below the 20,000 pCi/l level required by EPA for drinking water. Discharged water to the sanitary sewer system did not always have documented radioanalysis results.

Proposed Action: The ES&H Division should conduct an analysis of water prior to discharge to ensure the requirements are complied with.

WM Waste Management

Performance Objective: The Laboratory is required to fully comply with the Federal Resource Conservations and Recovery Act (RCRA), the Toxic Substance Control Act (TSCA), the Federal Insecticide Fungicide and Rodenticide Act (FIFRA), the State Hazardous Waste Control Law, applicable sections of the California code of Regulations Title 14, 22, and 26, the California Health and Safety Code, applicable local ordinances and DOE Orders 5400.1, 5400.3, and 5482.1B.

Finding WM.1: Some generators of hazardous waste have not been provided with training, guidelines, or procedures on how to properly manage hazardous waste.

Discussion: Some generators are unaware of storage requirements, labelling and marking requirements, and proper segregation techniques. A training program to provide this information began in July, 1991. However, materials such as the *Hazardous Materials Management Handbook* used in the training course are still in draft form.

Proposed Action: Training courses should be continued until all personnel requiring the training have received it. Annual refresher courses should be provided, and new employees trained. The *Handbook* should be finalized and issued.

Finding WM.2: Some hazardous waste containers are either not labelled or are not properly labelled. (See also Finding WS.6-2 in Chapter 2, "Environmental Assessment.")

Discussion: Federal, state, and local laws and regulations specify information that must be on each container. Drums of waste without proper labels are located around the facility. Fifty–five gallon drums are issued by the EP&WM Department with proper labels affixed to them. However, generators often re–use product containers for their waste products and so not properly label these containers.

Proposed Action: The ES&H Division should continue Hazardous Waste Generators training which teaches the requirements of hazardous waste container labelling. The ES&H Division should develop a policy prohibiting the re–use of product containers by generators and formally establish procedures for issuing pre–labelled hazardous waste containers.

Finding WM.3: WAAs have been mis–identified as SAAs.

Discussion: Several areas at the site have been mis–identified as "Satellite Accumulation Areas" and are being used to store hazardous waste in excess of the 90–day limit established by federal, state, and local laws and regulations.

Proposed Action: The ES&H Division should evaluate all SAAs to assure they meet the requirements of an SAA and correct any deficiencies discovered.

Finding WM.4: No procedures exist for operation of SAAs or WAAs.

Discussion: There are fourteen documented SAAs at the Laboratory. Operation of SAAs and WAAs is under the control of the hazardous waste generators. The generators do not have written guidelines or procedures on how to properly operate the areas or a list of what type of safety equipment is necessary. There are no checklists or procedures for performing weekly inspections. California Hazardous Waste Management Regulations (CCR Title 22) require weekly inspections of container storage areas and daily inspections of waste loading and unloading areas. Weekly inspections are conducted; however, they are not always thorough and corrections are sometimes not documented. The SAA inspection form does not contain a comment section for each item to be checked. Therefore, the specifics of noncompliance cannot easily be noted and corrections tracked.

Proposed Action: The ES&H Division should develop procedures for operation of these areas. Checklists, procedures, and training for performing weekly inspections should be provided to the generators.

Finding WM.5: Some SAAs and WAAs do not have the proper warning signs or equipment. (See also Finding PT.12-2 in Chapter 3, "Safety and Health Assessment.")

Discussion: Some SAAs and WAAs are not properly marked as hazardous waste storage areas. There are no NFPA hazard signs on the areas. Spill kits, safety equipment, and emergency equipment is inadequate or totally lacking. Access to many of these areas is not controlled.

Proposed Action: SAAs and WAAs should be properly marked and furnished with proper spill clean–up materials, and safety and emergency equipment. The ES&H Division should define standards for these activities, to be implemented by the line organizations.

Finding WM.6: Hazardous waste drums were frequently observed not stored in a secure and environmentally safe manner.

Discussion: Throughout the site, drums were observed open and outside of secondary containment.

Proposed Action: The Laboratory should issue a policy statement that all hazardous waste containers must be closed except when adding waste and must be stored in secondary containments, and should continue Hazardous Waste Generators Training.

Finding WM.7: The Laboratory has no hazardous materials spill policy.

Discussion: There is no clear policy or procedures on how to handle a spill of a hazardous waste or material. If a large spill occurs, the PAFD will respond, but generators are expected to clean up smaller spills. The Generators have been given no guidelines on how to properly clean up or report a spill to the EP&WM Department. Small spills or releases of hazardous chemicals or wastes are often not cleaned up or reported. Often the absorbent used for clean up is not swept up for disposal as a hazardous waste. Spill kits are absent or not readily visible in many waste storage areas.

Proposed Action: The Laboratory should develop a hazardous materials spill policy and distribute it to the appropriate personnel.

Finding WM.8: Clean–up materials, rags, and wipes contaminated with hazardous materials are not properly managed or disposed of. (See also Finding AR.10.)

Discussion: Rags, paper towels, and clean–up materials contaminated with hazardous materials such as oil or solvent are being disposed of in the trash.

Proposed Action: The ES&H Division should develop and disseminate a policy and procedures on how to properly handle and dispose of rags, paper towels, and clean–up materials contaminated with hazardous materials.

Finding WM.9: Containers of hazardous waste are frequently stored for durations exceeding the limitations imposed by federal, state, and local regulations.

Discussion: Federal, state, and local laws and regulations limit the acceptable duration for storage of hazardous waste.

Proposed Action: The ES&H Division should continue Hazardous Waste Generators Training which explains the limitation for storage of hazardous waste, and incorporate it into SAA and WAA training and procedures.

Finding WM.10: There are no written procedures for operation of the Hazardous Waste Storage Yards.

Discussion: There are no operating procedures for the Hazardous Waste Storage yards, nor are there procedures for waste pick–up, segregation, packaging, labelling, marking, preparing shipments, handling, and maintenance of paperwork. Personnel operating the yards follow verbal direction. There are no checks–and–balances to assure that operations are being performed correctly.

Proposed Action: The ES&H Division should develop procedures for operation of the Hazardous Waste Storage yards, provide procedure specific training to the hazardous waste technicians, and provide direct supervision to assure that operations are being performed in compliance with laws and regulations.

Finding WM.11: There are no waste acceptance criteria for the Hazardous Waste Storage Yard.

Proposed Action: The EP&WM Department should develop acceptance criteria for hazardous waste.

Finding WM.12: There is not an up–to–date contingency plan specific to hazardous materials/waste storage areas.

Proposed Action: The ES&H Division should update the Contingency Plan to include hazardous material/waste storage areas.

Finding WM.13: There is no Waste Minimization Plan for radioactive waste.

Discussion: The ES&H Division has recently prepared a comprehensive Waste Minimization Plan for hazardous waste, but the plan does not include radioactive wastes.

Proposed Action: The ES&H Division should prepare a waste minimization plan for radioactive wastes.

Finding WM.14: The Radioactive Waste Management Program was found to be lacking documentation, including inventory and personnel training records. (See also Finding RP.3-3 in Chapter 3, "Safety and Health Assessment.")

Discussion: The Radioactive Material Management Program must include a separately identifiable Radioactive Waste Management Program that meets the requirements of a generator shipping waste to the DOE–approved site at Hanford, Washington. The shipments conducted to Hanford in FY 91 were the first in the over 26–year history of the Laboratory. During FY 91, it was found that the program was lacking in required documentation and all approved shipping authorizations were suspended.

Proposed Action: The Laboratory should complete and implement the draft procedures for the Radioactive Material Management Program, including the Radioactive Waste Management Program and personnel training.

Finding WM.15: There is no site–wide radioactive/mixed waste management program.

Discussion: Drums were found containing unsegregated waste (radioactive, non–radioactive, and hazardous). There were indications of the improper storage of mixed waste (activated lead shavings in drums marked as waste). There is no program to ensure that wastes are monitored for proper storage.

Proposed Action: The ES&H Division should develop a mixed waste management program to ensure sufficient monitoring to meet the requirements of all applicable regulations and permits. Where possible, a recycling program involving the reprocessing of lead materials should be instituted.

Finding WM.16: Radioactive material was found in non-designated storage areas.

Discussion: Radioactive material, some of which was likely to be classifiable as radioactive waste, was found throughout the controlled section of the Laboratory.

Proposed Action: Procedures to classify radioactive waste should be implemented at the line management level using generator forms, tags, or other approved means to ensure materials are properly surveyed and placed in storage for reutilization (recycling) or entry into a waste stream. The ES&H Division should define appropriate standards.

QA Quality Assurance

Performance Objective: The Laboratory's QA Program must provide accurate, complete, and verifiable data for all ES&H programs. DOE Orders 5400.1, 5700.1B, 5484.1 and 5430.1 direct the Laboratory to meet QA for planning, monitoring, testing, and controlling of all environmental and radiation protection programs.

Finding QA.1: The *Institutional Quality Assurance Manual* does not specifically address environmental issues.

Proposed Action: The ES&H Division should expand the *Institutional Quality Assurance Manual* to include subsets of formalized documents detailing QA for environmental, meteorological, and effluent monitoring programs.

Finding QA.2: Quality assurance elements are lacking in environmental programs.

Discussion: Program compliance, audits, and evaluations are not conducted by outside independent sources on a routine basis. Environmental monitoring data is not validated.

Proposed Action: The ES&H Division should develop a Quality Assurance Program for all environmental areas.

Finding QA.3: There is currently no one in the Quality Assurance and Compliance Department who is trained in environmental laws and regulations.

Discussion: QA personnel are currently enrolled in training courses on environmental regulations.

Proposed Action: The Quality Assurance and Compliance Department should continue training of QA engineers in the area of environmental regulations.

Finding QA.4: **There is no program to assure that subcontractors using hazardous chemicals on site are complying with environmental regulations.**

Discussion: Environmental laws place restrictions on the types of materials which can be used. For example, products containing solvents must meet specific requirements to be used within the Bay Area.

Proposed Action: The Laboratory should develop a program for subcontractors, vendors, visitors, and users who perform work which requires the use of hazardous chemicals, which includes reviews for compliance.

Finding QA.5: **Hazardous waste TSD facilities and outside vendors who perform analytical work are not audited. (See also Finding QV.2-2 in Chapter 3, "Safety and Health Assessment.")**

Discussion: Some TSD facilities and laboratories have been visited by personnel from the EP&WM Department, but the visits are not properly documented.

Proposed Action: Analytical laboratories and TSD facilities should periodically be inspected and audited by the ES&H Division. The audits should be properly documented.

IS Inactive Waste Sites

Performance Objective: The Laboratory is required to report findings on inactive waste sites or potential sites under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and Superfund Amendments Reauthorization Act (SARA) Title III. Clean up is required under CERCLA, SARA Title III and RCRA. DOE Orders 5400.1 and 5484.1 also govern inactive waste sites.

Finding IS.1: **Closure of the former Hazardous Waste Storage yard was not properly documented.**

Discussion: Prior to the construction of the existing Hazardous Waste Storage yard, a hazardous waste storage yard existed east of Building 015. Post closure sampling and clean up has been completed, but not properly documented.

Proposed Action: The ES&H Division should develop procedures for properly documenting closure activities.

Finding IS.2: **A background soil study for comparing soil clean–up objectives is lacking. (See also Finding SB.1)**

Discussion: In conjunction with soil characterization studies and remediation projects, a considerable amount of analytical data on soil is already available. However, this data has never been evaluated as a whole to determine the concentration of elements which occur naturally at the site. Determination of background levels is necessary for evaluation of whether clean–up levels have been met during remediation of inactive waste sites.

Proposed Action: The ES&H Division should evaluate existing data and collect additional data as necessary to determine background concentrations of naturally occurring elements in soil around the Laboratory.

Finding IS.3: **Many suspected or confirmed inactive waste sites have not been fully characterized or remediated.**

Discussion: There exist a number of areas which are known or suspected to be contaminated with hazardous materials or wastes. These areas have not been fully characterized to determine the extent of contamination. The majority of the areas contain PCB–contaminated soils. Examples include areas around PCB transformers, the Master Substation, and the IR–6 drainage ditch. A subcontractor has been retained to begin evaluating known and suspected waste sites.

Proposed Action: The ES&H Division should develop a plan with priorities for remediation of contaminated areas.

SB Soils/Sediments and Biota

Performance Objective: The Laboratory should comply with the General Environmental Protection Program contained in DOE Order 5400.1, and surveillance and monitoring provisions contained in DOE Orders 5400.4 and 5400.5, and should conduct inventories to adequately characterize the site's natural resources to assure their enhancement. The Laboratory's operations, policies, and procedures should be in compliance with the Federal Fish and Wildlife Coordination Act and the Endangered Species Act. Provisions are included in the California Department of Fish and Game require the protection of endangered species. Additionally, the National Environmental Policy Act requires all major federal projects to evaluate and document potential impacts.

Finding SB.1: **The Laboratory does not have a biotic and soils/sediment baseline survey. (See also Finding IS.2)**

Discussion: Many soil samples have been collected around the site and analyzed. The data on the baseline or background characteristics of the soils to differentiate natural occurring elements and compounds from low level contamination has never been compiled.

Proposed Action: The ES&H Division should compile data, collect additional soils if necessary, and prepare a report on the baseline characteristics of the soils around the site.

Finding SB.2: **Remediation projects are not properly documented or approved by DOE and other regulatory agencies**

Discussion: Relatively small-scale environmental investigations and remediation projects are performed in house. These efforts are inadequately documented and, until one year ago, were performed without approval from the appropriate regulatory agencies and without NEPA documentation. Documentation of these efforts was limited to informal files kept by various individuals involved in the efforts.

Proposed Action: The ES&H Division should establish guidelines for performing and documenting remediation projects. DOE and appropriate regulatory agency approvals need to be obtained prior to starting remediation activities.

TM Toxic Chemical Materials

Performance Objective: The Laboratory should fully conform to the requirements for control of use, storage, and disposal of hazardous materials that are specified in the Toxic Substance Control Act (TSCA) and the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).

California Hazardous Waste Control Law does not make a distinction, as related to waste and waste disposal, for materials regulated under these Acts. Findings and Proposed Actions relative to toxic chemical materials can be found in the Waste Management subsection of this chapter and in Chapter 2, "Environmental Assessment."

RA Radiation*

Performance Objective: The Laboratory requires that policies, procedures, and operations should comply fully with the radiation protection requirements and regulations established by federal law, DOE Orders, and applicable state and local regulations. These include the Atomic Energy Act, the Resources Conservations and Recovery Act (RCRA), and DOE Orders on general environmental protection (5400.1), radiation protection of the public and the environment (5400.5), radiological monitoring (Draft 5400.XY), and radiological waste management (5480.2A). The Laboratory should maintain plans, operating programs, control and documentation for the management of activated material, radiological constituents of waste

* Issues/discussion relative to this section are also included in Chapter 3, "Safety and Health Assessment."

streams, and the characterization of the environment. The Laboratory should also fully comply with DOE environmental radiation protection programs, including DOE General Design Criteria (Order 6430.1), reporting (Order 5484.1), and environmental protection standards (Order 5482.1), and OSHA and EPA guidelines and standards. The Laboratory's operations require the use and the production of radioactive materials and radiation. The Laboratory's procedures and policies are required to fully comply with state and federal regulations regarding the handling and use of radioactive materials and sources, and the protection of occupational and public personnel. The applicable regulations include DOE Order 5480.11, and applicable sections of the California Administrative Code Title 17, California Radiation Control Regulations.

Finding RA.1: The 1990 Annual Site Environment Report has deficiencies.

Discussion: Gases are monitored for radioactivity at the Beam Switchyard, Positron Source, and the Final Focus system ventilation exhausts. Direct gamma and neutron radiation levels are monitored at six perimeter monitoring stations. Radioactive gas releases from the site are well below NESHAP limits. However, it was observed in the 1989 and 1990 annual reports that many of the perimeter monitoring stations were not working, and therefore data needed for the report was not available.

Proposed Action: The annual report should be updated to include the changes requested by DOE and to define the action necessary to ensure continuity of data acquisition.

Finding RA.2: Perimeter monitoring stations are not properly maintained.

Discussion: Since the perimeter monitoring stations are necessary for verification of perimeter exposures to neutrons and photons, more inspections and preventive maintenance are needed to ensure operation of these stations. Perimeter monitoring stations are being calibrated and regularly monitored to ensure timeliness and accuracy of data.

Proposed Action: A back–up system of passive radiation monitors (posted TLDs) should be installed to ensure continuity of data, and the existing perimeters stations properly maintained.

Finding RA.3: In a number of areas, inadequate posting of radiation areas/radioactive material storage areas was found. (See also Finding RP.3-2 and Finding RP.4-2 in Chapter 3, "Safety and Health Assessment.")

Discussion: Lack of adequate radiation area posting signs was noted in several areas. This included the postings found with inaccurate and outdated information, inadequate barriers surrounding posted areas, the existence of unnecessary postings, the non–existence of necessary postings, and the misuse of radiation labels.

Proposed Action: The Laboratory should update the radiation area postings and establish a Radiative Materials Handling Training Program.

Finding RA.4: Improper storage and labeling of radioactive material and controls material was noted in several areas of the Laboratory. (See also Finding RP.3-2 in Chapter 3, "Safety and Health Assessment.")

Discussion: Radioactive materials were found in non–designated locations, materials and sources were found unlabeled, sources were found in unlabeled storage locations, sources were found with old and outdated labels, materials were found with faded or non–regulation labels, labels were found on non–radioactive materials, radiation warning signs were found on equipment that posed no radiation hazard, and incomplete survey tags were found on materials. Radioactive signs and labels were found disposed of improperly.

Proposed Action: Lack of adherence to established radiation safety policies and procedures should be monitored and corrected through an enhanced oversight program provided by the Quality Assurance and Compliance Department and OHP reviews. In addition, OHP should raise the awareness of radiation safety policies and procedures in personnel by increasing consultation, OHP–site personnel interface, and notification by newsletter or notices of radiation safety issues.

Finding RA.5: Portable radiation detection instrumentation is sometimes used improperly.

Discussion: Improper use of radiation survey meters was observed. An uncalibrated survey meter was found being used by untrained personnel.

Proposed Action: The lack of policies and procedures for reporting and documenting the use of portable instruments should be addressed by training and written procedures.

Finding RA.6: Improper segregation, designation, and storage of activated/unactivated lead bricks was found throughout the Laboratory.

Discussion: There is a lack of awareness of radiation safety requirements on the part of personnel as well as health physics staff.

Proposed Action: Formal classroom training of the radiation safety staff has begun. This should be enhanced by written procedures and on–the–job training in the implementation of these procedures.

NE NEPA

Performance Objective: The Laboratory is required to comply with the provisions of the National Environmental Policy Act (NEPA) and the polices and procedures established by DOE for NEPA compliance.

Finding NE.1: There is no formal comprehensive NEPA Program.

Discussion: The BSD has responsibility for ensuring that projects receive appropriate NEPA review before being undertaken. Technical review support is provided by the EP&WM Department within the ES&H Division. There is no formal program to assure that all projects requiring NEPA determinations are receiving them.The Laboratory has conducted NEPA review of large–scale actions since 1975. More recently, this review has been expanded to include all General Plant Projects, in–house Energy Management Projects, Accelerator Improvement Projects, and remediation activities. Plans are underway to begin NEPA review on capital equipment purchases and some operationally funded actions.

Proposed Action: BSD should prepare NEPA compliance guidelines. This document should provide, at a minimum, an overview of NEPA requirements and how they apply to DOE and the Laboratory, clear definition of the NEPA compliance responsibilities and authorities of staff, a description of NEPA review procedures, including planning, scheduling, and budgeting systems that are in place for ensuring timely NEPA review, and a description of the internal and DOE/SAN and headquarters review and approval processes.

Finding NE.2: Some projects are being performed without proper NEPA documentation.

Proposed Action: Management should require that proper NEPA documentation be completed before undertaking some new projects.

Environmental Management

Performance Objective: The Laboratory should develop and implement environmental programs to assure the Laboratory's compliance with applicable federal, state, and local laws and regulations, and applicable DOE Orders.

Finding EM.1: Environmental programs are not adequately planned and implemented.

Discussion: Environmental programs are not at a level of compliance required by DOE Orders. Many of the planning and management documents required under DOE Order 5400.1, Chapter III, are incomplete.

Due to the rapid growth of the ES&H Division, some difficulties in the transition can be expected. Although new staff continue to be brought into the organization, there are currently too many projects for the existing staff to handle.

Proposed Action: General staffing requirements in the area of environmental protection and compliance should be evaluated. The ES&H Division should identify planning goals at reasonable increments. Programmatic planning should be conducted for each of the main program areas.

Finding EM.2: Budgeting and tracking of costs associated with environmental programs is not thorough.

Discussion: The ES&H Division in conjunction with the BSD, produces the Activity Data Sheets for the DOE mandated Five–Year Plan and the yearly budgets. Long range planning is done solely in conjunction with the DOE Five–Year Plan and needs to be improved. Cost estimates are frequently made without enough supporting documentation to substantiate how estimates were derived.

Proposed Action: The ES&H Division and the BSD should establish procedures to substantiate budget requests and provide information on actual costs of individual programs and projects as appropriate.

Finding EM.3: Information and guidance on environmental compliance issues is poorly communicated to line managers and the general employee. (See also Finding OR.2-1 in Chapter 4, "Management and Organization Assessment.")

Discussion: Dissemination of EP&WM information and direction is often done verbally. Information is also distributed in the form of memoranda or ES&H Bulletins. However, even when an ES&H Bulletin has been distributed, the information does not always to make its way through the system to reach the general employee.

Proposed Action: A distribution system which provides reasonable assurance that affected personnel receive information should be designed.

Finding EM.4: Responsibility for providing guidance on management of hazardous materials is not well defined.

Discussion: Presently, it is not clear which ES&H department has jurisdiction over hazardous materials management issues.

Proposed Action: The responsibility for providing guidance on the proper handling and storage of hazardous materials should be defined.

Finding EM.5: Communications between DOE and EP&WM are poor.

Discussion: There are monthly meetings of representatives from the DOE/SAN, the DOE site office, and the EP&WM Department. Generally, a preset agenda is distributed prior to the meeting. This agenda has an attachment of items to be addressed. Noncompliance items and other issues are noted and placed on the list of "items to be addressed" that is distributed at the meetings. Items long ago completed remain on the list, due partially to the Laboratory not always providing written notification of completion, or DOE's not updating the list. Upcoming issues (policy changes or additions from DOE HQ) are not always discussed at the meetings. There is little agreement among EP&WM, DOE/SAN and DOE site office in the prioritization of issues.

Proposed Action: Once the Laboratory has addressed an issue, it should be formally documented in writing and the results sent to the requestor (DOE site and/or SAN office). Formalized status sheets should be instituted for tracking purposes. The basis for prioritization should be addressed. The EP&WM Department should develop milestones for completing actions.

Finding EM.6: There is frequently insufficient time allowed to respond to DOE requests.

Discussion: The DOE frequently makes requests for information or review/comment on changes or proposals for DOE orders, directives, and guidelines. Correspondence and requests for information from DOE/SAN sometimes requires a response within a very short time frame resulting in insufficient time for the EP&WM staff to address any action items. The same situation applies to information or "comment requests" from other DOE bodies.

Proposed Action: The Laboratory and DOE/SAN should review the formal transmittal process.

Finding EM.7: Training of EP&WM staff is not adequately documented.

Discussion: RCRA requires that each hazardous waste generator establish a training program for appropriate personnel. The program can consist of classroom instruction or on–the–job training. The content of, schedule for, and techniques used in on–the–job training must be described in the training records maintained at the facility. Personnel within the EP&WM have received extensive off–site classroom training of hazardous materials handling, but it has not been documented.

Proposed Action: Course outlines of classes attended should be maintained in the personnel training folders. Additionally, descriptions of on–the–job training should be developed and maintained in a database.

Finding EM.8: There is a lack of records management in the EP&WM Department

Discussion: Specific information or files can take a considerable amount of time to retrieve. The Department has recently made considerable progress in consolidating and organizing the files, but procedures for document tracking have not yet been developed.

Proposed Action: Requirements for retention of applicable records should be defined and procedures developed and implemented.

Finding EM.9: QA has not been fully implemented into the environmental programs as required by DOE Orders. (See also subsection QA in this chapter.)

Proposed Action: The ES&H Division should incorporate quality assurance into environmental programs.

Finding EM.10: Review, tracking, and evaluation of the impact of regulatory changes is inadequate.

Discussion: Environmental regulations are constantly changing and new laws and regulations promulgated. Review of such changes and their impact on the Laboratory is not performed on a regular basis by the EP&WM Department, which could result in non–compliance or a disruption of operations.

Proposed Action: The EP&WM Department should track changes to existing regulations and proposals for new ones. These changes should be evaluated as they occur to determine their impact on the Laboratory.

3
Safety and Health Assessment

I. Scope and Approach

The Safety and Health Self Assessment (SHS) was conducted to determine the status and effectiveness of safety and health programs at the Laboratory. Teams for this purpose were assembled from all divisions, and instructed to examine how safely the Laboratory is being operated and the condition of its equipment.

The SHS was conducted according to the performance objectives and supporting criteria detailed in DOE Document No. DOE/EH–0135, June 1990, *Performance Objectives and Criteria for Technical Safety Appraisals at Department of Energy Facilities and Sites*, along with applicable government and the Laboratory regulations and policies, and best industry practices in the following categories:

- Organization and Management.
- Quality Verification.
- Operations.
- Maintenance.
- Training and Certification.
- Auxiliary Systems.
- Emergency Preparedness.
- Technical Support.
- Packaging and Transportation.
- Safety/Security Interface.
- Experimental Activities.
- Site/Facility Safety Review.
- Radiological Protection.
- Personnel Protection.
- Worker Safety and Health (OSHA) Compliance.
- Industrial Hygiene.
- Occupational Safety.
- Fire Protection.
- Medical Services.

These categories were reviewed against safety and health activities at SLAC and SSRL experimental and operating facilities, shops, offices, and management structures and operating procedures. Conduct of operations activities were reviewed at the accelerators and experimental facilities.

The Safety and Health Committee (SHC) was formed from members of the Self–Assessment Task Force (SATF), and with the addition of an environment, safety, and health technical expert, represented all

divisions of the Laboratory. After careful deliberations, the SHC formed teams of reviewers from SLAC and SSRL to address the applicable performance objectives of each of the categories above. In all, about fifty people participated on the various teams.

In order to perform a comprehensive appraisal, each team was coordinated by an SHC member and asked to determine whether the current operations for each specific facility and/or activity examined were being conducted within the scope of the applicable operational safety procedures and programs, including all applicable government and SLAC regulations, procedures, and best industry practices. The teams, using DOE/EH-0135 as a guide, were required as appropriate to observe routine operations, to note the physical conditions of the site and facilities, to interview management and staff, and to examine records, procedures, and applicable documents. This investigative activity was conducted in May/June 1991.

The Findings of the teams and their comments were collated and reviewed by the SHC. Each finding was further researched as necessary. Additional findings were generated from comprehensive reviews of internal and other Laboratory and DOE/government documentation, the site inspection, input from the other self-assessment Committees, and other appraisals of the Laboratory. All Findings were assembled into standardized formats, discussions appended as needed, and a Proposed Action developed. This Proposed Action is a suggestion as to how the Laboratory might address the particular Finding. These Proposed Actions will have to be prioritized and a corrective action schedule developed which is practical and consistent with available resources.

II. Key Findings

The SHS was the first self assessment of this type performed at the Laboratory. As the SHS proceeded, it became clear that certain pervasive practices and attitudes underlie the activities of the Laboratory. Of the total of approximately 230 Findings identified, the following six general findings may be considered to be the summary or key findings:

- The Laboratory does not have in place a fully implemented self-assessment program for safety and health issues. Consequently numerous safety-related problems have persisted.
- The ES&H Division is a recent creation, and thus has not yet had the opportunity to develop and coordinate the appropriate training and advisory activities essential for an integrated, laboratory-wide environment, safety, and health program.
- Communication and training in the essential areas of staff responsibilities, and attention to compliance with applicable environment, safety, and health standards, is not uniformly established throughout the Laboratory.
- Formality in addressing and implementing safety and health policy has been lacking in the line organization. Therefore, in many areas, there is a lack of documentation of procedures and actions.
- The large number of OSHA-type deficiencies found in the site inspection indicates numerous electrical system concerns and a lack of attention towards good housekeeping practices.
- The manner in which the Laboratory addresses the safety and health indoctrination of its many visitors participating in scientific programs and on-site subcontractors is not in conformance with the programs now planned and/or implemented for its employees.

The Laboratory is taking corrective actions daily. Many of the findings revealed during this self assessment have already been mitigated or corrected. Procedures and documentation addressing many concerns are being generated and/or implemented as appropriate. These actions have not been taken into account in this

document and no update effort has been attempted. Therefore, this self assessment should be viewed as a snapshot of the status of the Laboratory at the conclusion of the May/June appraisal.

III. Findings, Discussions, Proposed Actions

The Findings, Discussions, and Proposed Actions in the remainder of this chapter are summaries of the detailed research performed to accomplish the Technical Safety Appraisal. Most Findings are followed by a brief Discussion and always include a Proposed Action to address the problem. As this *Self Assessment Report* is being prepared, the Laboratory is planning the preparation of a detailed Corrective Action Plan to address the Tiger Team Findings. Preliminary work toward the development of the Corrective Action Plan is being undertaken based on the Laboratory's Findings. Further, the implementation of corrective actions has already begun, and in some cases has been completed for many of the Findings and OSHA–type deficiencies described in this chapter.

Organization and Administration*

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.

Finding OA.1-1: The appropriate organizational structure is in place, but is presently changing and evolving. During the change, information about the new organization's structure is slow to reach everyone at the Laboratory.

Discussion: As the organization changes, new information is passed on to the appropriate persons in a series of meetings. Safety organization documents are being developed, but major sections are missing laboratory wide, and are in various stages of preparation.

Proposed Action: Formal documentation which shows organizational changes should be developed, thoroughly distributed, and kept current.

Finding OA.1-2: Not all departments have documents defining authority, responsibility, accountability, and intentions with support requirements.

Discussion: Group memory is strong, working procedures are in place, and documentation is being written and upgraded. Definition of stop–work authority is almost complete.

Proposed Action: Documentation which establishes responsibilities and authorities should be completed in all appropriate areas and properly disseminated. Intergroup responsibilities should be defined, and necessary attention should be paid to visitor requirements.

Finding OA.1-3: Not all departments have identified safety officers and appropriate procedures.

Discussion: Though there are organization charts, there does not appear to be an individual with specific responsibility for safety operation of some facilities. The safety responsibility is sometimes removed to the administrative end of the organization. Decision and escalation procedures are not well defined in all areas.

Proposed Action: Line Safety Officer responsibilities, authorities and procedures should be fully defined and implemented.

* Additional issues/discussion in this area are contained in Chapter 4, "Management and Organization Assessment."

Finding OA.1-4: There is no official training or supervision relative to the safety of subcontractors other than by their own management. (See also Finding OR.1-5 in Chapter 4, "Management and Organization Assessment.")

Discussion: Laboratory employees are reasonably aware of safety issues, but issues dealing with organizations outside of the Laboratory are not always addressed.

Proposed Action: Project planning relative to safety impacts should include the appropriate coordination of employees' and outside subcontractors' work.

Finding OA.1-5: The Laboratory does not have a well–established tradition of proactive management in addressing safety–related issues.

Discussion: There has been a significant increase in safety awareness among the entire staff at the Laboratory in recent months. The Laboratory management has increased markedly the fraction of its resources devoted to environment, safety, and health activities. The formation of the ES&H Coordinating Council and the ES&H Division is indicative of increased attention to safety matters.

It is too soon to evaluate the extent to which Laboratory management at all levels has adopted a proactive posture for safety. There is certainly work to do in order to establish and maintain a high degree of attention to environment, safety, and health in all aspects of work at the Laboratory.

Proposed Action: Managers should actively promote total quality programs, including identifying safety concerns and developing remedial actions proactively rather than reactively. Staff at all levels should have regular group meetings at which safety is a topic and in which they are encouraged to identify and discuss safety concerns. Environment, safety, and health issues should be regularly incorporated into group discussions at all levels as an integrated part of group activities.

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.

Finding OA.2-1: Safety review functions are not universally separate from line functions.

Discussion: The Safety Officers for the Accelerator Department and SSRL do not have line functions, and they select individuals for safety reviews who are also not in conflict with the line functions being reviewed. Not all departments or safety review committees have this separation well established.

Proposed Action: The Laboratory should ensure that people performing safety and health reviews are functionally detached and appropriately independent of line functions.

Finding OA.2-2: While there is an effective program for classification of unusual occurrences, not all persons performing potentially reportable work are aware of the details of the program.

Discussion: There is a *SLAC Workbook for Occurrence Reporting*, which follows DOE Order 5000.3A closely. It has chapters titled the "Policy on Reportable Occurrences," "Index to Reportable Occurrences," and "Interpretation of Categorization Lists." This document is adequate for making decisions, but there has not been uniform training throughout the Laboratory on standards for initiating reporting. Some individuals were not aware that the *Workbook* contained categorization lists.

Proposed Action: Occurrence reporting procedures should be thoroughly disseminated and, when needed, additional training for appropriate individuals on reportable occurrences should be initiated, tracked, and documented throughout the site.

Finding OA.2-3: Safety corrective action is not consistently handled throughout the Laboratory. Records are not always updated and actions not always tracked to completion.

Discussion: There is no consistent, site–wide safety recording and tracking process.

Proposed Action: Consistency in recording and tracking safety corrective action should be developed by the ES&H Division for the entire Laboratory.

OA.3 Management Objectives

Performance Objective: Site/facility management objectives should ensure commitment to safe operation, including enforcement of approved work practices and procedures.

Finding OA.3-1: Neither the Laboratory's *Mission Statement* nor published management goals contain specific and measurable objectives which state the Laboratory's commitment to environment, safety and health.

Discussion: Although there is ample evidence of management's concern for environment, safety, and health (as in *All–hands* memos from the Director, active Citizen Committees, and a new ES&H Division), this concern has not been systematically integrated into the Laboratory's management practices. More specifically, achievement of environment, safety, and health goals and objectives has not formally been expected or, therefore, measured.

Proposed Action: The Laboratory's *Mission Statement* should be reviewed and amended to reflect a commitment to environment, safety, and health. Management should establish and communicate annual environment, safety and health goals for the Laboratory. The Laboratory's ongoing self–assessment process should include progress made toward environment, safety, and health objectives.

OA.4 Corporate Support

Performance Objective: Corporate interest and support for safe operation should be evident.

Finding OA.4-1: Documentation of the chain of command and University oversight procedures with respect to environment, safety, and health matters at SLAC is poor or non-existent.

Discussion: The Board of Trustees of Stanford University is responsible for corporate policy, contract approval, and assurance that corporate policies support full implementation of environment, safety, and health requirements. The Trustees have delegated to the Stanford University President all actions, with limited exception, related to the management of SLAC. The Director of SLAC is the University officer responsible to the President for implementing environment, safety, and health requirements. SSRL is treated as a SLAC Division for environment, safety, and health activities. University policy mandates full implementation of necessary environment, safety, and health requirements.

As a result of the new environment, safety, and health awareness and evolving DOE environment, safety, and health responsibility and accountability, the University is in the process of improving significantly its environment, safety, and health oversight of site management.

Proposed Action: University policies and procedures for oversight of environment, safety, and health activities at the Laboratory should be completed and documented.

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.

Finding OA.5-1: There is no uniform protocol for regular technical adequacy reviews of the activities undertaken to comply with procedural requirements.

Discussion: Often the translation of high level policy into specific programs is left to individual managers and supervisors. This sometimes results in non-uniform application of policies, inconsistent and contradictory interpretations, and lack of clearly defined responsibility.

Proposed Action: The Laboratory should institute a greater degree of uniformity in monitoring and assessing environment, safety, and health related facility operations.

Finding OA.5-2: The Laboratory does not have an effective system for disseminating necessary safety information directly to employees. (See also Finding WS.6-3.)

Discussion: Various methods are used to begin the dissemination of safety–related information to the staff; however, in many groups there is no method in place to assure that important information is distributed to everyone who should receive it. Distribution within individual groups is left to the group leaders who sometimes are not certain to whom it should go.

Proposed Action: Group leaders should provide for timely and thorough distribution of important safety material within their departments. Originators of such materials should accurately identify its intended recipients.

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.

Finding OA.6-1: Job descriptions and job qualifications for all employees have not systematically and thoroughly emphasized the duties and knowledge required to meet environment, safety, and health responsibilities. (See also Finding PP.2-2 in this chapter and Finding OR.1-1 in Chapter 4, "Management and Organization Assessment.")

Discussion: To date, not all appropriate employees have references to environment, safety, and health responsibilities in their job descriptions and job qualifications.

Proposed Action: All job descriptions and job postings should be reviewed and updated as appropriate to include duties, knowledge, and responsibilities as they relate to environment, safety, and health.

Finding OA.6-2: The annual performance evaluation process has not formally included all site personnel's performance in fulfilling environment, safety, and health duties or obtaining and updating the required environment, safety, and health knowledge.

Discussion: The Laboratory's performance evaluation process includes all exempt staff and non–exempt staff not covered by the University labor agreement, but includes only some of the employees represented by the USW. For the first time, in 1991, the performance evaluation form explicitly included environment, safety, and health responsibilities and knowledge.

Proposed Action: The Laboratory should continue to emphasize environment, safety, and health responsibilities in its performance evaluation process and should expand the performance evaluation process to all employees.

OA.7 Document Control**

Performance Objective: Document control systems should provide correct, readily accessible information to support operations.

Finding OA.7-1: There is no process, check list, or procedure which requires updates and/or changes in the SARs. Environment, safety, and health related technical specifications and operational safety requirements are not current.

Discussion: Safety documents and safety procedures exist in many formats. There is presently no system which can assure that safety–related documents are reviewed regularly and updated as required. Safety Officers have been appointed in appropriate departments at the Laboratory and have begun the process of updating technical specifications and operational safety requirements.

Proposed Action: Environment, safety, and health related technical specifications and operational safety requirements should be completed and methods for proper document control instituted laboratory wide.

Finding OA.7-2: There is no systematic document review process, and the distribution of safety documents is similarly not carried out systematically.

Discussion: Environment, safety, and health related documents from DOE are routinely received and logged into SLAC. Similarly, MSDS documents are properly and systematically received and filed in the ES&H Division. However, there is no process which guarantees that the proper information is then distributed to the facility or site where it might be needed. Additional satellite safety offices throughout the Laboratory, and/or computerized distribution of documents are being discussed as possibilities for an improved system.

Proposed Action: A systematic review and distribution procedure should be instituted. Management should ensure that appropriate documentation is supplied on site as required.

** See also subsection MG.1 in Chapter 4, "Management and Organization Assessment."

Finding OA.7-3: No formal, centralized policy or system exists for preparation, review, approval, distribution, and proper retention of all safety–related documents.

Discussion: Emergency action plans exist, for example, but not uniformly throughout the Laboratory. Many examples of proper distribution and placement of safety documents can be cited, but too frequently these practices are not followed. This problem has been identified and is being studied.

Proposed Action: The ES&H Division should make appropriate recommendations in this area and a formal procedure implemented. This effort should be used to address the other safety documentation issues in this section and throughout this report.

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.

Finding OA.8-1: Managers and supervisors have not been formally or systematically trained in the recognition and handling of employees who might be unfit for duty. Also, a clear cut set of procedures to guide managers and supervisors in the handling of drug or alcohol abuse by members of their staff is not available.

Discussion: The Laboratory expects managers and supervisors to identify employees who are too impaired, for whatever reason, to perform their job duties or perform them safely. Unless there is a clear violation of the Controlled Substances and Alcohol Policy, these instances are treated as job performance issues. This is done cooperatively between the line management department, Personnel, and the Medical Department.

Proposed Action: The Laboratory should develop and publish implementing procedures for handling workers who are unfit for duty, and should develop supervisory training programs to cover the issues related to fitness for duty.

Finding OA.8-2: The Laboratory does not monitor its on–site subcontractors to confirm that they abide by their contractual obligation to distribute copies of the Controlled Substances and Alcohol Policy to all of their employees assigned to the Laboratory.

Discussion: The Laboratory has incorporated a clause in all its contracts requiring the subcontractor to distribute a copy of the Controlled Substances and Alcohol Policy to all employees assigned to the site, and to assure compliance. Although contract requirements regarding job performance are monitored, compliance with the drug and alcohol clause is not routinely monitored.

Proposed Action: The Laboratory should develop and implement a system to monitor on–site subcontractor compliance with this clause.

Quality Verification

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.

Finding QV.1-1: The *Institutional Quality Assurance Manual* is not current, and lacks necessary approvals.

Discussion: The *Institutional Quality Assurance Manual* describes the QA program prior to a recent reorganization which formed the Quality Assurance and Compliance Department and placed an emphasis on environment, safety, and health auditing. It has not been approved by the DOE/SAN program division or project office Directors as required by SAN MD5700.6B. The manual does not reference any relationship to quality standards such as NQA–1 as required by DOE Order 5700.6B.

Proposed Action: The existing *Institutional Quality Assurance Manual* should be updated to reflect the new ES&H organization, its auditing emphasis, the relationship between SLAC and SSRL, and be approved as required by SAN MD5700.6B.

Finding QV.1-2: The QA organization does not perform all of the required audits of operational, technical, and administrative activities.

Proposed Action: The ES&H Division should improve the frequency and scope of its auditing functions.

Finding QV.1-3: Detailed implementing procedures have not been developed to describe the activities affecting quality.

Discussion: While the *Institutional Quality Assurance Manual* describes the highest level policy for QA, detailed documents specifying procedures, schedules, and plans for the quality effort are needed.

Proposed Action: The appropriate QA documents currently in draft form should be completed, and the relevant procedures formalized.

Finding QV.1-4: The QA program and administrative controls are only partially implemented.

Discussion: The QA auditing program that addresses safety– and personnel protection–related functions is only partially complete. Quality programs at the departmental level as required by the *Institutional Quality Assurance Manual* have not been implemented. The auditing effort is beginning, and will increase as more personnel are hired to support this activity.

Proposed Action: Departmental quality assurance manuals should be developed by line organizations where environment, safety, and health concerns exist in order to implement the QA program and administrative controls.

Finding QV.1-5: Quality verification personnel are not adequately trained in all areas of necessary expertise. The training that is occurring has not been formally documented.

Discussion: The environment, safety, and health activities at the Laboratory require training of audit personnel in a wide variety of specialties, including QA methods. Classes in Environmental Auditing, Low Level Radioactive Waste Management, and Performance Indicators have been attended so far. Auditor training has included self assessment field experience with experts in environmental, health physics, and OSHA specialties. Auditors have also accompanied experienced personnel during a vendor survey.

Proposed Action: The formalized training and auditor certification program now underway should be completed.

Finding QV.1-6: The independent quality reviews which are currently being performed are not in compliance with DOE Orders.

Discussion: The "Quality Assurance Council" as defined in the *Institutional Quality Assurance Manual* performed management reviews of the quality program until the formation of the ES&H Division. Since then, the Quality Assurance Council has not been active.

Proposed Action: The *Institutional Quality Assurance Manual* should be updated to include provisions to ensure appropriate independent quality reviews.

Finding QV.1-7: The QA program lacks criteria that discriminate between items requiring a rigorous QA approach and items requiring a less formal treatment.

Discussion: The "graded approach" requires the development of criteria to determine the level of QA required for different activities and circumstances.

Proposed Action: A revision of the *Institutional Quality Assurance Manual* to incorporate the "graded approach" should be completed.

Finding QV.1-8: Many QA practices are informal, undocumented, and inconsistent.

Discussion: Activities such as inspection, calibration, design review, and so forth, especially at the departmental/group level are often not performed in a consistent or controlled manner.

Proposed Action: The Laboratory should assure the preparation of the appropriate departmental QA manuals as required by the *Institutional Quality Assurance Manual*, and develop the necessary programs.

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.

Finding QV.2-1: No procedures exist to define the procurement practices with respect to quality for spare parts.

Discussion: While some checking of spare parts is occurring, there is no procedure that indicates which practices are required.

Proposed Action: A procedure describing the QA requirements for procurement practices should be written.

Finding QV.2-2: The current QA program for purchased services is not adequate. (See also Finding QA.5 in Chapter 2, "Environmental Assessment.")

Discussion: Construction sites are currently not being adequately inspected. Laboratories used for water and soil analytical work are believed to be certified for the task performed, but certification is not being reviewed formally by the Laboratory at this time.

Proposed Action: A proposal is currently under study to provide staffing for general, mechanical, and electrical inspections of construction projects. The Quality Assurance and Compliance Department should check certification of off–site laboratories employed for environmental sampling.

Finding QV.2-3: Classifications such as critical, major, minor, or other such systems are not used routinely in determining the appropriate level of sampling of procured products.

Discussion: No procedures exist which define the procurement practices with respect to the assignment of various items into critical, major, and minor categories.

Proposed Action: A procedure should be written to describe QA classification procurement practices.

Finding QV.2-4: No adequate procedures were found which indicate special requirements for the procurement of hazardous materials.

Proposed Action: A procedure should be written to describe procurement practices with special requirements, including practices for hazardous materials.

Finding QV.2-5: The program to control the receipt of counterfeit parts has not been fully implemented.

Discussion: While specifications have been developed, and vendor surveys have begun, required actions such as inventory purges have not been completed. Employees have not been notified of the counterfeit parts issue and the possibility of their procurement via purchase orders or petty cash.

Proposed Action: The actions to address counterfeit parts are identified in a letter dated May 31, 1991, from Eugene Rickansrud, Associate Director, SLAC, to John Muhlestein, of the DOE Site Office.

QV.3 Receiving and Pre–Installation Inspections

Performance Objective: Provisions should be established for the inspection of purchased material, equipment, and services in accordance with documented procedures by trained personnel.

Finding QV.3-1: Many inspections are not performed to written procedures.

Discussion: While there are inspection procedures in some departments, the use of procedures to perform inspections is not uniform.

Proposed Action: Consistent procedures to describe proper inspections should be developed and followed.

Finding QV.3-2: There is no formal program for verification of vendor material certifications on critical items.

Discussion: Requirements for vendor certified materials are in place in many areas, but formal procedures describing the systems to verify and retain these certificates do not exist.

Proposed Action: A procedure should be written to describe graded procurement practices, including certificate verification and retention.

Finding QV.3-3: The requirements for the training of receiving and in–process inspectors is not defined.

Discussion: No program exists which specifies the initial and ongoing training requirements for those individuals who are performing receiving or in–process inspections.

Proposed Action: The *Institutional Quality Assurance Manual* should be updated to include provisions for inspector training, and the appropriate program implemented.

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 specific intervals.

Finding QV.4-1: The current calibration of mechanical tools and gauges is performed to standards which may not be traceable to national reference standards.

Discussion: The mechanical calibration effort is currently being reviewed, and mechanical calibration services through certified outside calibration laboratories are being considered.

Proposed Action: The Laboratory should obtain outside calibration services, or establish the need for traceability of standards for in–house calibration, as applicable.

Finding QV.4-2: While calibrations are performed for electrical, mechanical, and survey equipment, the programs are informal.

Discussion: No overall procedure exists which describes the scope of the calibration effort and the policy that prevents the use of out–of–calibration equipment. There are few specific calibration procedures that indicate how calibrated items are to be identified, controlled, calibrated, and adjusted at specified intervals.

Proposed Action: The *Institutional Quality Assurance Manual* should be updated to define under what circumstances calibrations are to be performed throughout the Laboratory. Other fundamental requirements of calibration programs should also be defined in this revision.

Finding QV.4-3: There is no policy requiring the retention of "as found" calibration data. No policy exists which specifies what actions are required for re–measurement by users when equipment is found to be out of calibration.

Discussion: There is some retention of "as found" data, and some feedback to users is occurring on the status of "as found" equipment. However, this process is informal.

Proposed Action: The *Institutional Quality Assurance Manual* should be modified to define requirements for "as found" data reporting and retention.

Finding QV.4-4: There is no policy for determining the requirements for the accuracy of standards that are to be used to calibrate equipment.

Discussion: While standards used for calibration are generally more accurate than the "four times the required accuracy of the equipment being calibrated" rule of thumb, this is not a documented procedure.

Proposed Action: The *Institutional Quality Assurance Manual* should be updated to define the applicability and requirements for calibration standard accuracy.

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.

Finding QV.5-1: Procedures are not formalized in all areas for the identification and disposition of safety–related parts.

Proposed Action: Groups should review safety–related parts control for development of necessary procedures in this area.

QV.6 Inspections

Performance Objective: Prerequisites should be provided in written inspection procedures with provisions for documenting and evaluating inspection results.

Finding QV.6-1: Although there are inspections performed in several groups including Klystron, Mechanical Fabrication, Controls, and Physical Electronics, there are few procedures to guide these activities.

Proposed Action: Procedures should be developed to define how inspections are to be performed and results evaluated.

Finding QV.6-2: The responsibilities for inspections of items that have an environmental, safety or health impact have not been clearly defined.

Discussion: The inspections performed are often for functionality, not necessarily for environment, safety, and health concerns. Some inspections are performed by MESI, but inspection of other items of safety concern is believed to be incomplete.

Proposed Action: Procedures should be established describing the type of inspection to be undertaken on components with environment, safety, and health impact.

Finding QV.6-3: The qualification requirements for inspectors have not been developed.

Discussion: While many of the inspectors have a high level of training, there are no documented requirements for qualifications.

Proposed Action: The *Institutional Quality Assurance Manual* should be updated to reflect the appropriate requirements for inspector qualifications.

QV.7 Control of Special Processes

Performance Objective: Provisions should be established to ensure the acceptability of special processes such as welding, heat treating, non–destructive testing, and chemical cleaning, and that special processes are performed by qualified personnel using qualified procedures and equipment.

Finding QV.7-1: Written procedures are not completely established to control and verify special processes. The Quality Assurance and Compliance Department has not been involved in verification activities to ensure conformance with applicable codes, standards, and specifications.

Discussion: Standard engineering procedures are used to perform special processes which are vaguely defined and for which the documentation is generally incomplete. For example, while most personnel performing welding are qualified in the sense of possessing the necessary experience, training, and demonstrated proficiency, a formal program of welder certification has not been implemented. Certification of welders, when required by a project, is carried out by an outside agency. Likewise, the personnel engaged in chemical cleaning and plating operations are qualified for the task under the criteria enumerated above, and have been trained in hazards communication.

Specialized NDE processes are generally performed by outside organizations whose operatives are presumably certified in accordance with the pertinent standards and codes. Verification of such records is not controlled.

Proposed Action: The Laboratory should develop, in conjunction with outside help if necessary, a detailed QA plan to provide the appropriate guidelines for describing and implementing control and verification of special processes.

Operations*

OP.1 Organization and Administration

Performance Objective: Operations organization and administration should ensure effective implementation and control of operations activities.

Finding OP.1-1: Coherent organizational structures and well–defined environment, safety, and health responsibilities for management, supervisory, and professional facilities operations personnel are not fully established.

Discussion: Roles of some support professionals are not clearly defined or included in the current *Guidelines for Operations*. Unclear chain of command exists between SLC program advisors and operators. Person–in–Charge definition, during emergencies, is vague. Line responsibility for CEH safety systems needs defining. The SLD facility is currently in a transitional state from the installation and checkout mode to a commissioning and operating mode. SLD support tasks have not yet been defined fully nor has documentation of the interface with the support services been done. The intermingled operation of SPEAR by SSRL and SLC staff has surfaced concern over authority and responsibility in safety issues. Command chain matters are being resolved by operation management directives. *Guidelines for Operations* addresses most of the other noted issues. Revision or clarification of the *Guidelines for Operations* is needed to resolve Person–in–Charge ambiguities. The Operations organizational structure for the SLD group is currently in the process of being defined. Application of the *Guidelines for Operations* by the SLD operating group will serve to resolve many of this report's findings.

Proposed Action: The *Guidelines for Operations* and supporting documents referenced above should be fully developed to resolve these issues, including clarifications of Person–in–Charge ambiguities. The SLAC/SSRL operating groups should develop mutually consistent policies and implementation procedures that address responsibilities, lines of authority, and interfaces among groups. The SLD group should define an Operations Manager and identify the operating and safety responsibilities as called out in the *Guidelines for Operations*.

* The Laboratory defines operating facilities and operating staff as those associated with the accelerators, storage rings, and major experimental detectors.

Finding OP.1-2: Not all training of operations staff is well specified and documented. Formal qualifications requirements for control room staff are not defined.

Discussion: Safety–related training is specified and documented, but many operating procedures have not had the same degree of treatment. A formal training program for Operations personnel is under development. Requirements are specified in the draft *Guidelines for Operations* and are expected to be followed.

Proposed Action: Appropriate staff should be identified and the training program for operating personnel should be completed and implemented. The *Guidelines for Operations* should be completed and issued.

OP.2 Conduct of Operations

Performance Objective: Operational activities should be conducted in a manner that achieves safe and reliable operation.

Finding OP.2-1: Written policies directing how trainees may be used to support operations activities do not exist.

Discussion: Some control rooms have training programs in place that address this. SLC operations has formal rules only for operation of the Personnel Protection System. Most other operations have only informal policies, stating that trainees should always be supervised. A trainee management policy for SLD operations does not exist. SLC's Operations Section is developing a formal, documented training program for MCC operators which will address this.

Proposed Action: SLC should complete and implement their training program. Programs for operating trainees who support other operating facilities should be developed where necessary and should be implemented.

Finding OP.2-2: Documented quality assurance programs are not in use by operating facilities. (See also Finding QV.1-4.)

Discussion: The Laboratory's operating facilities have not developed QA plans. Divisional quality assurance programs are not yet in place.

Proposed Action: All Laboratory operating facilities should develop and implement formal quality assurance programs.

Finding OP.2-3: Monitoring of operations and proper maintenance of logbooks are inadequate at the SLD facility.

Discussion: Procedures and checklists are currently being reviewed, but some still need defining. The facility is still in transition to an operating facility.

Proposed Action: As SLD moves from commissioning to operations, procedures for monitoring operations and maintaining logbooks should be developed.

OP.3 Operations Procedures and Documentation

Performance Objective: Approved written procedures, procedure policies, and data sheets should provide effective guidance for normal and abnormal operation of each facility on a site.

Finding OP.3-1: Not all written procedures, reference material, and guidelines for the operation of accelerators and experiments are up to date.

Discussion: *SLAC Guidelines for Operations*, Issue 1 of May, 1990, is ineffective as a valid reference and guide. *SLAC Guidelines for Operations*, 2nd edition, June 1991, now in draft, is being used by a number of key people in some operations groups as a primary guideline. The *Emergency Planning Booklet* is outdated and incomplete. The *SLAC Emergency Preparedness Plan* is being re–written by the ES&H Division that will replace the *Emergency Planning Booklet*.

Proposed Action: The 2nd edition of *Guidelines for Operations* should be completed and released, and appropriate reference material updated.

Finding OP.3-2: Sufficient time is not always provided for formal training before procedure changes or system modifications are put into effect.

Discussion: This applies to both safety and non–safety related procedures. The short time between many system changes and operational implementation does not always leave room for the usual formal training programs which occur during scheduled downtimes.

Proposed Action: The operating groups should review their procedures for training and information transfer on the necessary operational changes during operating periods, and strengthen these procedures where indicated.

OP.4 Facility Status Controls

Performance Objective: Operations personnel should know the status of the systems and equipment under their control, and should know the effect of non–operational systems and equipment on continued operations. They should ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

Finding OP.4-1: Policies and procedures for managing equipment (non-personnel) protection systems fault are not well documented.

Discussion: Authorization and procedures for bypassing equipment protection systems are not in all cases well documented. SLC operations management directives are being written to clarify these issues.

Proposed Action: All operating groups should review the need for the above procedures and develop them where appropriate.

Finding OP.4-2: Alarms and warnings are not presented in a standard and coherent format.

Discussion: Safety–related alarms and warnings need to be isolated or reorganized in a way to clearly identify them as safety items and not general machine performance indicators. A full time engineer is assigned to SLC control room alarms and warnings upgrade. This upgrade project is partly completed, and some parts of the project are still under review. A system for monitoring status of SLD equipment is not fully operational.

Proposed Action: The SLD is in the process of being commissioned and as this is accomplished, a monitoring system should be completed. The SLC alarms upgrade project should be continued and other facilities should review the adequacy of their alarms and warning systems.

Finding OP.4-3: Procedures for controlling the placement of caution, warning, information, and other tags are not in place. (See also Finding MA.2-4 and Finding WS.4-7.)

Discussion: The procedures for the "lock and tag" of electrical hazards are in place with clearly identified special tags. However other tags, for example, informational and warning, are used informally throughout the site.

Proposed Action: These practices should be reviewed on a site–wide basis and guidelines developed and implemented where appropriate.

Finding OP.4-4: Repair of defective or out–of–tolerance SLD instrumentation, alarms, and controls is not accomplished in a timely manner.

Proposed Action: A general equipment error reporting system is under development and should be completed and implemented.

OP.5 Operations Stations and Equipment

Performance Objective: Operations stations and facility equipment should effectively support facility operation.

Issues related to this Objective are included in other subsections of this section.

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.

Issues related to this Objective are included in other subsections of this section.

OP.7 Shift Turnover

Performance Objective: Turnovers conducted for each shift station should ensure the effective and accurate transfer of information between shift personnel.

Finding OP.7-1: Conduct of shift turnovers at some operation facilities is not in all cases effective in information transfer.

Discussion: For example, shift turnovers at SLD and SSRL are informal and lack guidelines or checklists.

Proposed Action: Guidelines for the proper conduct of shift transfers should be developed and implemented at all appropriate operations stations.

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.

Finding OP.8-1: Localized coding conventions for alarms and warnings (color, size, shape, location) are not consistent.

Discussion: The SLC has a coding convention, but it is not always documented; therefore, implementation is inconsistent.

Proposed Action: Each operating facility should review and document/establish, when appropriate, guidelines for standardized alarms and warnings, and implement necessary corrections.

Finding OP.8-2: Some passageways and access ways exist that do not allow passage for personnel wearing protective equipment. (See also Finding WS.3-4.)

Discussion: Due to the geometry of the beam lines and the construction of the tunnels, some beam–line housing areas are difficult to access for persons wearing emergency gear. Emergency response personnel are aware of this situation and have appropriate procedures. The ES&H Division is conducting a confined space survey, the results of which will be available to emergency response personnel.

Proposed Action: The ES&H Division's confined space survey should be completed, and an appropriate OSHA compliant program implemented to the proposed OSHA standards.

Maintenance*

MA.1 Organization and Administration

Performance Objective: Maintenance organization and administration should ensure effective implementation and control of maintenance activities.

Finding MA.1-1: The Laboratory does not have a site-wide maintenance policy with clearly stated goals and objectives, and periodic evaluation of maintenance performance.

Discussion: The Laboratory has elected to decentralize its maintenance efforts throughout all divisions. One consequence of this is that there is no central policy concerning maintenance, nor uniform standards, nor a routine evaluation of how well individual maintenance efforts are being carried out.

Proposed Action: The Laboratory should review its maintenance programs to assure that mechanisms are in place for effective coordination of maintenance activities.

Finding MA.1-2: Maintenance, craft, and technical personnel are not actively encouraged or supported to develop improved methods of meeting safety and health goals.

Discussion: Safety and maintenance meetings are downward directed in that they tend to train, instruct, or inform without much encouragement to participate or make suggestions.

Proposed Action: The Laboratory should formulate a system for the review of safety and maintenance meetings, and emphasize the supervisor's responsibility to encourage worker participation.

* This section applies to the maintenance of safety systems, systems that if not properly maintained could cause safety problems, and the general safe performance of maintenance activities.

MA.2 Conduct of Maintenance

Performance Objective: Maintenance should be conducted in a safe and effective manner to support each facility condition and operation on the site.

Finding MA.2-1: In an effort to comply with operational goals, maintenance work has not always been carried out with safety as the number one priority.

Discussion: For many subsystems of the accelerator complex, the amount and depth of resources (personnel) is less than peak need. This occasionally leads to maintenance individuals feeling pressured to work long hours in an attempt to carry out repairs. Examples of people working up to twenty–four consecutive hours in hazardous environments have been seen.

Proposed Action: The Laboratory should re–emphasize the preeminent importance of safety when performing maintenance tasks, and the risks that fatigue imposes. Renewed emphasis should be placed on each employee's applying appropriate procedures for his or her own personal safety, as well as the safety of others.

Finding MA.2-2: Some maintenance personnel are inadequately trained to work on the equipment they are required to repair and maintain.

Discussion: No formal policy or set of procedures exists for qualifying and documenting that all maintenance personnel are adequately trained to work on the equipment for which they are responsible. Much of this training has come on–the–job or through an informal apprentice relationship and is not rigorous, complete, nor documented.

Proposed Action: The Laboratory should review the adequacy of maintenance training and take corrective action where necessary.

Finding MA.2-3: At SSRL, maintenance work is not always properly authorized and controlled for safety–related concerns.

Discussion: Work on some systems will occur without the knowledge of a "system" manager and therefore, without appropriate approvals. This is usually the result of a lack of defined responsibility for system components. Although it is very common for workers to use individual procedures for various tasks, there is no formal approval process for these procedures

Proposed Action: A review of the maintenance structure of SSRL should be done with attention placed on personnel qualification and the use of safety–related procedures.

Finding MA.2-4: Presently, the Laboratory's Lock and Tag policy is only being applied to electrical energy sources. (See also Finding OP.4-3 and Finding WS.4-7.)

Proposed Action: Lock and Tag policy and procedures should be developed for all hazardous energy sources at the Laboratory.

MA.3 Maintenance Facilities, Equipment, and Material

Performance Objective: Facilities, equipment, and material should effectively support the performance of maintenance activities.

Issues related to this Objective are included in other subsections of this section.

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.

Finding MA.4-1: Written work–control documents are not uniformly implemented to ensure safe completion of maintenance work.

Discussion: There is no general use of a written work order specifying the work to be done and the resources required, and showing the necessary written authorizations. Most repair work on major facilities is carried out on the basis of verbal instructions and approval. In parallel with the lack of a written work order specifying the work to be done, there is a lack of a written sign–off that the job was actually completed. There is no documentation of any post–maintenance requirements such as recalibration or other testing.

Proposed Action: Work control documentation should be strengthened to ensure safe completion of maintenance work and fitness for use.

Finding MA.4-2: The Laboratory has not established a documented and comprehensive confined space program. (See also Finding WS.3-4.)

Discussion: A survey of potential confined spaces is being conducted throughout the site. Once completed, a compliant confined space policy will be adopted.

Proposed Action: The Laboratory should assure that maintenance organizations develop and implement procedures for entry into confined spaces by maintenance personnel. Appropriate documentation should be developed and maintained.

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.

Finding MA.5-1: There is no formalized inspection program.

Discussion: Some maintenance supervisors in the klystron gallery make daily tours to identify and assure the correction of deficiencies related to safety and housekeeping. Some of the Accelerator Department area managers do likewise. There is no formalized program throughout the Laboratory.

Proposed Action: The Laboratory should review its practices with the intent of formalizing routine inspections.

Finding MA.5-2: At SSRL, not all mechanical and electrical components are in satisfactory condition.

Discussion: The SPEAR storage ring has many old components. Many of these components need corrective maintenance or complete replacement.

Proposed Action: Long range plans should address the concern for aging components and recommend a plan of action to ensure safe and reliable operation of the facility.

MA.6 Preventive Maintenance

Performance Objective: Preventive maintenance should contribute to optimum performance and reliability of systems and equipment important to operations.

Finding MA.6-1: Preventive maintenance is not consistently practiced, and where preventive maintenance programs exist, they are frequently deferred to program schedule.

Discussion: SLAC understands the benefits of preventive maintenance in the effective operation of certain types of equipment especially, where age–related degradation of components can be demonstrated. Examples are pulsed power devices which require the use of thyratrons and vacuum tubes, and are subject to electrostatic accumulation of dirt and grime inside high–voltage enclosures which degrades the performance of the equipment. However, scheduling of preventive maintenance on these devices is essentially confined to shutdown periods at the end of a running cycle which tends to be too long an interval. There is no clearly stated or consistently applied policy for scheduled maintenance during a run. Sometimes maintenance days are scheduled, sometimes not, but maintenance is frequently deferred in favor of pursuing the operational schedule. As a result of a reduction of force, the resources employed to clean modulators no longer exist. Non–invasive forms of preventive

maintenance are employed, for example, air filter exchange, but they are inadequate to the objective of optimizing equipment performance. SLAC has established a Maintenance Liaison Group with membership appointed from senior staff of technical organizations which will assist the Accelerator Department in addressing such issues as scheduled maintenance including preventive maintenance.

Proposed Action: The Laboratory should review preventive maintenance practices on critical safety items.

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.

Finding MA.7-1: There is no common maintenance history for most pieces of equipment.

Discussion: The responsibility for the collection of maintenance history and analysis of problems rests with the several individual maintenance/engineering organizations at SLAC. Historically, information has been collected in shop logbooks, logs assigned to specific equipment, information recorded on specialized forms, for example, ranging sheets for thyratrons, and also entered into a number of databases throughout the project. It is recognized that there is a lack of uniformity in this approach, as well as difficulty assembling useful data from logs for the purpose of analysis and evaluation of trends. A database, DEPOT, was created to address issues of location, inventory, tracking of failure modes, and maintenance history of equipment. However, the software necessary to transfer bar coded information into existing SLAC databases was not developed, which doubles the effort in collecting data and discourages some organizations from using it.

The Accelerator Department uses a trouble reporting system named CATER. This database was thought to be an excellent tool for root cause analysis to optimize equipment performance. However, it has serious deficiencies. At least two characteristics of the system make it less than satisfactory:

1. The author of a CATER entry has *carte blanche* in describing system, subsystem, equipment, and so forth.
2. Searching CATER can only be done through the "problem field," whereas the important information to maintenance is more likely to be in the "solution field" which has facilities for tracking such things as the model, serial number, documentation, and location.

Solving and closing CATER entries are mandatory, whereas solving and closing DEPOT reports is not. Hence, requiring computer validated data entry and providing the ability to retrieve (maintenance related) data from the "solution field" would make CATER an excellent tool to accumulate maintenance history and to facilitate root cause analysis.

Proposed Action: The Laboratory should review the advantages and disadvantages of generating software which will make the DEPOT database a usable tool. In addi-

tion, enhancements to the CATER system should be completed providing the ability to search on solutions as well as requiring validated entry when writing a CATER.

Finding MA.7-2: Predictive maintenance is not done uniformly throughout the site.

Discussion: Maintenance records and/or resources are not adequate enough to be used for predictive maintenance.

Proposed Action: Sufficient resources should be applied to enable the use of predictive and preventive maintenance practices.

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.

Finding MA.8-1: There are few procedures showing how to do maintenance work safely and effectively.

Discussion: Lacking a general site–wide policy on the development and use of procedures for maintenance, individual departments address the issue in different ways.

Procedures exist for some equipment, but these are old and inadequate in terms of necessary details which focus on safe practice. For example, the materials used to maintain modulators and sub boosters have had little or no updates since the originals were written and would not meet today's applicable industry operating standards. The Laboratory is in the process of formalizing its approach to the development, standardization, and issuance of procedures which address technical, as well as, safety issues appropriate to effectively maintain equipment.

Maintenance procedures are inconsistently documented between groups within SSRL, and may not provide adequate guidance and records. Maintenance records, documentation, and procedures are inadequate to provide guidance for predictive or preventive maintenance.

Maintenance records are not retained in a consistent manner. While some records may be found in personal or system operational logbooks, neither may provide complete guidance for system maintenance or be useful as records.

Documentation, as–built drawings, and operating procedures of the electrical systems which are less than adequate at SSRL result in the inability to apply sound preventive and predictive maintenance.

Proposed Action: The Laboratory should complete its efforts to formalize its approach to maintenance procedures.

Finding MA.8-2: Vendor manuals, reference materials, and documentation are not necessarily technically accurate nor up–to–date.

Discussion: The Laboratory procures equipment from vendors to its own specification, but the vendor is not obliged to furnish complete and accurate drawings or correct parts lists, that is, vendors often supply generic manuals. Equipment, chassis, and systems built in–house often lack documentation and maintenance procedures long after they have been commissioned and are operating. Said documents are produced in different departments based on their technical/engineering functionality, but there is no clearly understood procedure to provide information to others.

Proposed Action: The Laboratory should review the procurement process as it relates to vendor–supplied drawings, manuals, and parts lists.The Laboratory should review the adequacy of resources applied to the documentation and maintenance procedures of items built in–house and establish a mechanism to ensure notification across departmental lines when drawings are released.

Training and Certification

TC.1 Organization and Administration

Performance Objective: The training organization and administration should ensure effective implementation and control of training activities.

Finding TC.1-1: Environment, safety, and health training requirements do not exist for each work classification or each individual. (See also Finding HR.2-1 in Chapter 4, "Management and Organization Assessment.")

Discussion: Until recently there has been no system in place to develop this type of information, and no policy requiring its collection. Identification of environment, safety, and health training needs has been the responsibility of the line manager, with little support or resources. A Task and Hazard survey has been distributed to collect environment, safety, and health training requirements for each individual on site. This information will be maintained in a centralized database. A range of environment, safety, and health training required for each job classification will be determined from the survey (database) information. The information in the database will be available to line management to plan staff training. The new ES&H training staff will maintain the database while line management is responsible for data accuracy. This process will be described in detail in the *SLAC Environment, Safety, and Health Manual* and *ES&H Training Manual*.

Proposed Action: The ES&H Division should develop environment, safety, and health training requirements for each classification or individual.

Finding TC.1-2: SLAC personnel have not received all required environment, safety, and health training.

Discussion: A low percentage, estimated at about 20%, of required environment, safety, and health training classes are currently being provided on site. In most cases less than half of targeted employees have attended their required environment, safety, and health training. Individual environment, safety, and health training needs are being identified through the Task and Hazard survey. Training is being scheduled and presented according to the number of personnel required to attend the course and the level of criticality of the task/hazard that the course addresses. A training program plan is in development to schedule presentation of the required environment, safety, and health training.

Proposed Action: The Laboratory should continue to develop training programs and ensure that all targeted employees including supervisors, managers, and technical personnel receive required environment, safety, and health training. In addition, as programs are formalized, all training techniques including performance indicators and on-the-job training evaluation should be structured into the process.

Finding TC.1-3: The site-wide environment, safety, and health training organization is not clearly defined or understood.

Discussion: With a few exceptions, the environment, safety, and health training organization is only now being defined and staffed. The relationship of the Training Department in the ES&H Division with those responsible for environment, safety, and health training in each department is still being discussed and defined. Some departments have not yet established training roles and responsibilities within the department.

Proposed Action: Together with the ES&H Division, each department should clearly define training roles and responsibilities, and policy and procedures should be developed which establish and define the respective responsibilities of the ES&H Training Department and the line department.

Finding TC.1-4: Records of trainee attendance and performance at environment, safety, and health training are not consistently maintained in an auditable manner.

Discussion: Records consist of attendance lists collected sporadically by line safety trainers. No policy statement exists regarding documentation of environment, safety, and health training or post evaluation. Good attendance records have been maintained for hoisting and rigging training, electrical safety training, and radiation training. There has been no post evaluation of trainee performance conducted in all cases. Full documentation was maintained for the hazardous materials and waste and hazard communication training programs including post evaluation of trainee and trainer. Also, post evaluation of trainee performance was conducted for radiation worker training.

Proposed Action: Each individual's record of environment, safety, and health training attendance and successful completion should be maintained and made appropriately available. On-the-job training qualification records and staff safety meeting records should be maintained by line management. Future training should include post evaluations.

Finding TC.1-5: No formal site-wide schedule is maintained for the retraining of personnel.

Proposed Action: Completion of the Task and Hazard survey should provide a means to develop retraining schedules for environment, safety, and health requirements. ES&H training staff should generate reports from the database which are designed to remind line management of environment, safety, and health training requirements and retraining schedules, thereby assuring employee attendance at required training and retraining courses. Definition of retraining requirements with regard to environment, safety, and health should be completed.

Finding TC.1-6: Learning objectives with performance indicators have not been used to improve environment, safety, and health training performance.

Discussion: Learning objectives were incorporated into the new Hazard Communication Training program. No overall system has been developed for the use of learning objectives with performance indicators. Use of learning objectives as part of formal training development process is being described in the *ES&H Training Manual*. A training course should be provided to all potential environment, safety, and health trainers regarding standards and procedures as well as training methodologies.

Proposed Action: Written training objectives with performance indicators should be included in all formal environment, safety, and health training conducted at the Laboratory.

TC.2 Reactor Operations

Performance Objective: The operator and reactor supervisor training and certification programs should be based on DOE 5480.6, Section 8.e, as applicable, and should develop and improve the knowledge and skills necessary to perform assigned job functions. (Reactors Only)

This Objective is not applicable.

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. (Nuclear Facilities Only)

This Objective is not applicable.

TC.4 General Employee and 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.

Finding TC.4-1: The general employee training programs do not contain the necessary breadth of information to insure complete understanding of responsibilities.

Discussion: The training programs do not cover the organization and administration of environment, safety, and health programs, occupational safety practices, fire protection, emergency response procedures, or certain other appropriate elements.

Proposed Action: The Laboratory should review its general employee training programs against DOE and other requirements, to ensure that each addresses all of the necessary and appropriate topics. As part of this review, visitor and on–site subcontractor training requirements should be reviewed for appropriate inclusion.

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.

Issues/discussion relative to this Objective are included in the section "Maintenance" in this chapter.

TC.6 Criticality Safety

Performance Objective: Personnel should receive training in nuclear criticality safety consistent with their assigned tasks. (Reactors and Nuclear Facilities Only)

This Objective is not applicable.

TC.7 Training Facilities and Equipment

Performance Objective: The training facilities, equipment, and materials should effectively support training activities.

There are no Findings for this Objective.

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.

Issues/discussion relative to this Objective are included in the section "Quality Verification" in this chapter.

TC.9 Radiological Protection Personnel

Performance Objective: The radiological protection personnel training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

Finding TC.9-1: The Laboratory has not fully instituted a comprehensive radiological protection personnel training program.

Discussion: The ES&H Division has recently established training requirements and has scheduled required formal training.

Proposed Action: The Laboratory should ensure that the above mentioned program is fully carried out on a continuing basis and is properly documented.

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.

Issues/discussions relative to this Objective are included in other areas of this section and the "Technical Support" section of this chapter.

TC.11 Simulator Training/Facility Exercises

Performance Objective: Simulator training and/or facility exercises should be conducted utilizing methods and techniques that are effective in developing and maintaining team and individual knowledge and skills in responding to abnormal and emergency events, and in integrated operations. (Reactors and Nuclear Facilities Only)

This Objective is not applicable.

Auxiliary Systems*

AX.1 Systems Requirements

Performance Objective: Auxiliary systems should 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.

Issues/discussions relative to this Objective are included in the section "Emergency Preparedness" in this chapter.

AX.2 Effluent Holdup and Treatment

Performance Objective: Effluent holdup and treatment should ensure that the amount of hazardous substances released to the environment as escaping emissions and/or effluent gaseous or liquid releases are less than DOE and EPA standards, and are ALARA.

Finding AX.2-1: The Laboratory has not yet formally established goals for waste minimization for the discharge of hazardous substances to the environment.

Discussion: The ES&H Division is currently reviewing the effluent streams to identify opportunities for waste minimization. Plating facility management is collaborating with the ES&H Division in a study to devise practical and efficient methods of reducing the production of hazardous waste, and limiting the extent of the disposal effort. Cooling tower blow-down is also being reviewed.

Proposed Action: The ES&H Division should continue their review of effluent streams and make appropriate recommendations.

* Additional issues/discussion in this area are contained in Chapter 2, "Environmental Assessment."

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.

Finding AX.3-1: Procedures and controls for the management of solid hazardous waste (other than radioactive material) are not yet readily available.

Discussion: Solid waste, other than radioactive material, is handled under interim procedures while the final methodology is being developed. On–the–job training is done on an *ad hoc* basis without the benefit of written guidelines and instructions.

Proposed Action: Procedures for solid waste management and handling should be formalized, the appropriate training manuals developed, and the program implemented in all applicable areas.

AX.4 Storage and Handling of Fissile Material

Performance Objective: Fissile material should be stored and handled in a manner which minimizes the chances of loss, contamination, release, or inadvertent criticality.

This Objective is not applicable.

AX.5 Ventilation Systems

Performance Objective: Ventilation systems should reliably direct all airborne effluents from contaminated zones or potentially contaminated zones through cleanup systems to ensure that the effluent reaching the environment is below the maximum permissible concentration and is ALARA.

Issues/discussions relative to this Objective are included in Chapter 2, "Environmental Assessment."

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.

Issues/discussions relative to this Objective are included in Chapter 2, "Environmental Assessment."

AX.7 Heat Removal systems

Performance Objective: The heat removal systems should reliably remove heat as required from the reactor or process and equipment import to safety.

Issues/discussions relative to this Objective are included in Chapter 2, "Environmental Assessment."

AX.8 Engineered Safety Systems

Performance Objective: Engineered Safety Systems should be reliable and available to provide protection to the facility when required.

There are no Findings for this Objective.

AX.9 Coolant Cleanup Systems

Performance Objective: Recirculating coolants should be cleaned continuously or intermittently to minimize the buildup of contamination and reduce corrosion.

There are no Findings for this Objective.

Emergency Preparedness

EP.1 Organization and Administration

Performance Objective: Emergency preparedness organization and administration should ensure effective planning for, and implementation and control of, Site emergency response.

Finding EP.1-1: Adequate resources have not been allocated and assigned to accomplish tasks for both routine and emergency duties.

Discussion: The SLAC Emergency Preparedness Program does not have adequate manpower and resources to complete its assigned mission to the standards and performance objectives prescribed by DOE requirements and the Technical Safety Appraisal.

Past policy has relied on the Building Managers to develop facility emergency plans, emergency organizations, drills, exercises, and so forth. However, funding, management support, and Building Manager expertise varied widely across organizational bounds, and the topic area was generally very low priority. The Building Manager's program is currently under-going a thorough revision and upgrade. An Emergency Organization—Self–Help Program (to provide structure to specifically guide employees and visitors in an emergency) is also being developed.

Initial planning, discussion, and table top exercises have been conducted jointly with ES&H, Medical, PAFD, and Emergency Management personnel. A preliminary hazards list and a hazardous materials response equipment list have been developed. Equipment is being ordered. Although the large workload backlog of the ES&H Division have slowed progress, the additional staff being acquired should allow progress to be made again.

Proposed Action: The Laboratory should continue the development of a comprehensive emergency preparedness program. The need for additional resources should be reviewed and resources augmented where indicated.

Finding EP.1-2: Responsibilities and authority for each position and the organizational relationships in the SLAC emergency planning and emergency response organizations are not well defined and understood.

Discussion: SLAC developed and carried out a series of exercises designed to examine existing emergency plans and procedures. Combined with the experiences of two recent emergencies (1989 Loma Prieta Earthquake and the 1991 Freeze), SLAC is in the process of a major revision of its Emergency Preparedness Program.

Proposed Action: Individual responsibilities in the revised emergency planning and response organizations should be defined, and the personnel for each position trained. Emergency exercises should continue personnel training, and program evaluation and development.

Finding EP.1-3: Independent reviews of the Emergency Preparedness Program and its documentation are not conducted on an annual basis.

Discussion: Although an independent review was conducted by the IT Corporation in September 1990, in–house, independent reviews are not part of the Emergency Preparedness Program's normal annual work plan.

Proposed Action: An independent program review should be included in an annual workplan for the Emergency Preparedness Program.

Finding EP.1-4: A system for ensuring that timely and effective action is taken to track and correct identified emergency response deficiencies and their basic causes is not in place.

Discussion: There is no documented program at the Laboratory to debrief the participants in an emergency response, and thereby track and ensure that timely and effective action is taken to correct identified deficiencies and their basic causes.

Proposed Action: Deficiencies should be identified and corrected as part of an annual process. Emergencies should be investigated in accordance with the requirements for occurrence reporting. Corrective actions should be initiated on a timely basis.

Finding EP.1-5: A comprehensive system for arrangements, agreements, and understandings with off–site groups is not in place and documented.

Discussion: SLAC borders on several governmental jurisdictions. While considerable coordination and joint planning has gone on with the DOE and various departments at each jurisdiction, a comprehensive system has not been developed to document the arrangements, agreements, and understandings.

Proposed Action: A matrix of supporting groups and agreements should be developed by the BSD along with a system for documenting and periodically reviewing the agreements.

Finding EP.1-6: Procedures have not been developed to provide for decision making and protective action recommendations that cover the complete spectrum of operational emergencies.

Discussion: The *SLAC Emergency Preparedness Plan* is currently undergoing major revisions.

Proposed Action: The above procedures should be complete and proper decision making authorities delineated.

EP.2 Emergency Plan and Implementing Procedures

Performance Objective: The emergency plans, the emergency plan implementing procedures, and their supporting documentation should provide for effective response to operational emergencies.

Finding EP.2-1: A hazards analysis based on SLAC–specific safety analyses of potential abnormal conditions and covering the range of credible emergencies has not been documented.

Discussion: Although there have been numerous discussions and several documents written on possible failures and emergencies, and a SAD is planned for the Plating Shop, there has been no comprehensive review documenting the potential hazards at the Laboratory.

Proposed Action: A comprehensive hazards analysis should be performed, documented, and periodically reviewed.

Finding EP.2-2: Existing emergency plans are not concise and usable, and do not address many of the elements of the DOE criteria for an Emergency Plan. (See also Finding EP.1-6.)

Discussion: Utilizing the experiences from recent emergencies and a series of exercises designed to test existing plans, the *SLAC Emergency Preparedness Plan* is in the process of a major revision and upgrade, updating and superseding the existing *SLAC Emergency Planning Booklet* and the *SLAC Earthquake Emergency Plan.*

Proposed Action: The *SLAC Emergency Preparedness Plan,* now in revision, should be concise, usable, and address applicable DOE criteria.

Finding EP.2-3: A set of comprehensive EPIP specifying the detailed actions required to carry out the directives the *SLAC Emergency Preparedness Plan* have not been developed.

Proposed Action: Existing procedural checklists should be developed into EPIPs within the framework of the new *Emergency Preparedness Plan.* An annual administrative review procedure and a distribution and control system should be developed by the ES&H Division.

Finding EP.2-4: A consistent system of evaluating and utilizing feedback from evaluations, appraisals, drills, exercises (and actual events and emergencies in DOE and industry) to improve emergency plan effectiveness has not been developed.

Discussion: Although there was a debriefing after the Loma Prieta Earthquake and extensive evaluations after the March and December 1990 Exercises, there is no consistent evaluation system.

Proposed Action: A consistent evaluation system should be developed by the ES&H Division.

Finding EP.2-5: SLAC has not developed an emergency preparedness job task analysis study to identify the responsibilities of the emergency response organization.

Discussion: The *SLAC Emergency Preparedness Plan* is currently in revision.

Proposed Action: After the *Emergency Preparedness Plan* is updated, a job task analysis study of the emergency organization can be accomplished by the ES&H Division to identify assigned position responsibilities.

Finding EP.2-6: The Laboratory does not have a public information plan in compliance with DOE criteria.

Discussion: The Laboratory lacks appropriate reporting criteria and necessary directions, and a comprehensive set of preformatted emergency news releases.

Proposed Action: A comprehensive emergency public affairs plan and prepared materials should be developed as appropriate.

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.

Finding EP.3-1: A comprehensive emergency management training program for the SLAC Emergency Organization has not been established.

Discussion: Although training for various components of the Emergency Organization has been taking place as part of preparation for exercises or response to exercise or disaster evaluations, a comprehensive program addressing all of the DOE criteria has not been developed. Agreement in principle has been reached on joint training with the Stanford Campus, Hospital, and Medical Center on common emergency positions, particularly on a common introductory emergency management course for building managers and response teams. As work on the revised *SLAC Emergency Preparedness Plan*, the job task analysis, and the EPIPs progresses, the training program can be developed to include skills needed for each position, testing, and documentation.

Proposed Action: After the *Plan* is adopted, a training program for the SLAC Emergency Organization should be established for initial and continuing training in accordance with the DOE criteria. This program should cover both the initial and continuing training needs, and include training methods, evaluation standards, and implementation responsibilities.

EP.4 Emergency Preparedness Drills and Exercise

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.

Finding EP.4-1: An emergency exercise program has not been established for the planning, scheduling, preparation, conduct, control, critique, and documentation of drills and exercises.

Discussion: Although SLAC has conducted numerous drills and exercises in the last year, they have not been documented in accordance with DOE criteria. One of the recommendations of the December 1990 exercise evaluation was the creation of an Exercise Design Committee to ensure a thorough, well coordinated program.

Proposed Action: As the *Emergency Preparedness Plan* is updated, the EPIPs developed, and the initial training is delivered, the ES&H Division should establish an exercise program in accordance with DOE criteria.

EP.5 Emergency Facilities, Equipment, and Resources

Performance Objective: Emergency facilities, equipment, and resources should adequately support site/facility emergency operations.

Finding EP.5-1: **MCC is not well designed to serve as an EOC, and it is not equipped and maintained to support emergency response operations.**

Discussion: The December 1990 full field exercise demonstrated many of the limitations of the architecture and equipment of MCC as an EOC. The spaces in the conference room, control room, and foyer do not function well as an EOC. The control room has excellent communications resources, but integrating them acceptably with the Crisis Management Team's activities in the conference room would be difficult. The December exercise demonstrated that the current communications equipment in the conference room is inadequate for emergencies.

Proposed Action: The Laboratory should study various alternative locations for an improved EOC or MCC modifications.

Finding EP.5-2: **There are no reliable alarm or announcing systems which are adequate to notify all personnel of emergencies.**

Discussion: There are various alarm and announcing systems covering selected areas of the site. However, there is no system which provides full coverage of the site.

Proposed Action: The Laboratory should study the various means to deal with this issue.

Finding EP.5-3: **Adequate equipment and documents are not specified and maintained so the Command Centers are constantly ready to support emergency operations. Adequate backup facilities for the Command Centers are not currently available.**

Proposed Action: The Laboratory should determine the appropriate need for and response to this requirement.

Finding EP.5-4: Adequacy of emergency communications has not been thoroughly examined and documented.

Discussion: The 1989 Loma Prieta Earthquake and the December 1990 Exercise uncovered shortcomings in site radio communications. This has been mitigated with the acquisition of additional equipment and radio frequencies. The 1990 Ham Radio Exercise demonstrated the need for more equipment, and the development of procedures and training. The equipment has been purchased and installed, and the procedures and training are in process.

Proposed Action: An emergency communications plan should be developed by the ES&H Division to ensure sufficient reliable primary and backup communications networks are available.

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.

Finding EP.6-1: A system has not been established for coordinating event classifications with local and state response agencies and for coordinating releases of accident–related information to the public.

Proposed Action: As the new *Emergency Preparedness Plan* is revised and the EPIPs are developed, the Laboratory should address these procedures.

Finding EP.6-2: Procedures are not established for assessing or responding to the release of hazardous materials on site and off site.

Proposed Action: Procedures to address this requirement should be developed and implemented by the Laboratory.

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.

Finding EP.7-1: The evacuation plan and procedures now in place need to be further developed.

Proposed Action: The revised *Emergency Preparedness Plan* should address the evacuation issue.

Technical Support

TS.1 Organization and Administration

Performance Objective: Technical support organization and administration should ensure effective implementation and control of technical support activities.

Finding TS.1-1: Supervisory personnel are inadequately trained in safety matters relating to technical support.

Discussion: The Laboratory has established a training department within the ES&H Division. This group has begun a program to identify job training needs and to develop the necessary training programs. Safety performance is now a component of annual performance evaluations.

Proposed Action: In addition to the site–wide training effort underway, the Laboratory should use training, performance evaluations, and other encouragements to improve safety awareness and performance.

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 in the site.

Finding TS.2-1: There is no laboratory–wide method for identifying those procedures for which formal document control protocols are necessary for safe operations. Each technical support group maintains its own system for writing, controlling, and modifying procedures. (See also the subsection OA.7 in this chapter.)

Proposed Action: A formal policy should be implemented which establishes the need for, and defines the production, control, use, and modification of procedures for safe operations for the entire Laboratory.

Finding TS.2-2: Safety Analysis Documents are not in existence for all facilities on the site.

Discussion: Many facilities on–site predate the SAR system.

Proposed Action: The Laboratory should identify those facilities for which safety analyses are required, and proceed to conduct them.

TS.3 Facility Modifications

Performance Objective: Technical support services required by each facility on the site should be carried out in accordance with sound engineering principles that should assure proper design, review, control, implementation, and documentation in a timely manner.

Finding TS.3-1: Not all technical support personnel are familiar with DOE Order 5480.4 or the standards referenced in it.

Proposed Action: A formal process should be implemented to assure that all modification plans are reviewed by knowledgeable personnel for compliance with applicable codes and standards.

Finding TS.3-2: Design reviews and controls are not established and uniformly applied to modifications throughout the technical support organizations.

Proposed Action: Establish appropriate design reviews and controls in technical support groups.

Finding TS.3-3: Design changes are sometimes not reviewed outside of the technical support group performing the modification.

Proposed Action: Departmental QA plans should establish appropriate review requirements for modifications to facilities.

Finding TS.3-4: Documentation is sometimes not completed before modifications are tested and placed in operation. Field changes do not always receive the same level of review as the original modification.

Proposed Action: Technical support groups should establish procedures for controlling and documenting modifications, field changes, and as–built information.

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.

Finding TS.4-1: ***Not all technical support groups maintain auditable programs for testing and monitoring performance of equipment with environment, safety, and health impacts. Personnel qualification practices are spotty, and in many cases there is no provision for re-examining and requalifying. Tracking and trending of equipment performance is not done.***

Discussion: Plant Engineering and Plant Maintenance services have documented programs for monitoring and testing much of the equipment under their jurisdiction. The vehicle fleet is subject to a regular, documented maintenance program. Fluid control systems also are closely monitored and tested. Not all technical support groups have formal programs, and procedures are often *ad hoc* and undocumented. This is true of some groups within the Plant Engineering Department. Emergency and exit light maintenance has not been adequate. Crane and hoist testing has often been behind schedule.

Proposed Action: Departments should identify equipment and components whose functions have environment, safety, and health impact, and implement formal audited programs for monitoring their performance.

TS.5 Environmental Impact

Performance Objective: The impact on the environs from the operation of each facility on the site should be minimized.

Issues/discussion relative to this Objective are included in Finding TS.4-1 and Finding EP.6-2 in this chapter, and in Chapter 2, "Environmental Assessment."

TS.6 Packaging and Transportation of Hazardous Materials

Performance Objective: Performance of the packaging and transportation (PT) functions should ensure conformance with existing standards and accepted practices as given in DOE 5480.3, and other DOE and Federal regulations.

Issues/discussions relative to this Objective are included in the section "Packaging and Transportation" in this chapter.

TS.7 Reactor Engineering

Performance Objective: Reactor engineering activities should ensure optimum nuclear reactor operation without compromising design, safety, or nuclear fuel limits. (Reactors only)

This Objective is not applicable.

TS.8 Criticality Safety

Performance Objective: Specialized support for criticality safety issues should be fully integrated into the operation of the reactor, and the handling and storage of fuel by facility personnel. (Reactors only)

This Objective is not applicable.

Packaging and Transportation*

PT.1 Administration and Organization

Performance Objective: Management should develop and implement a system of policies and directives that will provide for effective implementation of DOE Orders, particularly DOE 5480.3, 1540.1, 1540.2, federal and state regulations, and good industrial practices in operations involving P&T of hazardous materials.

Finding PT.1-1: The Laboratory has not developed a transportation safety manual.

Discussion: There are various documents that address transportation safety, but they have not been consolidated into a comprehensive manual. These include Safety Bulletins and draft procedures, including the draft *SLAC Environment, Safety, and Health Manual.*

Proposed Action: A transportation safety manual should be developed by the Laboratory.

Finding PT.1-2: A Packaging and Transportation Committee has not been formed.

Discussion: A committee has not been specifically chartered to provide review of required documentation including the adequacy of corrective actions for any inspections, audits, or self-assessments. Although some elements of a P&T program have been covered by other committees, most have not.

Proposed Action: The Laboratory should review the need for a separate P&T committee, and implement findings accordingly.

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.

* Issues/discussions relative to this section are included in Chapter 2, "Environmental Assessment."

Finding PT.2-1: Formal training is not identified or documented prior to assignments of employees to P&T duties.

Discussion: Training has been informal and not consistently applied. There is no written certification by the trainer as to skill assessment. There has been some formal training given to employees at the Laboratory for the hazardous materials communication program.

Proposed Action: The Laboratory should provide a training plan for each position in P&T. This should include a training program for personnel who operate vehicles transporting hazardous materials.

PT.3 Quality Assurance

Performance Objective: A system of checks and balances should exist that ensures the QA requirements of the applicable DOE Orders, especially DOE 5700.6B, and ANSI NQA-1-1986 are met.

Finding PT.3-1: The P&T QA program for hazardous materials is not adequately documented and the internal audit area has not been fully implemented. (See also the section "Quality Verification" in this chapter, and Finding PT.10-1 and Finding PT.11-1.)

Discussion: The hazardous materials implementation plans are still in draft form. The process to accomplish internal audits has begun, but is not yet fully developed or implemented.

Proposed Action: The actions underway to correct this element should be completed and fully implemented.

PT.4 Regulatory Compliance

Performance Objective: All P&T operations involving hazardous materials should be conduced in compliance with the applicable State and Federal regulations, including those of the DOT, the NRC, OSHA, and the EPA.

Finding PT.4-1: Records required to ensure accountability of hazardous material from "cradle-to-grave" are incomplete.

Discussion: Records for procurement, use, and ultimate disposal are incomplete for the various types of hazardous materials used at SLAC. Return manifests from disposal sites may not have been received for all FY 91 shipments as required.

Proposed Action: Procedures should be established to ensure that all manifests from disposal sites are properly filed in the ES&H Division office responsible for regulatory closure, and as appropriate in the Purchasing Office.

PT.5 Accidents and Incidents

Performance Objective: Accidents and incidents involving packaging and transportation of hazardous materials should be reported in a timely manner to DOE.

Finding PT.5-1: Spill response procedures, and the method of notifying key individuals of an accident or incident are not specified sufficiently to ensure timely response or action.

Discussion: Spill response procedures have not yet progressed beyond the draft stage. Proper methods of notifying the key reporting personnel require the completion of final procedures and development of a training program for the individuals involved in hazardous materials P&T.

Proposed Action: Draft procedures should be used to commence training in spill response procedures. A program with clear lines of responsibilities for reporting provided to responsible individuals in P&T, should be completed by the ES&H Division.

PT.6 Operations

Performance Objective: Site–wide 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.

Finding PT.6-1: On–site movements of hazardous materials are conducted on an *ad hoc* basis without documented procedures.

Discussion: Building managers are not generally aware of all hazardous material movements through their areas. Specified procedures are not in force at this time.

Proposed Action: Hazardous materials standard operating procedures have been combined into a *Hazardous Materials Management Handbook* which will serve as the guideline for these issues, including P&T. The ES&H Division should complete and seek approval of this *Handbook*.

PT.7 Intra-Building Movements

Performance Objective: Intra–building movements and en route storage operations should be conducted in a safe, consistent, and accountable manner, following approved procedures, in conformance with applicable standards and accepted practices.

Finding PT.7-1: The Laboratory does not have an intra–building or enroute storage hazardous materials controls program. (See also Finding PT.8-1.)

Discussion: Standard operating procedures for hazardous materials operations have not yet been implemented. Vehicle certifications are not fully compliant.

Proposed Action: Standard operating procedures are in draft form for handling hazardous materials on site. A transportation safety manual (see Finding PT.1-1) should be prepared by the Laboratory to ensure vehicle and other P&T equipment certification programs are regularly practiced.

PT.8 On–site Transfers

Performance Objective: On–site 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.

Finding PT.8-1: No centralized set of procedures for managing on–site transfers exists at the Laboratory.

Discussion: Addressed in Finding PT.7-1.

Finding PT.8-2: Hazardous material can be delivered to an unattended staging and receiving area.

Discussion: A number of buildings have staging and receiving points where hazardous materials are left unrestrained and might block exit paths if there was an emergency.

Proposed Action: Standard operating procedures are in draft form for handling hazardous materials on site. A transportation safety manual (see Finding PT.1-1) should be prepared to ensure that delivery policies are regularly practiced in an approved manner.

PT.9 Off–site Shipments

Performance Objective: Off–site 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.

Finding PT.9-1: There are no written procedures for the shipment of hazardous material off site.

Discussion: Although tightly specified requirements are identified for low level radioactive waste shipments and hazardous waste shipments, shipping and receiving personnel are not familiar or trained in the requirements.

Proposed Action: Standard operating procedures are in draft form for handling hazardous materials on site. A transportation safety manual (see Finding PT.1-1) should be prepared to ensure shipping policies are regularly practiced in an approved manner.

PT.10 Records

Performance Objective: Records of hazardous materials movements, transfers, and shipments should be prepared and maintained to ensure compliance with DOE and other regulatory requirements, and to provide an auditable trail of actions.

Finding PT.10-1: Records of on–site transfers are not maintained, existing records are not maintained in a central location, and specific QA review of P&T of hazardous materials is not done. (See also Finding PT.3-1 and Finding PT.11-1.)

Discussion: Although records of shipments off site are filed, there are no checklists or internal transportation records. Accident and incident reports are filed.

Proposed Action: Standard operating procedures are in draft form for handling hazardous materials on site. A transportation safety manual (see Finding PT.1-1) should be prepared to ensure that documentation and reporting responsibilities are provided in a P&T training program and regularly practiced in an approved manner.

PT.11 Appraisals and Internal Audits

Performance Objective: Periodic P&T safety appraisals of contractors by the Field Office, and independent internal P&T safety audits by each contractor are required by DOE 5480.3 are conducted in accordance with DOE 5482.1B.

Finding PT.11-1: Internal audits have been infrequent and DOE/SAN and SLAC incompletely followed up on the corrective action to the last P&T audit in 1989. (See also Finding PT.3-1 and Finding PT.10-1.)

Discussion: Internal audits have been infrequent and do not specifically cover just P&T issues. The field office audit last done in 1989 for P&T issues has not been closed out by SLAC. The issue of DOT rules not applying to activities on the SLAC site has not been fully resolved by DOE. The field office has noted the lack of documentation for these issues at SLAC.

Proposed Action: A checklist should be developed that conforms to the QA program. The transportation safety manual and functions of the P&T Committee should address internal audits and corrective action plans (see Finding PT.1-1 and Finding PT.1-2).

PT.12 Packaging and Storage Procedures

Performance Objective: All packaging and storage procedures for hazardous material are in conformance with DOE 5480.3, 49 CFR, and 40 CFR.

Finding PT.12-1: Vendor-provided certification documents for shipping containers are not filed at SLAC.

Discussion: Type 17H containers provided by vendors do not have copies of their certifications on file at SLAC. Vendors have a standing recognition with DOE and Waste Holding Center (Hanford) for low level radioactive waste, but specific documentation is not available on site.

Proposed Action: Containers specifically procured for hazardous waste shipments and low level radioactive waste shipments should have the requirement for compliant certification added to the contract/purchase order.

Finding PT.12-2: Satellite accumulation areas were found lacking secondary containment barriers. (See also Finding WM.5 in Chapter 2, "Environmental Assessment.")

Discussion: Some satellite hazardous waste collection areas were found not to possess the required secondary containment features.

Proposed Action: All satellite hazardous waste collection areas should be renovated or replaced by an area which meets applicable requirements.

Finding PT.12-3: Allowable limits for radioactive materials in the various scrap and storage yards are not established.

Discussion: Although a procedure exists in the *SLAC Radiation Safety Procedures* book for the Radioactive Material Scrapyard, similar programs have not been established for other areas.

Proposed Action: A program for providing for additional posted storage areas including allowable limits for each area is in partial draft. This program should be completed and implemented by the ES&H Division.

Finding PT.12-4: No formally documented procedures exist for packaging hazardous materials.

Discussion: Procedures are needed for preparing hazardous waste material shipping papers, use of special shipping containers, and on–site storage materials.

Proposed Action: Standard operating procedures are in draft form for handling hazardous materials on site. A transportation safety manual (see Finding PT.1-1) should be prepared to ensure documentation and material preparation responsibilities are provided in a P&T training program, and are regularly practiced in an approved manner.

Security/Safety Interface

Issues/discussions relative to this section are included in other sections of this chapter.

Experimental Activities

EA.1 Interface with Experimenters

Performance Objective: Persons planning or conducting experiments in or with the facility should have their relationship to the operating group clearly defined.

Finding EA.1-1: Procedures and written instructions for safety systems, which may be shared by more than one group, are not always clearly defined.

Discussion: An example of this is the oxygen deficiency monitoring system in the Collider Experimental Hall. At least one group there is not clear who is responsible for maintaining the area system.

Proposed Action: The line management of the Laboratory should assure that all safety systems are the assigned responsibility of a specific group. This information should be posted in the appropriate area.

Finding EA.1-2: Some facility Safety Officers do not have their responsibilities clearly defined and receive no formal training. (See also Finding OA.1-3.)

Discussion: The Laboratory procedures require a Safety Officer to be appointed for each experimental facility. Some officers do not appear to have a clear idea of their responsibilities, nor do they receive any training specific to the environment, safety, and health areas for which they are responsible.

Proposed Action: A written description of the responsibilities of the Safety Officer should be developed, as well as appropriate training defined and implemented.

Finding EA.1-3: Employees and experimenters are not given adequate safety indoctrination upon their arrival at the Laboratory.

Discussion: In general, when new employees or experimenters arrive at the Laboratory, they are given an out–of–date, incomplete package of safety information. Sometimes they do not receive it at all. Some specific experimenters receive additional information, like those at SLD who are required to read the *SLD User's Safety Manual,* but this practice is not consistently applied.

Proposed Action: The safety information packet being updated by the ES&H Division should be consistent for both SLAC and SSRL, completed, and properly distributed.

EA.2 Experiment Categories

Performance Objective: All proposed experiments should be approved by an independent Safety Review Committee before they are performed.

Finding EA.2-1: Small–scale, in–house research projects, particularly those which do not require the use of the accelerators, are inadequately reviewed for environment, safety, and health concerns.

Discussion: Review of large experiments at SLAC or of the user program at SSRL is very thorough. There is little or no review of small–scale in–house research projects.

Proposed Action: SSRL should implement the planned Safety Review Panel for in-house projects. SLAC should determine the environment, safety, and health requirements that line managers must satisfy for in–house research projects.

EA.3 Experiment Proposals

Performance Objective: Sufficient information on a proposed experiment should be submitted to permit a safety evaluation to be made.

Issues/discussions relative to this Objective are included in the section "Site/Facility Safety Review" of this chapter.

EA.4 Operation of Experiments

Performance Objective: Experiments performed in any facility on the site should not present undue risk or significantly increase the risk previously evaluated for the facility or the site.

Finding EA.4-1: Monitoring of some operating experimental facilities is inadequate.

Discussion: Experiments receive extensive and appropriate review for environment, safety, and health concerns prior to the time they are commissioned. However, once experiments are on going, monitoring to provide assurances that unsafe conditions do not develop is often inadequate. Responsibilities for monitoring are not clearly defined or implemented.

Proposed Action: The responsibility for periodic monitoring of on–going experiments should be reviewed, properly defined, and implemented.

Site/Facility Safety Review

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 5482.1B., Section 9.d.

Finding FR.1-1: Safety reviews do not always treat safety considerations in sufficient depth and breadth to assure that all potential consequences are being reviewed. (See also Finding EA.2-1)

Discussion: The Laboratory employs several Citizen Committees to review safety matters in different technical areas. In general, the sum of these committees, and their practices and policies satisfy most of the criteria in this section. However, some of the committees do not review detailed technical designs or implementation plans. It is not clear that all projects, especially small ones and those for system modifications come to the attention of the appropriate review committees.

Proposed Action: A method should be established to assure that implementation and testing of important safety systems are reviewed, and that small projects and system changes are brought to the attention of the appropriate review body.

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.

Finding FR.2-1: The present safety review process at the Laboratory relies upon project leaders to notify the appropriate committee of their planned activities.

Discussion: There is not a formal process in place that assures that all activities receive adequate review for safety concerns. At times, systems which have been reviewed and approved undergo modifications at a later time which may have safety implications, but are not referred back to the safety committee.

Proposed Action: Project plans should identify stop points requiring that a determination be made whether all necessary reviews and approvals have been achieved.

FR.3 Operation of Safety Review Committee

Performance Objective: Review of site/facility objectives by the Safety Review Committee should ensure achievement of a high degree of safety.

Issues/discussion relative to this subsection are included in other parts of this section.

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 as specified in DOE 5480.5 and DOE 5480.6.

Issues/discussions relative to this subsection are included in other parts of this section.

FR.5 Triennial Appraisal Of Site/Facility Safety Review

Performance Objective: A triennial appraisal of the safety review system should be performed by contractor management.

Finding FR.5-1: Regular appraisals of the safety review system have not been performed to date.

Proposed Action: The laboratory management should conduct triennial reviews of the safety review system, document the result, and use the information to improve its effectiveness.

FR.6 Operating Experience Review

Performance Objective: Operating experiences should be evaluated, and appropriate actions should be undertaken to improve safety and reliability.

Finding FR.6-1: Although line management does evaluate operating experience with regard to performance and safety, information is not always distributed to appropriate personnel. In particular, the information in Occurrence Reports and so forth are not distributed to the SOC or any other safety committees.

Proposed Action: Occurrence Reports should be routinely sent to the SOC and other appropriate site personnel.

Radiological Protection*

RP.1 Administration and Organization

Performance Objective: Site/facility organization and administration should ensure effective implementation and control of radiological protection activities on the site/facility.

Finding RP.1-1: The internal audit program of the Laboratory does not meet all DOE radiological protection requirements.

Discussion: The Laboratory has an internal audit program which audits the Hazardous Waste, Operational Health Physics, and Radiation Physics areas on a three year cycle. A person not directly responsible for the program performed the most recent audit. However, the extent of the audit documentation was inadequate. There has never been a formal closure of audit findings nor was the safety program ever included in this process. This was a finding in previous DOE/SAN audits.

Proposed Action: The ES&H Division includes a Quality Assurance and Compliance Department which should address radiological protection in its internal audit program as appropriate.

Finding RP.1-2: Laboratory responsibilities for radiological protection are not clearly defined.

Discussion: The professional radiation protection staff understands its responsibility for radiation protection. The technical staff, that is, Health Physics Technicians, is less sure of its responsibilities and authority. The radiation safety responsibilities at the Laboratory are not clearly understood by all groups. The *SLAC Radiation Rule Book* is being updated, and procedures are being developed which define the roles and responsibilities of operators in emergency situations.

Proposed Action: The ES&H Division should develop appropriate procedures and necessary updates to the *SLAC Radiation Rule Book*, and ensure that all groups are informed of their responsibilities.

Finding RP.1-3: The Laboratory does not have approved procedures in place to implement the radiological safety program.

Discussion: Although some procedures have been provided in the *SLAC Radiation Safety Procedures* and *SLAC Radiation Rule Book*, the majority of activities involved are covered only by draft procedures or verbal directions.

Proposed Action: The draft procedures should be reviewed and issued by the ES&H Division in final, approved form.

* Issues/discussions relative to this section are also included in Chapter 2, "Environmental Assessment."

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.

Finding RP.2-1: The timely closeout of incident reports is lacking.

Discussion: A program to implement DOE requirements on occurrence reporting is in place, but the Laboratory needs to apply more effort to close these reports in a timely manner. The *Guidelines for Operations* contains procedures for investigating unusual occurrences, and the Technical Division has developed a form to be completed.

Proposed Action: Procedures should be reviewed by the Laboratory to ensure that all close outs required on incident reports are performed in a timely manner.

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 RP.3-1: The Laboratory needs to establish a site–wide program for the control of activated material.

Proposed Action: The Laboratory should develop the appropriate procedures and issue them in final form.

Finding RP.3-2: The Laboratory has not completely surveyed all buildings for radioactive materials and designated areas with required posting, where radioactive material use and storage is authorized. (See also Finding RA.3 and Finding RA.4 in Chapter 2, "Environmental Assessment.")

Discussion: A complete survey of all buildings will ensure that activated and possibly radionuclide source materials are properly identified and located. Areas where sources are used or activated material is stored, worked, or processed need to be posted as required.

Proposed Action: The ES&H Division should complete its survey of buildings for activated materials to ensure proper storage and posting.

Finding RP.3-3: The Laboratory does not have a written comprehensive procedure for the storage of radioactive material. (See also Finding WM.14 in Chapter 2, "Environmental Assessment.")

Discussion: The Radioactive Material Management Program, a part of which is the Radioactive Waste Management Program, needs to be fully documented and implemented.

Proposed Action: The ES&H Division should develop procedures for identifying and storing radioactive materials.

Finding RP.3-4: The Laboratory needs to document training requirements for users of radioactive sources. (See also Finding TC.9-1.)

Proposed Action: The ES&H Division should review and document the training requirements for users of radioactive material.

Finding RP.3-5: The Laboratory does not have an adequate inventory system for activated components which are removed from the accelerator housing. The Laboratory needs to implement an improved radioactive waste inventory system for the radioactive waste storage area.

Discussion: The inventory of activated materials is a part of the Radioactive Materials Management program. Activated material determined not to be waste, as well as materials that have been declared to be waste, need to be inventoried.

Proposed Action: The ES&H Division should review the requirements for a comprehensive inventory system and implement appropriate controls.

Finding RP.3-6: The procedures for an X-ray machine certification program do not always follow appropriate guidelines.

Discussion: At present, X-ray machines are surveyed in accordance with Operational Health Physics Procedure 5 from the *SLAC Radiation Safety Procedures Book*. Compliance with the appropriate ANSI guidelines is in question. Results of old surveys and the frequency of re-surveying are not readily retrievable.

Proposed Action: The ES&H Division should review and strengthen the certification program for X-ray machines to ensure compliance with ANSI standards.

RP.4 External Radiation Exposure Control Program

Performance Objective: External radiation exposure controls should minimize personnel radiation exposure.

Finding RP.4-1: The Laboratory has not formally documented the beta/gamma exposure ratio to personnel working on activated components.

Proposed Action: A series of controlled experiments involving actual materials and measurements should be conducted by the ES&H Division to provide a data file of beta/gamma exposure ratios for identified conditions and materials.

Finding RP.4-2: The boundaries of radiation areas are not clearly posted. (See also Finding RA.3 in Chapter 2, "Environmental Assessment.")

Discussion: The extent of radiation areas outside of the machine enclosures is not well defined. Radioactive material storage areas may contain materials leading to restricted (> 2 mrem/hr) or actual radiation (> 5 mrem/hr) areas in limited portions of a storage area.

Proposed Action: The ES&H Division should review its procedures for posting areas and make appropriate changes.

RP.5 External Radiation Dosimetry

Performance Objective: The routine and accident personnel dosimetry programs should ensure that personnel radiation exposures are accurately determined and recorded.

Finding RP.5-1: The Laboratory has not corrected the deficiencies and recommendations cited by the on-site DOELAP team, and a Dosimetry Program is not yet accredited.

Discussion: The first review for DOELAP accreditation passed the technical performance portion, but failed due to the lack of records and documented procedures. The Laboratory is in the process of correcting the deficiencies and implementing the recommendations from the previous site visit.

Proposed Action: The ES&H Division should complete the above corrections and continue to pursue the accreditation process.

Finding RP.5-2: The Dosimetry Program does not have a documented QA Program.

Discussion: The Laboratory is in the process of developing a dosimetry QA Program.

Proposed Action: The ES&H Division should complete development and implementation of a dosimetry QA Program.

Finding RP.5-3: The Laboratory does not have a documented training program for personnel dosimetry monitoring technicians.

Proposed Action: The ES&H Division should complete the training program now in preparation and provide instruction as appropriate.

Finding RP.5-4: The Laboratory does not have a documented procedure for estimating the dose on a lost dosimeter.

Proposed Action: The ES&H Division should review lost dosimeter protocols and administrative procedures for badge retention, and take appropriate corrective action.

RP.6 Internal Radiation Exposure Control Program

Performance Objective: Internal radiation exposure controls should minimize internal exposures.

Finding RP.6-1: The Laboratory needs to document its assertion that the potential for internal exposure is very low.

Discussion: Swipe surveys and area/breathing zone air monitoring results need to be filed in a retrievable fashion for compliance review.

Proposed Action: The ES&H Division should prepare documentation to demonstrate that the potential for internal exposure is low.

RP.7 Internal Radiation Dosimetry

Performance Objective: The internal radiation dosimetry program should ensure that personnel radiation exposures are accurately determined and recorded.

This Objective is not applicable.

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.

Finding RP.8-1: The Laboratory needs to document its criteria for the selection of radiation monitoring instruments.

Discussion: Selection criteria based upon the potential sources to be monitored have not been documented or situationally justified.

Proposed Action: The ES&H Division should document its selection criteria.

Finding RP.8-2: The Laboratory needs to clearly document its calibration and testing program for radiation monitoring instruments.

Discussion: Although individual instrument calibration sheets have been completed for the instruments calibrated at the Laboratory, particularly for portable survey instruments, fully approved calibration documentation does not exist.

Proposed Action: The ES&H Division should document the calibration and testing program.

Finding RP.8-3: The Laboratory lacks a documented training program for instrument repair and calibration personnel.

Discussion: A formalized training program or on–the–job training check–off system does not exist at the Laboratory.

Proposed Action: The ES&H Division should prepare a documented training program for instrument repair and calibration personnel.

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 RP.9-1: The Laboratory needs to document the Radioactive Gas Monitoring Program, and formalize procedures for testing and calibrating the air monitoring equipment. (See also Finding AR.14 in Chapter 2, "Environmental Assessment.")

Discussion: The Laboratory is in the process of preparing documentation for the Radioactive Gas Monitoring program.

Proposed Action: Procedures documenting the activities associated with the Radioactive Gas Monitoring program at the Laboratory should be completed and approved by the ES&H Division.

Finding RP.9-2: The flow rate of each vent from an area where radioactive gas can be released is not documented formally.

Discussion: Flow rate characterizations are needed with enough monitoring data to account for the variations normally observed to assure adequacy of the sampling system.

Proposed Action: The ES&H Division should document the release rate as part of the NESHAP project.

Finding RP.9-3: Criteria for selection of sampling instrument heads for gas monitors are not documented formally.

Discussion: Insufficient data exists to assure all possible gas releases are accounted for using the existing sampling arrangement. A profile map of exhaust vent velocities has not been done.

Proposed Action: The ES&H Division should document the selection process for sampling instrument heads.

RP.10 Radiation Monitoring/Contamination Control

Performance Objective: The radiation monitoring and contamination control program should ensure worker protection from radiation exposures.

Finding RP.10-1: The Laboratory has not formally documented its assertions that surface contamination is not a problem.

Discussion: The results of sample swipes, air sampling results, and water samples need to be documented and filed in a retrievable manner to justify the Laboratory's posture to compliance reviewers.

Proposed Action: The ES&H Division should prepare documentation to demonstrate that surface contamination is not a problem.

RP.11 ALARA Program

Performance Objective: A formally structured, auditable program should be in place with established milestones to ensure that exposures are maintained as low as reasonably achievable (ALARA).

Finding RP.11-1: The Laboratory has not set ALARA goals.

Discussion: Although an ALARA committee has been formed, the establishment of specific goals for the Laboratory personnel radiation exposures has not taken place. The ALARA committee looks at group average dose and individual doses in an attempt to identify groups for ALARA recommendations. Goals have not been set because of the low exposures received by radiation workers at the Laboratory.

Proposed Action: The ALARA committee should continue to attempt to identify groups of workers in order to develop possibilities for exposure reduction and document same as appropriate.

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.

Finding RP.12-1: The Laboratory has not implemented some of the DOE requirements on radiation exposure records.

Discussion: The Laboratory is not requesting radiation exposure histories for Laboratory–hired radiation workers and integrating the information into the personnel dosimetry databases.

Proposed Action: The Laboratory should review its posture on radiation exposure data and support its position with appropriate documentation.

Finding RP.12-2: Visitors are not provided records of their exposure.

Proposed Action: The Laboratory should review its policies on dosimetry reporting and document proper records for visitors as warranted.

Finding RP.12-3: The Laboratory does not have complete procedures for radiological record retention.

Discussion: There is a need to specify in a procedure what information must be kept, and in what manner, to assure compliance with appropriate directives and guidelines.

Proposed Action: The Laboratory should formalize procedures on radiological record retention.

Personnel Protection

PP.1 Organization and Administration

Performance Objective: Site and facility organization and administration should ensure effective implementation of the personnel protection program.

Finding PP.1-1: The quality and adequacy of organizations responsible for health and safety programs is not uniform across the Divisions.

Discussion: Not every group or significant activity has a safety officer responsible for those safety and health matters related to its construction or operation. Management and employees are not always effective in disseminating and managing information relevant to good health and safety practices.

Proposed Action: The Laboratory should establish the appropriate means to train all staff in the identification and mitigation of safety, health, and environmental concerns.

Finding PP.1-2: QA programs are currently not uniformly incorporated into personnel protection programs.

Discussion: The general lack of uniformity of QA programs is discussed in the subsection Quality Programs of "Quality Verification" in this chapter.

Proposed Action: The Laboratory should provide appropriate guidance and training to ensure that an effective environment, safety, and health QA program, including means of monitoring and appraisal of the quality of the personnel protection activities, is in place.

PP.2 Procedures and Documentation

Performance Objective: Procedures and documentation should provide appropriate direction, record generation, and support for the personnel protection program.

Finding PP.2-1: Operating procedures do not uniformly provide the necessary directions to ensure that health and safety requirements are met, and that potential hazard areas are identified and noted for corrective action. (See also Finding WS.6-3.)

Proposed Action: The ES&H Division should continue the process of developing a comprehensive *Environment, Safety, and Health Manual*, various guidance documents, and a document control system. Follow-up activities to increase staff involvement and training in the implementation of procedures should be included in the program where appropriate.

Finding PP.2-2: Awareness of safety and health priorities is deficient, not uniform throughout the Laboratory, and not yet institutionalized. (See also Finding OA.6-1 in this chapter and OR.1-1 in Chapter 4, "Management and Organization Assessment.")

Discussion: Written policies relating to occupational safety and industrial hygiene are published on an as needed basis, but the distribution and update mechanisms are inadequate to ensure timely and thorough dissemination. Formal tracking to correct deficiencies and deviations from prescribed standards is not consistent throughout the Laboratory. Line management has a condensed version of the *OSHA General Industry Standards* and is required to conduct periodic self inspections, but this activity is not implemented uniformly. Job descriptions and performance appraisals do not routinely include safety duties and responsibilities, but improvements in this regard have been noted.

Proposed Action: The Laboratory should coordinate all activities related to the issuance and timely revision of all documentation and corrective actions relevant to safety and health matters. Job descriptions should be amended where appropriate to reflect the appropriate safety and health responsibilities.

PP.3 Management of Health and Safety Concerns

Performance Objective: Chemical, physical, and/or other environmental stresses arising in the workplace should be identified, evaluated, and controlled.

Finding PP.3-1: The program to identify potential chemical, physical, and/or environmental stresses exists, but the documentation is not adequate and is not implemented uniformly throughout the site.

Proposed Action: The Laboratory should review the adequacy of the program to identify chemical, physical, and/or environmental stresses, and make appropriate corrections in this area.

PP.4 Surveillance of Health and Safety Concerns

Performance Objective: Appropriate surveillance of activities should be conducted to measure safety and health performance, and ensure the continued effectiveness of controls.

Finding PP.4-1: The program monitoring chemical, physical, and biological stresses is not adequately documented. (See also Finding WS.2-2 in this chapter.)

Discussion: Surveillance of laboratory activities to ensure safety is often weak. The collected data is assigned to various databases, but is seldom used for program improvement. The medical and health surveillance data are the notable exception.

Proposed Action: Procedures for safety and health documentation should be reviewed and modified to ensure that proper information is available to all qualified requestors, and that the information is contained in appropriate database formats.

PP.5 Personnel Communication Program

Performance Objective: Site/facility personnel should be adequately informed of chemical, physical, and biological stresses that may be encountered in their work environment. Written programs are available, and are of sufficient quality to comply with all DOE–prescribed occupational safety and health standards.

Finding PP.5-1: Training and dissemination of safety and health information has been insufficient to effectively and uniformly influence the general safety consciousness and hence the behavior of employees.

Proposed Action: See Finding TC.1-2 and Finding TC.4-1 in this chapter.

Worker Safety and Health Compliance

WS.1 Management of Health and Safety Concerns

Performance Objective: Chemical, physical, and/or other environmental stresses arising in the workplace should be identified, evaluated, and controlled.

Finding WS.1-1: Some facilities are not in compliance with all applicable standards. The Laboratory policy does not establish schedules for air and noise sampling.

Discussion: Established facilities have been evaluated, and not all are in compliance with applicable standards. The ES&H Division and the Citizen Committees develop guidelines where no applicable standards exist. Workplace environmental sampling reports are sent to line supervisors. There is a laboratory policy for bioassay.

Proposed Action: A documented program to identify, evaluate, and control regulated environmental stresses should be established.

Finding WS.1-2: Housekeeping practices and programs vary throughout the Laboratory.

Discussion: Management and supervisory personnel at the Laboratory have no common guidelines and understanding or commitment to maintaining a neat, clean, and orderly workplace. Work areas are often reused by individuals and groups as they were left by prior users, and in turn, these individuals and groups do not generally leave their work areas clean upon departure. Daily work habits do not routinely include a cleanup time near the end of a shift. Workers do not often cleanup the detritus that they produce—sawdust, metal cuttings, cable ties, coffee cups, pieces of wire, cigarette butts, and so forth are left for others. While work is in progress and often afterwards, aisles and exits may be blocked. Trash sometimes is piled outside of buildings and forgotten. Regular outside cleanup is not done in many areas.

Proposed Action: Laboratory line management should develop policies that establish standards of good housekeeping, and vigorously promote and enforce these standards.

WS.2 Surveillance of Health and Safety Concerns

Performance Objective: Appropriate surveillance of activities should be conducted to measure safety and health performance and ensure the continued effectiveness of controls.

Finding WS.2-1: Monitoring to ensure the effectiveness of controls at construction sites is not adequate.

Discussion: Although attending staff emphasize safety and health concerns at construction sites and call upon the ES&H Division for monitoring and safety compliance decisions, routine qualified surveillance is inadequate.

Proposed Action: See Finding OS.4-1 in this chapter.

Finding WS.2-2: Surveillance documentation for monitoring chemical, physical, and biological stresses is inadequate. (See also Finding PP.4-1 in this chapter.)

Discussion: Although actual documentation of the program is inadequate, performance is considered adequate and reports are provided to line supervisors and employees according to OSHA requirements

Proposed Action: The program for periodic monitoring of stresses should be documented by the ES&H Division.

Finding WS.2-3: The Earthquake Safety Committee has not conducted inspections at the frequency required by their Charter.

Discussion: The 1989 Loma Prieta Earthquake caused relatively little damage and no injuries at the Laboratory. This is a tribute to the proactive work of the Earthquake Safety Committee. On the other hand, the recent site inspection found that approximately 20% of the OSHA–type deficiencies were related to seismic safety. The Earthquake Safety Committee Charter states that the Committee will inspect the entire Laboratory over the period of one year. Building and area managers are also charged with inspecting their own areas, though they may not have all the training or take all actions necessary.

Proposed Action: The Laboratory should investigate the level of expertise necessary to conduct an effective seismic safety program and design an implementation strategy that best utilizes the available resources.

WS.3 Compliance with Occupational Health Standards for General Industry

Performance Objective: Site/facility operations should comply with DOE–prescribed standards for the evaluation and control of occupational health hazards.

Finding WS.3-1: There is a possibility of exposure to asbestos in a few areas of the Laboratory. Formal procedures for working with asbestos–containing materials do not exist.

Discussion: Asbestos materials are used in gaskets, heating and cooling duct insulation, pipe insulation, and in the form of Transite and asbestos–containing wallboard. Laboratory employees are not allowed to undertake any activity which could result in the airborne release of friable asbestos fiber. The ES&H Division determines if a material contains asbestos when requested by line management or supervision. No written procedures or guidelines exist, and all work is done informally. An Asbestos program is presently being devised by the ES&H Division.

Proposed Action: Asbestos hazards in the working environment should be included in training for affected workers, and appropriate procedures developed.

Finding WS.3-2: SLAC has no documented carcinogen control program. (See also Finding MS.2-2 in this chapter.)

Discussion: Carcinogens are included in the Hazard Communication Program. The Laboratory maintains an inventory of hazardous materials used and stored on the site. The new *Environment, Safety, and Health Manual* will include a Carcinogen Control Program, and ALARA will be the guiding principle.

Proposed Action: The new *Environment, Safety, and Health Manual* should be completed, and control programs implemented.

Finding WS.3-3: Training for certain classes of lasers is inadequate.

Discussion: The number, location, and users of lasers at the Laboratory is not completely known. The Laser Safety Officer, a member of the Non–ionizing Radiation Safety Committee, is currently conducting an inventory of lasers in use at the Laboratory. Some lasers at the Laboratory are being used in an unsafe manner due to lack of adequate training.

Proposed Action: The Laboratory should ensure that users of lasers are trained in their safe operation.

Finding WS.3-4: The Laboratory does not have formal procedures for working in confined spaces. (See also Finding MA.4-2 in this chapter.)

Discussion: Confined space entries have been addressed by the ES&H Division as special circumstances. The program is not documented. The ES&H Division is conducting a survey to identify potential confined work spaces and developing a compliant program.

Proposed Action: The ES&H Division should complete development of the Confined Space Program.

Finding WS.3-5: The Laboratory has no formal policy or standards for the design, installation, maintenance, and calibration of hazardous atmosphere detectors, oxygen deficiency detectors, and monitoring equipment.

Discussion: Numerous hazardous atmosphere detectors protect personnel in various Laboratory facilities. Several types of detectors are in use, installed by different groups and often maintained by yet another group. While the National Electrical Code has provisions for the installation of electrical equipment and wiring in hazardous locations, the Laboratory has no mechanism to ensure that the rules of the Code are followed. This Code prevision does not apply to the numerous oxygen deficiency monitors which protect personnel in various Laboratory facilities. One standard type of detector is in use, which may be installed by one group and maintained by another. The current practice requires the group, whose activities may result in a hazardous or oxygen deficient atmosphere, to submit for review a proposal for protection of personnel. The reviewing body is the Hazardous Experimental Equipment Committee, which examines the proposal for technical merit and inspects the installation before issuing approval for operation. This procedure works well provided that the responsible group recognizes the hazard and prepares the appropriate technical documentation.

Proposed Action: The Laboratory should establish a formal policy governing the overall responsibility for, and the use of, installation and maintenance of hazardous and/or oxygen deficient atmosphere detection systems. Information on all such systems in use should be collected in an appropriate database, and the information reviewed periodically to ensure conformance with established practices.

WS.4 Compliance with Occupational Safety Standards for General Industry

Performance Objective: Workplaces should be free of uncontrolled physical hazards and be in compliance with DOE–prescribed occupational safety standards.

Finding WS.4-1: Appropriate danger, warning, and safety information signs are not uniformly placed throughout the facility.

Discussion: There are many examples of inadequate as well as improper and inconsistent signs.

Proposed Action: The Laboratory should establish appropriate standards for safety related signs and correct deficiencies.

Finding WS.4-2: Ladders, guard rails, and fall–protection equipment are not always well–maintained or adequate.

Discussion: Railings around some open manholes are poorly maintained. Temporary guard rails are not always used around open pits and other dangerous work areas. Permanently installed ladders do not always have appropriate extensions. The recent site inspection has identified many inadequate guard rails, and these are being repaired or replaced.

Proposed Action: Laboratory line management should continue its review and complete corrective actions on ladders, guard rails and fall–protection equipment.

Finding WS.4-3: Machine guarding is not always adequate or in compliance with OSHA standards.

Discussion: Machine guarding and shields are sometimes not present or up to modern/OSHA standards. Some guards and shields ar not properly adjusted. Consistent interpretation of regulations is needed. Violations commonly occur in the small shops scattered about the facility. The main machine shop in the Light Fabrication Building is closest to compliance with standards. Guards on belt driven machinery are sometimes defective or missing. Guards are not always provided for motor driven pumps and similar devices.

Proposed Action: The Laboratory should formulate a set of consistent practices. Users of machine tools need to be educated on the proper setup of agreed upon guards and tool rests.

Finding WS.4-4: Exit signs are not always adequate, and exits from work areas are sometimes not in compliance.

Discussion: Lighted signs are not used as often as necessary. Doors that are not exits are not always marked *Not an Exit*. Marked aisles are sometimes violated. Cabinets near doors are not always anchored and are, therefore, an earthquake hazard. Materials and empty packing materials are sometimes stored on top of cabinets in hallways and could provide obstructions to egress. No policy exists for consistent use of emergency lighting. Disorderly work habits sometimes cause egress to be blocked longer than necessary. The SLAC Earthquake Safety Committee is establishing bracing and anchoring procedures for furniture, equipment, and storage racks.

Proposed Action: The Laboratory should develop and update appropriate guidelines for signs and exits. Both lighted and unlighted exit signs and emergency lighting should be installed where required. Policy should be set for consistent emergency lighting installation. Aisle markings should be provided, maintained, and respected.

Finding WS.4-5: The Laboratory's training, inspection, and preventative maintenance program for powered platforms, hoisting and rigging devices, cranes, and other powered tools and machinery is not fully in compliance with the DOE requirements.

Discussion: A Hoisting and Rigging Safety Committee was recently formed and a policy written and accepted. The Committee will be charged with devising a formal means of implementing the new Hoisting and Rigging Safety Policy.

Proposed Action: The new Hoisting and Rigging Safety Committee should devise inspection, training, maintenance, and record keeping procedures to bring Laboratory practice up to DOE requirements.

Finding WS.4-6: High pressure gas cylinders are not always properly secured, tagged as *full, in use,* or *empty,* or properly stored at the end of a work period. Oxygen and acetylene cylinders are sometimes stored adjacent to one another without the required firewall or the twenty–foot separation.

Discussion: Users of high–pressure gas cylinders need to be trained in the proper tagging and storage of these items. Empty or unused cylinders should be routinely returned to Stores. Cylinders should not be stored on their sides. The Earthquake Safety Committee has stated that cylinders should be attached to brackets or carts with a single welded chain. This rule is not always observed and needs enforcement.

Proposed Action: The new *SLAC Environment, Safety, and Health Manual* will address the proper use of gas cylinders.

Finding WS.4-7: The lock–and–tag procedures for energy systems are not yet uniformly applied throughout the Laboratory. (See also Finding OP.4-3 and Finding MA.2-4 in this chapter.)

Discussion: The Laboratory's new lock–and–tag procedure is partially in place and training is underway. In some cases, electrical panels are not lockable and require observance of inconvenient methods and procedures.

Proposed Action: The Laboratory should continue with the full implementation of the new lock–and–tag procedures, and panels that are frequently tagged out should be modified or replaced to allow easy use of the new procedures.

Finding WS.4-8: Many electrical items and installed systems are not in compliance with the National Electrical Code and/or common good practice.

Discussion: Many instances exist where covers are missing on electrical junction and pull boxes. Some breaker boxes have missing panels, thus exposing live junctions where the box is opened. Open knockout holes allow access to live circuitry. The use of daisy–chained extension cords is evident. Flexible temporary electrical cord is often used where permanent wiring in conduit should be installed. Those items that can be handled quickly and easily are being promptly corrected by the occupants or the building managers.

Proposed Action: See the Proposed Action in FindingWS.4-9 below.

Finding WS.4-9: The Laboratory does not have an adequate electrical inspection program.

Discussion: The recent site inspection found that approximately 40% of the OSHA–type deficiencies were electrical in nature. The Electrical Safety Committee charter states that the Committee will inspect the entire Laboratory over the period of one year, but this is impractical. Building and area managers are also charged with inspecting their own areas, but may not have all the training or take all actions necessary.

Proposed Action: The Laboratory should study ways to deliver an effective electrical inspection program and take corrective actions accordingly.

Finding WS.4-10: Exposed wiring inside breaker panels, faulty door latches, and missing or incorrect breaker lists are sometimes problems at the Laboratory.

Discussion: Breaker panels have a small door to access the breaker switches, and a large door which exposes the interior of the breaker box. Opening the large door exposes personnel to unprotected high–voltage wiring. Some panels have missing tie–down screws or broken latches. Some panels lack covers for missing individual breakers that will allow personnel to touch live wiring. Lists identifying breakers are sometimes missing or incorrect and might cause undue delay in shutting off a circuit in the event of an emergency.

Proposed Action: All such panels should be identified, and corrective actions planned and carried out.

Finding WS.4-11: Industrial machines do not remain off after an interruption of main power as required by OSHA and NEC codes.

Discussion: NEC and OSHA require that all industrial machinery have an under voltage trip that prevents the machinery from restarting in the event of a power failure. The Laboratory has industrial machines acquired before this requirement was put into effect and has not yet retrofitted all machines to be compliant.

Proposed Action: A program to identify these machines should be instituted and corrective action taken to bring them into compliance.

Finding WS.4-12: Employees consume food and beverages in many work areas where hazardous or toxic materials are in use. Workers sometimes store food and industrial materials in the same refrigerators. Refrigerators do not always bear signs stating proper use.

Proposed Action: The Laboratory should formulate and enforce policies concerning use of work areas, break areas, lunch rooms, and refrigerators.

Finding WS.4-13: Electrical equipment and cabling in wet environments has been damaged.

Discussion: Water seeps into the conduits that carry electrical cables to the tunnel complex. The water has caused major damage to electrical boxes mounted on tunnel walls. This is a shock hazard for those working in the tunnels.

Proposed Action: The problem has been identified in the recent site inspection and is under repair. Surveillance and maintenance activities should be devised to identify and repair these occurrences on a timely basis.

Finding WS.4-14: Welding, cutting, and brazing operations are not always in conformance to requirements.

Discussion: Ventilation in welding, cutting, and brazing areas is not always adequate. Not enough attention is paid to removing toxic or flammable coatings from materials prior to cutting, welding, or brazing. Hot work permits are sometimes not obtained.

Proposed Action: The Laboratory permit system for hot work should be observed uniformly. Training should be provided to all affected personnel.

WS.5 Compliance with Occupational Safety and Health Standards for Construction Industry

Performance Objective: Construction activities should be free of uncontrolled physical and health hazards, and should be in compliance with DOE–prescribed occupational safety and health standards relating to construction.

Finding WS.5-1: There is not an auditable vehicle maintenance program at SSRL.

Discussion: Vehicle maintenance is inadequate and rigorous inspections of vehicles do not occur.

Proposed Action: SSRL vehicles should, in the future, be maintained by SLAC.

Finding WS.5-2: Motor scooter drivers do not always wear helmets.

Proposed Action: Use of protective headgear should be made mandatory when using motor scooters.

Finding WS.5-3: Some drivers ignore road signs and markings.

Discussion: No means exists for enforcing traffic laws or encouraging driver courtesy.

Proposed Action: The Laboratory should review the recent traffic engineering study and take appropriate action.

WS.6 Personnel Communication Program

Performance Objective: Personnel should be adequately informed of chemical, physical, and biological stresses that may be encountered in their work area.

Finding WS.6-1: Many employees have not been fully trained to deal with possible spills of the specific hazardous materials they handle. (See also Finding WM.7 in Chapter 2, "Environmental Assessment.")

Discussion: Some workers do not know what to do if their materials are spilled. Initial response to major spills is provided by the PAFD, located on site.

Proposed Action: The Laboratory should identify the specific needs for training workers to manage spills of hazardous materials, and continue or institute such training.

Finding WS.6-2: Containers of hazardous chemicals are not always appropriately labeled. (See also Finding WM.2 in Chapter 2, "Environmental Assessment.")

Discussion: The contents of small containers of chemicals are sometimes not marked or are informally labeled without indicating hazard or hazard level. Sometimes the container is incorrectly marked. Cabinets are often marked incorrectly or not marked at all.

Proposed Action: Laboratory personnel should be properly trained and labeling requirements enforced.

Finding WS.6-3: The safety awareness program at the Laboratory has been informal and not well documented. (See also Finding PP.2-2 and Finding EA.1-3 in this chapter.)

Discussion: The program to date has not been comprehensive or well documented. A method for ensuring that visitors and users continue to receive environment, safety, and health information is particularly lacking. However, information about safety matters at the Laboratory is spread by ES&H Newsletters, Safety Notices, memos, word of mouth, and the *SLAC Safety Manual*, which is not current. There has also been a survey of training needs and a new emphasis placed on providing training.

Proposed Action: The Laboratory should continue to implement the new awareness programs and evaluate those programs for necessary course corrections at appropriate intervals.

Industrial Hygiene

IH.1 Organization and Administration

Performance Objective: Site and facility organization and administration should ensure effective implementation and control of the industrial hygiene program.

Finding IH.1-1: Relative to organization and administration, the Laboratory does not have an Industrial Hygiene Program which is fully compliant with DOE requirements.

Discussion: Minimization of occupational health hazard exposure is a stated intention in the Laboratory's projects, without specific figures being assigned to this objective. The industrial hygiene staff uses a database to record its findings, but formal inspections to determine compliance with recommendations are not consistently conducted. The Laboratory does not have a documented Industrial Hygiene Program to record and monitor the quality of results from past workplace samplings and certified laboratory tests.

Proposed Action: The Laboratory should continue to review its IH program and DOE requirements including QA, establishment of objectives, and development of databases for tracking, and implement program corrections as appropriate.

IH.2 Procedures and Documentation

Performance Objective: Procedures and documentation should provide appropriate direction, record generation, and support for the Industrial Hygiene program.

Finding IH.2-1: Relative to procedures and documentation, the Laboratory does not have an Industrial Hygiene Program which is fully compliant with DOE requirements.

Discussion: Formal industrial hygiene policies have not been formulated and documented. No formal ALARA program exists for hazardous materials exposure or for the use of personal protection equipment. No carcinogen control program has been published. The effectiveness of the Industrial Hygiene Program has not been analyzed on the basis of existing documents.

Proposed Action: The Laboratory should continue to review the IH program and DOE requirements including policies, hazardous materials control, documentation, and implement program corrections as appropriate.

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. Appropriate surveillance of activities should be conducted to measure industrial hygiene performance and ensure the continued effectiveness of controls.

Finding IH.3-1: The Laboratory does not have fully compliant Industrial Hygiene Programs based on DOE requirements which identifies, evaluates, and controls health concerns.

Proposed Action: The Laboratory should continue to review its IH program and DOE requirements including identification, evaluation, and control of health concerns, and implement program corrections as appropriate.

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.

Issues/discussion relative to this Objective are included elsewhere in the sections "Worker Safety and Health (OSHA) Compliance," "Personnel Protection," and "Occupational Safety" in this chapter.

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.

Issues/discussion relative to this Objective are included elsewhere in the sections "Worker Safety and Health (OSHA) Compliance," "Personnel Protection," and "Occupational Safety" in this chapter.

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.

Issues/discussion relative to this Objective are included elsewhere in the sections "Worker Safety and Health (OSHA) Compliance," "Personnel Protection," and "Occupational Safety" in this chapter.

Occupational Safety

OS.1 Organization and Administration

Performance Objective: Site and facility organization and administration should ensure effective implementation and control of the occupational safety program.

Finding OS.1-1: The Occupational Safety Program is not effectively controlled throughout the Laboratory.

Discussion: The degree to which occupational safety programs are implemented varies from department to department. Ample high level policy exists, largely in the form of directives and memoranda produced over a period of years. However the policy has not been comprehensively presented and little or no implementation guidance or control is in place.

Building Managers are among the staff responsible for the direction and operation of occupational safety programs. They frequently have neither budgets nor authority nor, in some cases, the qualifications to do so.

Necessary information is not always communicated to all segments of the organization. Few staff members, including persons with management responsibility, know of DOE requirements which pertain to their area of responsibility.

Resources are not always made available to meet the operational requirements of the occupational safety programs. Individual groups are responsible for identifying funds for group environment, safety, and health needs.

Management has not established specific goals for reducing the frequency and severity of occupational accidents and injuries. Although safety activities are intended to be a part of annual employee performance evaluations, no follow up assures that this takes place.

Proposed Action: A completely revised *SLAC Environment, Safety, and Health Manual* is in process which will comprehensively address occupational safety issues. Programs should be defined in a consistent, integrated laboratory–wide manner and be applied uniformly across the facility. Departmental safety needs should be identified and adequate resources allocated.

Building Managers, whose responsibilities are being defined, should have their authority established and be given the training necessary to carry out those responsibilities.

Program effectiveness should be audited and evaluated on a regular basis and employee safety performance, especially that of supervisors, should be evaluated annually by line managers and remedial training given where indicated.

OS.2 Procedures and Documentation

Performance Objective: Procedures and documentation should provide appropriate direction, record generation, and support for the occupational safety program.

Finding OS.2-1: Occupational safety policies exist, but not all groups have developed procedures which implement them fully and consistently.

Discussion: Occupational safety programs implemented at the department or group level are not systematically reviewed for compliance with Laboratory requirements. Interpretation is usually left to the discretion of the first or second level supervisor. Group leaders may not be aware of their responsibility to comply with national codes or standards.

Proposed Action: The Laboratory should ensure that appropriate implementing procedures are developed for occupational safety.

Finding OS.2-2: Programs for identifying, reporting, correcting, and checking safety concerns are in place, but are not consistently implemented.

Discussion: Various plans exist for identifying and responding to safety concerns on site, depending on the type of safety issue. However, these plans are by no means integrated, and some lack the follow up needed to close the loop. For example, a self–audit program is in place to yearly inspect all aspects of occupational safety. This is performed at the departmental level, on a voluntary basis. Follow up on this is not complete, so departments can "slip through the cracks."

Recently, a Performance Indicator system has been implemented, but it is still in its infancy, and has yet to be integrated into the already existing programs.

Proposed Action: The Laboratory should ensure that all departments identify, track, and correct occupational safety deficiencies.

Additionally, follow–up guidelines must be developed to close the loop, and the ES&H Division should review specific departmental guidelines.

OS.3 Management of Safety Concerns

Performance Objective: Physical and/or other environmental stresses arising in the workplace should be identified, evaluated and controlled.

Finding OS.3-1: There is no formal program which assures that physical and/or other environmental stresses arising in the workplace are identified and controlled.

Discussion: The manner by which workplace stresses are monitored on a day–to–day basis is left to individual managers and supervisors. Safety concerns, once identified, are evaluated and measures taken to reduce risk and control hazards. However, little formality is imposed upon that process unless an incident occurs.

Proposed Action: See Finding IH.3-1. Additional issues/discussions related to this Objective are included in the sections "Worker Safety and Health (OSHA) Compliance," "Personnel Protection," and "Industrial Hygiene" of this chapter.

OS.4 Surveillance of Safety Concerns

Performance Objective: Appropriate surveillance of activities should be conducted to measure safety performance and ensure continued effectiveness of controls.

Finding OS.4-1: Surveillance activities for construction projects have not been adequately implemented.

Discussion: The data that is reported to the Safety Performance Measurement system, and the Unusual Occurrence Reporting system is not subjected to trend analysis.

There is no formalized construction surveillance program. Plant Engineering is involved in monitoring many construction activities, but this effort is not formalized to include all aspects of occupational safety.

A Quality Assurance and Compliance Department has been formed to perform environment and safety audits of facilities. A Construction Inspection position within the Quality Assurance and Compliance Department is planned and budgeted.

Proposed Action: As more data from the DOE Performance Indicator program becomes available, trend charts should be generated to detect significant changes in the level of safety concerns. The Quality Assurance and Compliance Department mentioned above should be tasked with occupational safety surveillance activities.

OS.5 Personnel Communication Program

Performance Objective: Site/facility personnel should be adequately informed of physical stresses that may be encountered in their work environment.

Issues/discussion relative to this Objective are included in the sections "Organization and Administration" and "Personnel Protection" of this chapter.

Fire Protection

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.

Finding FP.1-1: **There is some ambiguity between the ES&H Division and Plant Engineering as to the role that each plays in maintaining the fire protection system, and who can change it. The general population does not understand the structure of the organizations. There is no overall descriptive statement of the Fire Protection program.**

Proposed Action: Fire protection organization and administration plans and a description of the Fire Protection program should be developed, published, and distributed.

Finding FP.1-2: **Minor construction modifications to existing buildings are occasionally accomplished without fire and safety reviews.**

Proposed Action: Building managers should ensure proper review of proposed changes or modifications to existing buildings prior to proceeding with construction.

FP.2 Life Protection

Performance Objective: All facilities on site should provide adequate life safety provisions against the effects of fire.

Finding FP.2-1: **The Laboratory inspection program is not sufficiently comprehensive to ensure compliance with *Life Safety Code* requirements.**

Discussion: The Laboratory is in general compliance with NFPA 101, *Life Safety Code* requirements. The Palo Alto Fire Department performs inspections using the adopted version of the *Uniform Building Code*. Not all elements of the *Life Safety Code* are reviewed during inspections.

Proposed Action: Steps should be undertaken to ensure more thorough field safety inspections.

FP.3 Public Protection

Performance Objective: All facilities on site should provide adequate protection to prevent any added threat to the public as a result of an on–site fire causing the release of hazardous materials beyond the site (or facility) boundary.

Finding FP.3-1: The Laboratory has not determined if containment systems will preclude an off–site release of hazardous amounts of toxic materials as the result of fires on site.

Proposed Action: The Laboratory should evaluate the potential for the release of hazardous material beyond the site boundary as the result of a fire.

FP.4 Impairment of Operations

Performance Objective: The site should not be vulnerable to being shut down for an unacceptable period as a result of a credible fire.

Finding FP.4-1: Some critical facilities do not include fire sprinkler systems.

Discussion: Positive and negative effects of providing fire sprinkler protection of these areas are still in the investigative stage.

Proposed Action: The Laboratory should complete the review of critical facilities and develop a corrective action plan.

FP.5 Property Protection

Performance Objective: A maximum credible fire, as defined in DOE 5480.7, Section 6.f, should not result in an unacceptable property loss.

Issues/discussion relative to this Objective is included in other areas of this subsection.

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.

Issues/discussion relative to this Objective is included in other areas of this subsection.

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.

Finding FP.7-1: The Laboratory is not conducting all required fire protection system tests and inspections.

Proposed Action: The Laboratory, under the auspices of the ES&H Division, should instigate a program to provide timely reviews and documented inspections of fire protection apparatus in consort with building and or area managers.

Finding FP.7-2: The Laboratory has no internal audit documentation program for fire protection standards.

Discussion: DOE conducts audits bi–annually. The Quality Assurance and Compliance Department of the ES&H Division has no fire protection audit documentation.

Proposed Action: The ES&H Division should take steps to create a Fire Protection Audit Plan with appropriate documentation.

Finding FP.7-3: At present, formal documentation review of the Fire Protection Program is not conducted.

Proposed Action: The Fire Protection Engineer and the ES&H Division should implement a policy for an annual documented review of subject programs.

Medical Services

MS.1 Organization and Administration

Performance Objective: Site and facility organization and administration should ensure effective implementation and control of the medical services program.

Finding MS.1-1: Current contract with PAMF does not ensure site staffing levels set by DOE Order 5480.8A.

Discussion: To be in compliance with DOE Order 5480.8A Sections 8b(2) and 8b(3,4), the contract should provide for one full–time physician and three full–time nurses.

Proposed Action: The Laboratory should continue to pursue an exception based on SLAC's close proximity to excellent community resources and because all Laboratory employees are covered by a medical insurance plan.

Finding MS.1-2: Some programs proposed by the Medical Department are not implemented due to logistical considerations within other departments.

Discussion: Recommendations in such areas as absenteeism, substance abuse, and prompt return to work must be achieved through the concerted effort of several departments to maintain and share statistics. Medical services cannot comply with specific DOE Orders concerning return to work and absentee reduction until a formal program addressing such issues is supported by top management.

Proposed Action: Members of the ES&H Division, and Personnel and Medical Department staff should review requirements and propose plans for implementation of formal programs to address these issues.

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.

Finding MS.2-1: A percentage of line management and other personnel on site seem to be unclear as to their specific responsibilities concerning medical services (for example, respirator program, accident reporting, return to work).

Discussion: Procedures manuals for Nursing, Education, and Administration are in place, but cannot be fully implemented unless management is trained to communicate these medical programs and services to employees.

Proposed Action: The Laboratory should develop and implement procedures to ensure that supervisors and administrators carry out their responsibilities concerning medical services.

Finding MS.2-2: Formal procedures for carcinogen protection have not been adopted for the site. (See also Finding WS.3-2 in this chapter.)

Discussion: The consensus has been that carcinogen protection has been in place by virtue of the Hazard Communication Program. Specific procedures have not been written however, and do not appear in the current *Safety Manual*.

Proposed Action: The Laboratory should develop specific carcinogen protection procedures and reference them in the new *SLAC Environment, Safety, and Health Manual*.

Finding MS.2-3: Accident reporting is not handled in a consistently efficient manner.

Discussion: Few supervisors and employees realize that a single on–site injury frequently requires the completion of up to seven reports. The Medical Department has a standard procedure in place that works very well if they are informed of the accident immediately. However, the employee's department must take responsibility for completing the required forms. Factors such as the lack of communication between the appropriate parties and inefficient routing impede the timely completion of these forms.

Proposed Action: The Laboratory should review the accident reporting process to determine how inefficiencies can be eliminated.

MS.3 Medical Treatment

Performance Objective: Medical treatment should be available and provided by qualified, competent staff, and adequate facilities should be available.

Finding MS.3-1: Emergency power supply available to the Medical Department is not well marked and has not been tested.

Discussion: Electrical plans indicate that a single outlet in the Medical Department will be powered during an emergency. However, such outlets are usually marked in red and this is not the case for the outlet called out in the plans. Of equal concern is the fact that a test has never been conducted to see if the outlet actually does work off the emergency power supply.

Proposed Action: Once emergency power supply to the outlet has been confirmed, it should be marked and tested.

Finding MS.3-2: First–aid kits are not standardized and properly maintained throughout the site.

Discussion: Laboratory policy prohibits individuals and departments from maintaining first–aid kits. The logic behind this policy is that employees should be reporting injuries to the Medical Department for assessment and/or treatment. Prohibited or not, the fact remains that first–aid kits of varying forms do exist throughout the site. These kits are not standardized, and provisions have not been made to properly maintain them or to provide training for their use.

Proposed Action: The policy on first aid should be reviewed. Part of the emergency preparedness effort currently underway should be to develop plans for training first aid teams to be responsible for specific areas throughout the site. The program should also provide for the standardization and maintenance of first–aid kits.

Finding MS.3-3: Physical exams are offered to new, continuing, and exiting employees on a voluntary basis. Exams for continuing employees are not occurring often enough to meet DOE standards.

Discussion: The Laboratory has filed for an exception to the guidelines set for employee examinations based on the insurance coverage offered to each employee. Also of note are the findings of recent medical studies indicating that annual examinations are not as cost effective as those given for cause.

Proposed Action: The Laboratory should continue with the exemption process.

MS.4 Review and Audit

Performance Objective: Policies, procedures, and practices for medical services should be reviewed and audited periodically to ensure continued effectiveness of the medical services.

Finding MS.4-1: The Laboratory has not regularly audited its Medical Program.

Discussion: PAMF is responsible for assuring that professional licenses are maintained and that services negotiated in the contract are being provided by qualified personnel. PAMF is in the process of developing a QA program.

Proposed Action: The Laboratory should include the Medical Program in its QA program.

MS.5 Personnel Communication Program

Performance Objective: Site/facility personnel should be adequately informed of the medical hazards that may be encountered and of the medical services that are available.

Finding MS.5-1: The Hazard Communication Training program is not fully implemented.

Discussion: Approximately 80–90% of the target Laboratory's employee population has undergone Hazard Communication training. However, the program will not be fully implemented until supervisors provide documentation showing that they have trained staff to be familiar with hazards specific to their areas.

Proposed Action: The program should be monitored to ensure timely implementation.

4
Management and Organization Assessment

I. Scope and Approach

The purpose of the management and organization (M&O) assessment was to evaluate the effectiveness of the Laboratory's organizational structure, policies, and procedures in implementing environment, safety, and health requirements and related DOE Orders. The topics covered were those on the draft DOE publication *Recommended Management Objectives and Criteria for Tiger Team Management Assessment*, dated June 14, 1990. All items in this document were taken into consideration, with the exception of *DOE Oversight*.

The M&O Committee consisted of two members of the SATF and a representative from each of the five divisions of the Laboratory. The Committee studied relevant Tiger Team material, as well as the self assessments of similar DOE laboratories. The Findings concerning SLAC and SSRL represent the collective judgement of the Committee members.

The committee has attempted to examine the M&O aspects of the Laboratory's operation from the viewpoint of a government inspection team focusing on performance in compliance with DOE regulations. The method was to convert selected statements in the document into questions and to distribute them to senior Laboratory managers. These managers were subsequently interviewed by members of the Committee. In addition, a multi-level questionnaire was used to conduct *vertical slice* interviews, beginning with hourly workers and tracking issues they raised through several management levels above them.

II. Summary and Key Findings

Summary

Two significant improvements in environment, safety, and health management were made in the Fall of 1990. First, the Director of the Laboratory in a memorandum dated September 20, 1990 announced the formation of the ES&HCC. By doing so, he initiated an organizational change for improved environment, safety, and health management. Second, the ES&H Division was established on November 27, 1990.

Although the strong emphasis on environment, safety, and health issues resulting from these organizational changes is relatively recent, much has been accomplished at the Laboratory in the last few months in improved communications, training, and elimination of hazards. The Laboratory has also begun to lay a foundation for the near term preparation of operating procedures, the establishment of routine self assessments and for other management tools leading to improved environment, safety, and health performance.

Nevertheless, in the strict sense of current performance against the DOE objectives being audited, a number of deficiencies were noted at the time of this assessment (May/June 1991). Related Findings are detailed in the remainder of this section. A summary is given below, with titles corresponding to the pertinent headings of the DOE document.

Commitment

There is a lack of clarity in Stanford University's environment, safety, and health policies with respect to oversight and the linkage to the Laboratory.

Organization

Awareness by some Laboratory managers of their detailed responsibility and accountability for environment, safety, and health matters is in transition. The present level of understanding within the Laboratory of environment, safety, and health goals, objectives, and procedures is improving, but was not satisfactory at the time of the survey.

Planning

Environment, safety, and health considerations are not given appropriate weight by Laboratory management in setting the operational priorities for the Laboratory.

Human Resources

Not all departments have plans for appropriate environment, safety, and health staff assignments. Environment, safety, and health training, although improving, has not been fully carried out.

Management Systems

QA programs and a document control system to address environment, safety, and health concerns are not as yet fully implemented on the site. The Laboratory does not have a comprehensive, ongoing self–assessment program. Managers have not always ensured that environmental, safety, and health deficiencies identified by external reviewers are communicated to the line organizations and that corrective action plans are developed and implemented expeditiously.

Public and Institutional Interactions

The Laboratory has not always ensured that managers and supervisors are aware of reporting procedures and that they are implemented.

Key Findings

From the above summaries, the following key findings are identified:

- Authority and responsibility for environment, safety, and health in the Laboratory has not, until recently, been adequately defined or understood.
- Staff training necessary to implement environment, safety, and health policies has been inadequate.
- Integration of environment, safety, and health issues into Laboratory management, planning, and related activities has only recently been undertaken and its results are not yet apparent.

III. Root Causes

Each Finding from both the Environmental, and the Safety and Health assessments (a total of 298 findings) was analyzed to determine one or more Causal Factors. The most prevalent Causal Factors are (in order of frequency):

1. Lack of written procedures to implement Laboratory policy, DOE requirements, and federal, state, and local laws.
2. Failure to implement or communicate written policies and procedures.
3. Inadequate personnel training for implementing policies and procedures.
4. Ineffective or insufficient appraisals, audits, and reviews, and/or inadequate follow up.

These Causal Factors, together with the Findings of the Management and Organization assessment, suggest the following root causes:

Causal Factors 1 and 3: Lack of written procedures to implement Laboratory policy, DOE requirements, and federal, state and local laws. Inadequate personnel training for implementing policies and procedures.

Root Cause 1: **DOE has not provided, and the Laboratory management has until recently not allocated, sufficient resources to develop and communicate environment, safety, and health procedures and provide comprehensive safety training to the Laboratory staff.**

Discussion: Success of the Laboratory's program has been measured by the quality of its research results. This will continue to be a principal goal of the Laboratory, but it must be coupled with increased attention to achievement of excellence in environment, safety, and health. The Laboratory and the DOE must accept the fact that increased emphasis on environment, safety, and health, without increased funding from DOE, will impact the research program.

More resources are now being devoted to complying with environment, safety, and health requirements for written procedures and putting in place a comprehensive safety training program. However, it will take time to catch up, so that many deficiencies in these areas have yet to be corrected. The Laboratory is in a transition period with regard to environment, safety, and health funding; only time will tell what level of funding will be necessary to meet the environment, safety, and health requirements once equilibrium has been reached.

Causal Factor 2: Failure to implement or communicate written policies and procedures.

Root Cause 2: **Senior management has not taken sufficiently seriously its responsibility for implementing the Laboratory's Environment, Safety, and Health Program.**

Discussion: Many senior managers have viewed safety as an activity which is secondary to research and accelerator operation. Consequently, the Laboratory's Safety Program has been carried out with an informality relative to that now required. Until recently, senior management has not instilled in the first line managers and supervisors a sense of urgency for implementing environment, safety, and health require-

ments, and has not held them accountable for compliance through oversight, performance appraisals, and job descriptions.

Managers at all levels are becoming aware of their environment, safety, and health responsibilities and are being trained on how to best carry them out. The Laboratory has now formed an ES&H Division that is providing advice and support in the areas of worker safety, emergency preparedness, training, environment protection, waste management, and radiation physics, as well as oversight in the areas of quality assurance and compliance. It is of course very important that, when resources are limited, there be a balance between enforcement of environment, safety, and health compliance and risk.

Causal Factor 4: Ineffective or insufficient appraisals, audits, and reviews, and/or inadequate follow up.

Root Cause 3: **The development of an ongoing self assessment program, reviews and audits of various programmatic elements, and the response to deficiencies uncovered by internal and external reviews have not been pursued vigorously enough by the Laboratory management.**

Discussion: Completion of the existing, yearly self assessment, called the Safety Self Audit, is essentially voluntary. There are no comprehensive guidelines or training for how to perform it. Not all Associate Directors have been intimately involved and have not held the Group Leaders accountable for reviewing the performance of their operations and the timely completion of the Safety Self Audit. Not all Groups ensure that the correction of findings and deficiencies is planned, implemented, and tracked.

Using the experience gained by the large number of staff who participated in this self assessment, the Laboratory must now develop a much more comprehensive self assessment program, give it a higher priority than in the past, and provide the resources necessary to correct findings and deficiencies in a timely manner.

IV. Findings, Discussions, Proposed Actions

The Findings, Discussions, and Proposed Actions in the remainder of this chapter are summaries of the detailed research performed to accomplish the assessment. The Findings are followed by a brief Discussion and include a Proposed Action to address the Finding. As this *Self Assessment Report* is being prepared, the Laboratory is planning the preparation of a detailed Corrective Action Plan to address the Tiger Team Findings. Preliminary work toward the development of the Corrective Action Plan is being undertaken based on the Laboratory's Findings, and implementation of corrective actions has already begun.

Commitment

CM.1 University Policy and Culture

Performance Objective: Corporate policy establishes a strong commitment to environment, safety, and health excellence, fosters a culture which reflects this commitment, and mandates full implementation of DOE's environment, safety, and health initiatives.

Background: The Board of Trustees of Stanford University is responsible for corporate environment, safety, and health policies, contract approval, and, through the President of the University, assurance that University policies support full implementation of the environment, safety, and health policies and contractual requirements.

The President has delegated to the Laboratory Director all environment, safety, and health responsibility for the site. For the purpose of environment, safety, and health, the separately–contracted SSRL operation is treated like a division of SLAC. This treatment is reflected in the SLAC/SSRL *Memorandum of Understanding*. However, the autonomy afforded SLAC and SSRL to conduct their operations with minimal oversight furnished by the University has not provided the mechanism to assure the University that DOE's environment, safety, and health requirements and initiatives are being implemented.

The University is initiating a process to assure that its priorities promote a culture that clearly reflects the University's commitment to environment, safety, and health. Goals and objectives related to environment, safety, and health implementation are presently being clarified.

Finding CM.1-1: The University has not provided oversight for SLAC's environment, safety, and health performance.

Discussion: On September 21, 1988, the Stanford University President issued a *Statement of Principles for Environmental Health and Safety Management and Quality Assurance* and a *Charge to the University Committee on Health and Safety.* The *Statement* and the *Charge* are contained in the University's *Research Policy Handbook*. The *Handbook* also describes the fact that SLAC is subject to environment, safety, and health contractual obligations to the DOE that may differ from the University's ordinary requirements. (By virtue of the SLAC/SSRL *Memorandum of Understanding*, this statement includes SSRL as well.) The University, however, has not provided oversight for SLAC environment, safety, and health performance.

One of the specific charges to the University Committee on Health and Safety is to exercise oversight over all health and safety programs at Stanford, including those of SLAC. The Laboratory's ES&H Division Associate Director has recently become a voting member of the University Committee on Health and Safety., whose members are appointed by the University President.

Proposed Action: The University should clarify and formalize its environment, safety, and health oversight of the Laboratory.

CM.2 Contractual Commitment

Performance Objective: The corporation accepts contractual terms and conditions that articulate a strong commitment to full implementation of DOE's environment, safety, and health initiatives.

Finding CM.2-1: The SLAC and SSRL contracts do not have environmental clauses.

Discussion: Both the Stanford University's (SLAC and SSRL) contracts with DOE include safety and health clauses. The clauses are silent with respect to environmental concerns. However, not only do the organizations interpret the existing clauses to incorporate environmental concerns, they also follow federal and state environmental laws.

Proposed Action: When the DOE/Stanford contracts for SLAC and SSRL are extended, the necessary addition of an environmental clause should be reviewed.

Organization*

OR.1 Structure

Performance Objective: The organizational structure provides a clear understanding of the functions, responsibilities, authorities, and accountabilities of the site organization.

Background: The responsibility and authority for complying with environment, safety, and health regulations and standards at the Laboratory flows from the Director of SLAC through the Associate Directors of SLAC and the Director of SSRL and the line–management organization to the first–line managers. This puts environment, safety, and health concerns in the foreground with other operational concerns, and places the authority into the hands of the managers on the scene, where the interplay between the two kinds of concerns can best be understood. It also establishes a clear line of responsibility and authority.

The ES&H Division has been created to support the Laboratory's management, and to carry out audits and inspections to assess compliance. In cases where compliance is lacking, the Associate Director for ES&H takes action directly with fellow Associate Directors, through the ES&HCC or otherwise, to achieve compliance. The ES&HCC consists of the Deputy and Associate Directors of SLAC and the Deputy Director of SSRL. The role of the ES&HCC is to facilitate the environment, safety, and health program at the directorial level, and to consider and recommend environment, safety, and health policy.

Finding OR.1-1: Most employee job descriptions do not define the employee's responsibilities in environment, safety, and health. (See also Finding OA.6-1 and Finding PP.2-2 in Chapter 3, "Safety and Health Assessment.")

Discussion: The Laboratory policy, that all line supervisors are responsible for safety, is not present in all job descriptions. Many employees either do not have job descriptions or they are out of date. Few employees have job descriptions which include environment, safety, and health responsibilities.

There is an effort currently underway to update all job descriptions and to address and define environment, safety, and health responsibilities. All divisions either have already, or are in the process of updating organization charts, so as to identify those individuals with environment, safety, and health responsibilities within their organizations. It is particularly important that the individuals so identified have accurate and up–to–date job descriptions.

Proposed Action: Job descriptions should be formalized for all line managers and employees with specific mention of environment, safety, and health responsibilities.

* Additional issues/discussion in this area are contained in Chapter 3, "Safety and Health Assessment."

Finding OR.1-2: The relationship between the Laboratory divisions' line management and the ES&H Division staff are not always clearly defined or well understood.

Discussion: Some SLAC managers are under the impression that environment, safety, and health issues are the responsibility of the ES&H Division. This, however, is changing as the interfaces between the line organization and the ES&H Division improves. Some divisions report that a close relationship exists, that the interface is well understood, and that there are few problems. This should apply to all divisions.

All divisions, departments, and groups are identifying individuals to be responsible for bringing environment, safety, and health matters to the attention of line managers for appropriate action. These individuals will develop the interface and functional relationships between the ES&H staff and the staff in their area.

Proposed Action: Steps should be taken to ensure that the relationship between the ES&H Division and the other divisions is defined and understood by all.

Finding OR.1-3: The independence and authority of staff which monitors environment, safety, and health compliance is insufficient or undefined in some departments.

Discussion: At this time, people with environment, safety, and health monitoring and verification responsibilities in all departments are being educated to recognize that they have the authority and independence to elevate unresolved issues. However, the authority of these people varies with each department and is not well documented. All divisions are aware of this problem and are working on clarifications.

Proposed Action: Upper management should continue the process of identifying and training environment, safety, and health monitoring staff while vesting them with appropriate authority.

Finding OR.1-4: The degree of responsibility and authority, and the allocation of resources for environment, safety, and health matters is not understood by all departments.

Discussion: The Director has made it clear that environment, safety, and health planning and implementation is the responsibility of line managers. Consequently, managers understand their responsibility. The problem, however, is that some managers have difficulty recognizing the necessity for reallocating existing resources to meet environment, safety, and health requirements.

Proposed Action: This issue of line–manager authority, responsibility, and resources to deal with environment, safety, and health requirements when they are in conflict with scientific objectives must be adequately discussed and decisions rendered and implemented.

Finding OR.1-5: There is no formal program to require and check environment, safety, and health compliance by subcontractors. (See also Finding OA.1-4 in Chapter 3, "Safety and Health Assessment.")

Discussion: Subcontracts and Purchase Orders contain specific provisions related to environment, safety, and health, but, the mechanics of monitoring subcontractor compliance are not well communicated to responsible Laboratory employees. Some employees do not understand their responsibilities or are not properly trained to provide oversight of subcontractors. All Subcontracts and Purchase Orders designate either a University Representative, a Technical Representative, or the requestor as being responsible for overseeing the work being performed by these subcontractors.

Proposed Action: The Laboratory should design and implement a program to monitor subcontractors' environment, safety, and health compliance.

OR.2 Site Management

Performance Objective: The site managers and supervisors carry out the site mission in full compliance with DOE's environment, safety, and health initiatives.

Background: See the discussion in Finding OR.1-4 of this section. "Full" compliance may require resources not available to site managers and supervisors. On the other hand, a balanced approach, with both environment, safety, and health, and scientific needs taken into account, may fully serve environment, safety, and health objectives without compromising the Laboratory's scientific mission.

Finding OR.2-1: Not all managers and supervisors ensure that site-specific environment, safety, and health policies, goals, objectives, procedures, and tasks are implemented and communicated to all levels of the Laboratory staff and users. (See also Finding EM.3 in Chapter 2, "Environmental Assessment.")

Discussion: While the new approach to environment, safety, and health initiatives has been communicated to managers and supervisors, there is still evidence that these initiatives are not being adequately implemented and communicated to and understood by all levels of staff. In many instances, the information has been communicated, but there is little, if any, documentation to that effect.

At the Associate Director level, the importance of environment, safety, and health issues are communicated in meetings with Group Leaders and Department Heads. At mid-management levels, the importance of the new environment, safety, and health culture, although acknowledged, has less enthusiastic support, while working level support is very apparent. Part of mid-management's lack of enthusiasm can be attributed to the requirements for extensive documentation without the commensurate resources to implement these requirements.

Proposed Action: Steps should be taken by managers and supervisors for broad dissemination of environment, safety, and health policies, goals, objectives, procedures, and tasks.

Planning

PL.1 Integrated Planning

Performance Objective: Environment, safety, and health plans and programs are an integral part of the site–wide planning and budgeting process.

Background: The Laboratory has a very strong ability to respond quickly when immediate actions are required. All environment, safety, and health expenses, with the exception of those activities funded under ERWM, are paid by the Office of High Energy Physics for SLAC and the Office of Basic Energy Sciences for SSRL. As environment, safety, and health responsibilities have become more clearly defined and structured by the DOE requirement to have specific ERWM funding, the Laboratory's ability to respond rapidly to immediate environment, safety, and health needs has been seriously diminished.

Finding PL.1-1: Existing site–wide plans do not fully address environment, safety, and health and research requirements on an integrated and prioritized basis.

Discussion: Even though the Laboratory has been addressing some specific environment safety, and health problems throughout the budget process, in general, there is no systematic site–wide plan to address all programmatic and environment, safety, and health activities on an integrated or prioritized basis. Consequently, allocation of resources or trade–off decisions are difficult for line managers.

Proposed Action: The Laboratory should develop a plan that includes the budgeting process and addresses both programmatic and environment, safety, and health activities. Procedures should be developed to analyze the environment, safety, and health risks and vulnerabilities on a laboratory–wide prioritized basis.

Human Resource Management

HR.1 Human Resource Planning

Performance Objective: The human resource requirements for full implementation of site–wide environment, safety, and health programs are identified and prioritized, and plans are developed to ensure that these resource requirements are met.

Background: Senior management of the Laboratory is sensitized to the DOE requirement for more human resources for full implementation of site–wide environment, safety, and health programs and planning. A separate ES&H Division was established as a means to better address environment, safety, and health issues on a laboratory–wide basis. As a result, the Laboratory as a whole and the ES&H Division in particular have been addressing the human resources requirement. Active recruitment of needed personnel is ongoing. SLAC's general recruitment program is competitive with other prospective employers in the area. The total number of environment, safety, and health staff is expected to reach 76 by the end of 1991, an increase from 26 FTE's in the predecessor organization (ESO).

Finding HR.1-1: Not all groups and projects have a plan for identifying environment, safety, and health staffing needs.

Discussion: A review of various activities in the Laboratory indicates that although most groups and projects have plans for identifying environment, safety, and health staffing needs, this is not universally the case.

Proposed Action: Management should assure that each department, group, and project identify their environment, safety, and health resource needs and develop plans to fill those needs.

HR.2 Staff Development, Training, and Certification

Performance Objective: Formal site–wide programs for staff development, training, and certification ensure that only fully qualified personnel are assigned to environment, safety, and health programs.

Background: One of the major objectives of the *SLAC Environment, Safety, and Health Manual*, when completed, will be to formulate site–wide environment, safety, and health programs for staff development, training, and certification to ensure that qualified personnel are assigned to environment, safety, and health programs. Included in the *SLAC Environment, Safety, and Health Manual* will be the line management responsibility for the training of their employees.

Finding HR.2-1: Staff training at the Laboratory is incomplete. (See also Finding TC.1-1 in Chapter 3, "Safety and Health Assessment.")

Discussion: In the past, there had been no integrated training program or training records system by either the individual divisions or the Laboratory Personnel Office. One of the first tasks undertaken by the new ES&H Division was to implement a laboratory–wide process to determine the environment, safety, and health training needs of all Laboratory personnel. The ES&H Division has already completed a Job Task/Hazard Survey for every employee at the Laboratory. The results of the survey have been entered in a centralized database that is being used to identify individual training needs. The courses that have been conducted by the ES&H Division have been both standardized and formalized with appropriate testing, certification, and documentation of attendees. The Laboratory has taken the initial steps towards developing comprehensive, site–wide training programs, to meet mandatory environment, safety, and health training and certification requirement. However, it should be noted that this program is only in its initial stages.

Proposed Action: The Laboratory should continue the recently initiated systematic approach of analyzing and defining environment, safety, and health training requirements. The ES&H Division should continue to be the focal point for standardized and formalized training that crosses divisional lines.

Management Systems

MG.1 Compliance Management

Performance Objective: A system is in place to translate laws, regulations, DOE orders, and other DOE requirements into site–specific operating procedures and assures that all site activities are conducted in a fully compliant manner.

Background: The Associate Director of the Business Services Division receives DOE orders and requirements and acts appropriately depending on their nature. The Stanford/SLAC legal staff reviews the *Federal Register* and other legal reports on a regular basis and brings important changes in laws and regulations to the attention of the SLAC Directorate for appropriate action.

Finding MG.1-1: A QA program, formal document control system, and a formal records management system, is not yet fully implemented throughout the site for environment, safety, and health activities. (See also subsection OA.7 in Chapter 3, "Safety and Health Assessment.")

Discussion: A formal QA program is being implemented at SLAC; however, it is not being used universally. A document control system is under development.

Proposed Action: The QA program should be fully implemented for all major facilities and projects. A formal document control and records management system should be implemented for environment, safety, and health activities.

Finding MG.1-2: A formal corrective action program for environment, safety, and health activities, which incorporates trend analysis, UORs and a compliance status system, is not regularly used on a site–wide basis.

Discussion: A formal corrective action program is now under development.

Proposed Action: The Laboratory should complete the corrective action program.Training in trend analysis and root cause analysis should be started and used to support environment, safety, and health plans.

MG.2 Self Assessment

Performance Objective: Managers and supervisors are directly and actively engaged in assessing the performance of their operations and are constantly striving to identify areas for improvement.

Finding MG.2-1: The Laboratory's self–assessment method for environment, safety, and health activities is inadequate.

Discussion: The Laboratory has used a simple self–assessment questionnaire in recent past years. It was filled out department–by–department by the appropriate personnel. However, those personnel had not been trained in many of the underlying compliance standards which are needed to accurately complete the questionnaire.

SLAC/SSRL conducted their first internal independent assessment on environment, safety, and health in preparation for the Tiger Team visit, but there is no plan for regular assessments.

Proposed Action: The Laboratory should establish an institutionalized Self–Assessment Program that meets the Secretary of Energy's guidelines and ensures its implementation throughout.

MG.3 Internal Independent Assessment

Performance Objective: Internal independent assessments are conducted on a formal and regular basis by personnel who have no vested interest in the results of the assessments.

Finding MG.3-1: There is, at the present time, no plan for regular independent internal assessment for environment, safety, and health activities at the Laboratory.

Discussion: There has been no internal independent assessment on environmental matters due to lack of trained staff (an external staff was used).

Proposed Action: The Quality Assurance and Compliance Department, which has a direct line to the Laboratory's Director, should prepare a program for internal independent assessment of environment, safety, and health activities.

MG.4 External Assessment

Performance Objective: Managers and supervisors encourage and support environment, safety, and health assessments performed by external parties, and ensure timely and effective follow up by the cognizant line or support organization.

Finding MG.4-1: Managers and supervisors have not always ensured that environment, safety, and health deficiencies identified by external reviewers are communicated to the responsible line or support organizations, that corrective action plans are developed and implemented in an expeditious manner, and that these action plans are formally included in a performance tracking system.

Discussion: In the past, advice of external reviews has not always been integrated into laboratory action and/or policy. However, understanding of line responsibility for environment, safety, and health, and compliance with DOE orders is improving.

Proposed Action: The Laboratory should review external assessments, set policies and priorities appropriately, and ensure that the managers and supervisors implement the actions required.

MG.5 Performance Measurement System

Performance Objective: A performance measurement system is used by managers and supervisors to plan, budget, authorize, monitor, and control environment, safety, and health activities on a day–to–day basis.

Finding MG.5-1: Performance against environment, safety, and health plans is not always monitored and reported.

Discussion: Many environment, safety, and health activities at the Laboratory are controlled on an informal basis, rather than on a formal basis involving baselines and milestones. Correction of this problem will require resources and education. Changes are already taking place. For OSHA–type deficiencies, a system has been established.

Proposed Action: The Laboratory should monitor performance against environment, safety, and health plans, and provide regular reports on appropriate topics to involved staff.

Public and Institutional Interactions

PI.2 Regulatory

Performance Objective: Managers, supervisors, and staff cooperate fully and openly with federal, state, and local regulatory agencies to facilitate compliance with environment, safety, and health laws and regulations.

Finding PI.2-1: The Laboratory has not always followed the existing procedures for reporting to regulatory agencies and potentially affected parties contamination discovery.

Discussion: Regulators are provided full access to Laboratory environment, safety, and health operations and records. In general, timely and accurate information is provided to regulatory agencies. On one occasion, SLAC failed to report PCB contamination to regulatory agencies in a timely manner after the DOE Environmental Team discovered the contamination. The Laboratory has site–specific policy for Occurrence Reporting, but, not all supervisors and department heads are aware of its existence.

Proposed Action: The Laboratory should ensure that all managers and supervisors are aware of reporting procedures and that they are implemented.

A
Site Inspection

The Tiger Team self assessment began with an inspection of all Laboratory facilities and buildings and was carried out during a three–week period in February/March 1991. The inspection covered every building, utility pad, and storage area at the Laboratory, about two million square feet of indoor space. It was conducted by 24 teams of 3-4 Laboratory personnel each, accompanied by the building manager of the particular building/area being inspected. Prior to the walk-throughs, the 95 inspectors and 85 building managers received one day of OSHA training and a half–day briefing on the details of the process. As part of the training, team leaders were taken on separate tours by consultants from Lawrence Livermore Laboratory and IFC Kaiser Engineers. During the entire three–week period, there were 2–3 consultants per day available to accompany teams to selected buildings. At the end of each day, a session with the team leaders and consultants was held. These turned out to be very useful sessions where inspectors could share their experiences, ask questions of the consultants, and discuss technicalities of the procedure for recording data.

Prior to the actual inspection tours, each inspector received a package of material consisting of a checklist (Attachment 1) to serve as a reminder of what to look for in nine problem areas, supplemental guidelines for seismic and electrical deficiencies (Attachment 2), and definitions of the four Hazard Levels (Attachment 3). A set of orange tags which were to be used for marking the location of Hazard Level One or Two deficiencies, and forms to be used for recording data were also provided.

There was always a Self–Assessment Task Force member on–call, so that if a Hazard Level one deficiency was seen, it could be dealt with immediately. That occurred twice during the assessment; both deficiencies involved exposed wiring and were immediately reduced in severity with barriers.

Many of the Hazard Level Two citations were checked by the consultants in the field before being entered into the database. The consultants also read through about 75% of the forms to verify that problems which were described as Hazard Level Two were properly categorized. Figure 1 shows a histogram of the deficiencies versus Hazard Level. Figure 2 gives a histogram of the number of deficiencies versus problem type. A total of 10,476 deficiencies found, with 2 Hazard Level One, and 511 Hazard Level Two deficiencies being reported.

Table 1 lists the number of deficiencies and frequency of occurrence of problem types for all Hazard Levels as well as for Hazard Levels One and Two only. Electrical problems accounted for 42% of all deficiencies and 47% of Hazard Level One and Two deficiencies.

The deficiencies have been sorted by building and by department and given to the appropriate Building Manager and Department Head for corrective action response. A typical page from the Self Assessment database is provided as Attachment 4. All Hazard Level Two deficiencies have either been corrected or are scheduled to be corrected as soon as possible. On separate Corrective Action Forms, the Building Manager or responsible Department Head have either recorded the status of each deficiency as corrected, or have provided an estimate of cost and schedule for correcting the deficiency. The corrective action status for the self assessment is monitored by management reports that provide information on the number of responses and completion of deficiencies as a function of building, department, division, and Hazard Level and problem type.

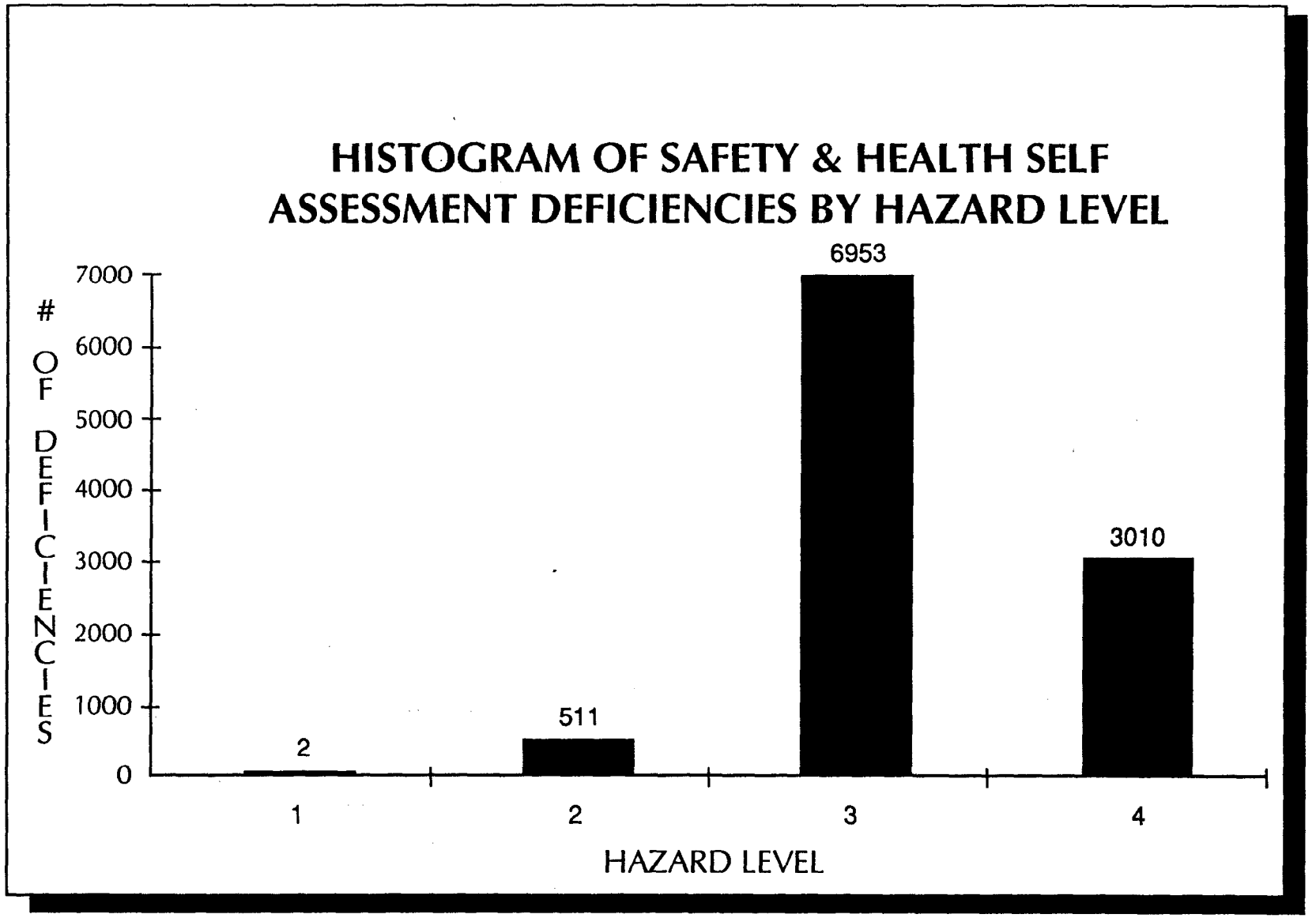
HISTOGRAM OF SAFETY & HEALTH SELF ASSESSMENT DEFICIENCIES BY HAZARD LEVEL
OF DEFICIENCIES
7000
6000
5000
4000
3000
2000
1000
0
2
511
6953
3010
1
2
3
4
HAZARD LEVEL

Figure 1

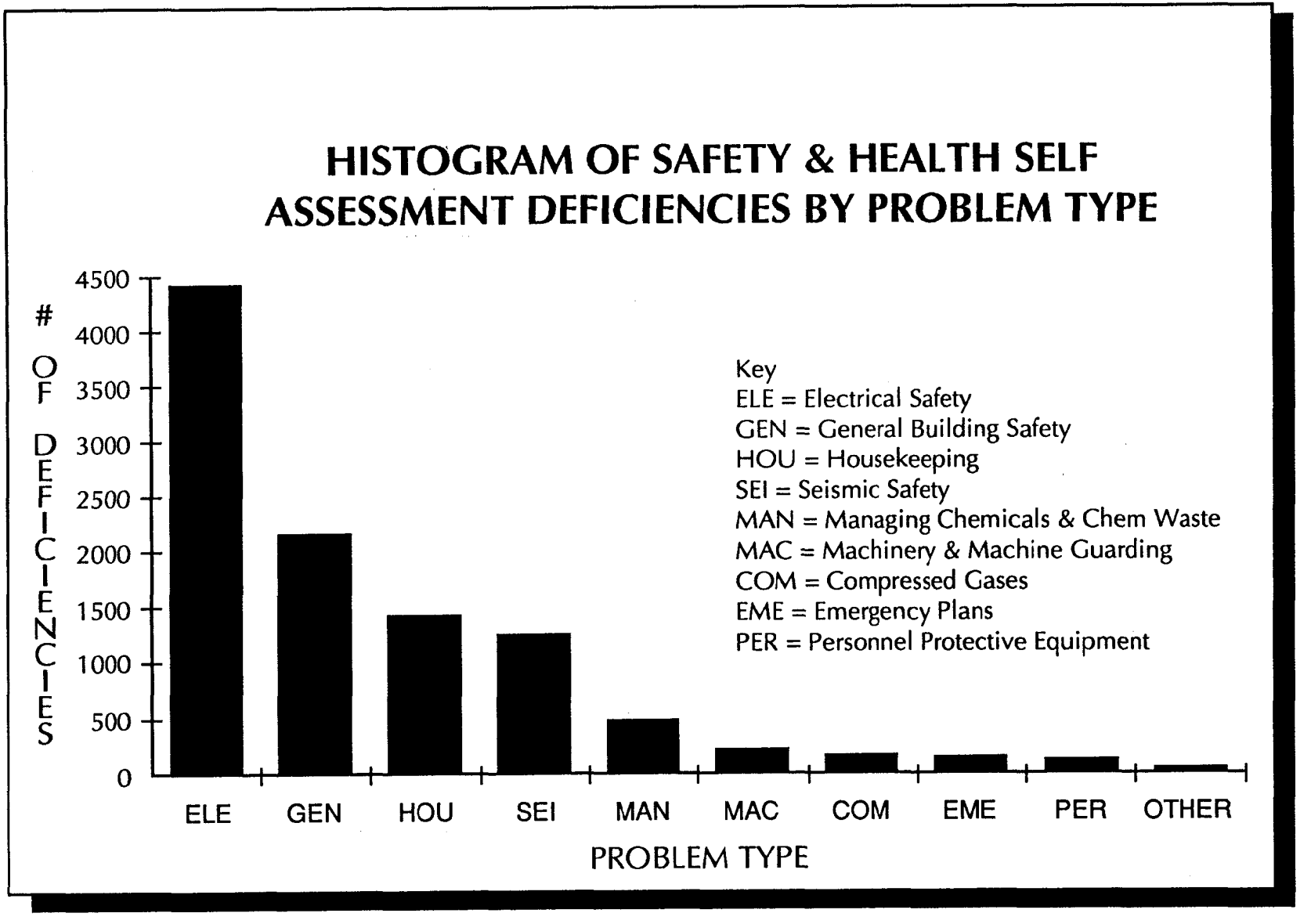
HISTOGRAM OF SAFETY & HEALTH SELF ASSESSMENT DEFICIENCIES BY PROBLEM TYPE
OF DEFICIENCIES
4500
4000
3500
3000
2500
2000
1500
1000
500
0
ELE
GEN
HOU
SEI
MAN
MAC
COM
EME
PER
OTHER
PROBLEM TYPE
Key
ELE = Electrical Safety
GEN = General Building Safety
HOU = Housekeeping
SEI = Seismic Safety
MAN = Managing Chemicals & Chem Waste
MAC = Machinery & Machine Guarding
COM = Compressed Gases
EME = Emergency Plans
PER = Personnel Protective Equipment

Figure 2

Table 1

SUMMARY TABLE OF SAFETY AND HEALTH SELF ASSESSMENT DEFICIENCIES BY PROBLEM TYPE

PROBLEM TYPE	NUMBER OF DEFICIENCIES (ALL HAZARD LEVELS)	PERCENTAGE OF DEFICIENCIES (ALL HAZARD LEVELS)	NUMBER OF DEFICIENCIES (HAZARD LEVELS 1&2 ONLY)	PERCENTAGE OF DEFICIENCIES (HAZARD LEVELS 1&2 ONLY)
ELECTRICAL SAFETY	4437	42.4%	242	47.4%
GENERAL BUILDING SAFETY	2168	20.7	109	21.3
HOUSEKEEPING	1432	13.7	17	3.3
SEISMIC SAFTY	1254	12.0	23	4.5
MANAGING CHEMICALS & CHEM WASTE	487	4.6	49	9.6
MACHINERY & MACHINE GUARDING	223	2.1	36	7.0
COMPRESSED GASES	165	1.6	9	1.8
EMERGENCY PLANS	137	1.3	4	0.8
PERSONNEL PROTECTIVE EQUIPMENT	128	1.2	19	3.7
OTHER	45	0.4	3	0.6
TOTAL	**10,476**	**100.0**	**511**	**100.0**

Attachment 1

SLAC SELF-ASSESSMENT CHECK LIST GUIDELINES

REV 2/6/91

SLAC SELF ASSESSMENT

ENVIRONMENT AND SAFETY CHECKLIST GUIDELINES

TABLE OF CONTENTS

A. HOUSEKEEPING

	Everything in Order?	
1. Fire Inspection Report findings all corrected?	Y	N
2. Orderly and clean appearance of work area.	Y	N
3. Floors clean and dry (no oil, grease, or wet spots).	Y	N
4. No trip hazards.	Y	N
5. No sharp protruding objects.	Y	N
6. Furniture in good repair.	Y	N
7. Aisles, passageways clear (not blocked) and in good repair.	Y	N
8. Raised areas (platforms) which are used for storage identified as to load limit. Loads within limits.	Y	N
9. No food or beverages in laboratory and shop refrigerators or cabinets used for chemical storage.	Y	N
10. Refrigerators properly labeled when used for food or beverage storage	Y	N
11. Separate storage and disposal containers for rags, glass, paper, and hazardous materials.	Y	N
12. Unused equipment maintained in a safe, orderly manner or sent to storage/salvage.	Y	N
13. Sufficient illumination of work areas.	Y	N
14. When materials are stored, are they securely stacked to prevent tipping.	Y	N
15. No piles of papers or computer output under tables	Y	N

B. SEISMIC SAFETY

	Everything in Order?	
1. Clothes lockers, file cabinets, cabinets, and bookshelf units in path of egress or near people, secured against tipping and falling during an earthquake (bolted to wall/floor).	Y	N
2. No excessive piles of books/paper/equipment to fall off high shelves and onto desk or path of egress.	Y	N
3. No heavy objects (>10 pounds) above 5 feet unless secured.	Y	N
4. Chemicals and/or hazardous materials stored in closed cabinets with working latches to prevent spills.	Y	N
5. Suspended ceilings inside buildings supported by angled wiring. Light fixtures independently supported (not just sitting on frame).	Y	N
6. Trailers and portable buildings secured to foundations with lateral bracing (to prevent sliding).	Y	N
7. Free-standing electronic racks bolted to concrete floor (not just to computer floor).	Y	N
8. Large equipment--large copy machines not on rollers, machine shop equipment, large lab equipment--bolted to floor or table top.	Y	N
9. Cable trays and piping supported at regular intervals with lateral bracing to prevent swinging.	Y	N
10. Heavy equipment and storage vessels--air conditioners, tube trailers, storage tanks, equipment trailers--mounted to foundations with anchors or seismic isolators (springs or rubber pads). Note, cast iron vibration isolators are not acceptable seismic isolators.	Y	N
11. Tall shielding blocks in inhabited areas secured to floor to prevent sliding and tipping.	Y	N
12. Detectors and other large experimental equipment in habitated IR's secured to concrete floor or steel floor plates to prevent sliding and tipping.	Y	N

C. ELECTRICAL SAFETY

	Everything in Order?	
0. Electrical Safety Inspection Report findings all corrected?	Y	N
1. Proper use of power extension cords.		
A. Not used in place of permanent wiring.	Y	N
B. Not run through walls, ceilings, doors.	Y	N
C. Equipped with proper cord plugs.	Y	N
D. Do not create a trip hazard.	Y	N
E. Three conductor cables are used.	Y	N
F. No damaged and taped cords.	Y	N
G. Not daisy-chained	Y	N
2. Hand-held power tools are provided with double insulation or electrical grounds?	Y	N
3. Plugs, cords, (no frayed cords) and receptacles properly installed and in good condition. Must have cover plates on receptacles.	Y	N
4. Electrical equipment grounded or provided with barriers/shields.	Y	N
5. No broken or removed grounding pins on 3-wire cord plugs.	Y	N
6. Exposed terminals guarded adequately.	Y	N
7. Unobstructed access to control switches, circuit breakers, electrical panels and emergency (3 feet clear zone). No potential obstructions after earthquake.	Y	N
8. Ground fault interrupters (GFI) in wet/damp areas and in receptacles within 6 feet of sinks, including fume hood sinks.	Y	N
9. Disconnect devices (switches, breakers, etc.) identified as to their use.	Y	N
10. Do all boxes, raceways, fittings, etc. have protective covers installed?	Y	N
11. Power cabinets and breakers properly labeled.	Y	N

C. ELECTRICAL SAFETY

	Everything in Order?	
12. Electrical equipment provided suitable for the workplace environment. Proper electrical classification for wet or explosive areas, etc.	Y	N
13. Electrical cords/wires protected from damage.	Y	N
14. Permanently located machinery hard wired and provided with disconnecting means.	Y	N
15. High voltage control panels and doors closed and interlocked.	Y	N
16. High Voltage Warning signs at enclosure doors and removable panels as required. (Voltage greater than 600 volts)	Y	N
17. Grounding points are clearly identified inside enclosures.	Y	N
18. For High Energy (high voltage) equipment grounding hooks are available and fully visible.	Y	N
19. Oil-filled transformers provided with a secondary containment in the event of an oil leak.	Y	N
20. No portable metal ladders near electrical equipment, or used for electrical work.	Y	N
21. Lock out tabs on circuit breakers; unused circuit breakers locked-out and tagged and openings properly protected.	Y	N
22. Office wiring sufficient to meet the needs of the office.	Y	N
23. Cable trays properly grounded? not overfilled?	Y	N

D. MANAGING CHEMICALS AND WASTE

	Everything in Order?	
1. Is there a designated waste storage area	Y	N
2. Appropriate disposal cans available for the disposal of waste.	Y	N
3. Waste containers properly labeled.	Y	N
4. Satellite waste start date less than 1 year old?	Y	N
5. Waste retention tank inspected daily/weekly and record kept.	Y	N
6. Waste containers kept closed except when wastes are being added.	Y	N
7. Flammable solvents stored in appropriate cabinets. Protection against spills in an earthquake.	Y	N
8. Organics, acids, and bases stored apart.	Y	N
9. Chemicals properly labeled.	Y	N
10. All bottles, vials, flasks, etc. appropriately labeled. (contents, date)	Y	N
11. Hazardous liquids, such as solvents, stored where they cannot spill into drains. Protection against spilling during an earthquake.	Y	N
12. Secondary containment provided for chemicals & chem waste.	Y	N
13. Spill containment materials readily available for simple or small spills.	Y	N
14. Are there records of inspection for all of the above.	Y	N
15. Are applicable hazard signs posted.	Y	N
16. Are chemical handling and compatibility charts posted.	Y	N
17. Are eye wash & deluge shower required for this area and are they operational?	Y	N
18. MSDS's available for any hazardous substances present?	Y	N

E. EMERGENCY PLANS

	Everything in Order?	
1. Is the "Evacuation Assembly Area" map in place for the building?	Y	N
2. Are emergency numbers posted at nearest phone.	Y	N

F. PERSONNEL PROTECTIVE EQUIPMENT

	Everything in Order?	
1. Safety glasses being worn when required.	Y	N
2. Appropriate protective clothing and apparatus available and in use. (lab coats, face shields, respirators, gloves)	Y	N
3. Safety glasses available for visitors if eye hazards exist.	Y	N
4. Requirement for hard hats are being followed.	Y	N
5. Safety shoes worn in required areas.	Y	N
6. Radiation badges carried as required by workers	Y	N
7. Signs indicating safety glasses, hard hats, and hearing protection requirements are posted where needed.	Y	N
8. Is noise protection provided when sound levels exceed standard?	Y	N

G. GENERAL/BUILDING SAFETY

	Everything in Order?	
1. Are laser work areas properly labelled with the hazard classification and safety measures enforced?	Y	N
2. Are appropriate warning signs posted in areas where lasers are used.	Y	N
3. Are radiation working zones properly posted?	Y	N
4. Are ES & H survey inspection tags posted on microwave ovens?	Y	N
5. Are radiation areas posted and survey tags present and properly dated.	Y	N
6. Are suitable hoods available for the work to remove dust and fumes?	Y	N
7. Is the hood inspection sticker current?	Y	N
8. Does the work area smell like it is adequately ventilated?	Y	N
9. Is the hood approved for its use?	Y	N
10. Are appropriate fire extinguishers located in areas where combustible liquids are stored and/or used?	Y	N
11. Is the inspection of the fire extinguisher current?	Y	N
12. Are "NO SMOKING" signs posted and enforced as needed? (By battery charging areas.)	Y	N
13. Are flammables and their vapors kept from ignition sources, such as electric motors?	Y	N
14. Are sprinkler heads present and unobstructed?	Y	N
15. Are roadways, walks leading to facility clean and clear of debris. Appearance of building adequate.	Y	N
16. Building and trailer identification numbers posted on exterior for emergency response.	Y	N
17. Emergency response kits available and maintained.	Y	N

G. GENERAL/BUILDING SAFETY

	Everything in Order?	
18. Emergency egress routes posted. Use of "EXIT" signs.	Y	N
19. Doors that could be mistaken as an exit marked "NOT AN EXIT"?	Y	N
20. Is the exit sign to the outside of the building lighted?	Y	N
21. Emergency shut down procedures posted.	Y	N
22. Hazard warning, directional and information signs and tags used where there are immediate dangers, potential hazards, or need for general instructions.	Y	N
23. Use of signs and tags consistent throughout facility.	Y	N
24. Proper use of tags affixed to all defective equipment not secured against use.	Y	N
25. Do doors swing to accommodate exit traffic.	Y	N
26. Floor holes and openings guarded.	Y	N
27. Stairways in good repair.	Y	N
28. Do stairways with more than 4 risers have a rail?	Y	N
29. Portable ladders in good repair.	Y	N
30. Scaffolds in good condition.	Y	N
31. Elevated platforms and working areas over 4 feet have standard rails and toe boards.	Y	N
32. Emergency lighting installed and in good working condition.	Y	N
33. Doors, walls, etc. maintained. Proper operation of closers, Fire doors labeled and not blocked open, no holes in walls.	Y	N
34. Posting of the name of the ES & H person to contact is current and readily visible.	Y	N

H. MACHINERY AND MACHINE GUARDING

	Everything in Order?	
1. Do the provided safeguards keep employee's hands, arms, and body parts from contacting dangerous moving parts?	Y	N
2. Safeguards are firmly secured and not easily removable.	Y	N
3. Equipment can be serviced without removing safeguards.	Y	N
4. Is there a lockout procedure for the machinery before the safeguards are removed and the system serviced?	Y	N
5. Are belts and chain drive guarded?	Y	N
6. Employees know how to utilize the safeguards, and operate machines without bypassing or readjusting these safeguards.	Y	N
7. Machines are equipped with emergency OFF buttons.	Y	N
8. Are your hoist chains/ropes/slings free of kinks and twists?	Y	N
9 Is the rated load of each hoist or crane legibly marked and visible to the operator?	Y	N
10 Are hoists, lifts, and crane inspections performed and records available?	Y	N
11 Are lifting fixtures inspected periodically?	Y	N

I. COMPRESSED GASES

	Everything in Order?	
1. Do compressed gas cylinders present a safe appearance? (Appropriate pressure relief device, manifold.)	Y	N
2. Is the use of compressed gas cylinders appropriate and safe when the design of the system is considered?	Y	N
3. Are gas cylinders tied down securely? (Double chain attached to non-movable object.)	Y	N
4. Are cylinder caps in place when cylinder is not in use?	Y	N
5. Are compressed gas cylinders stored away from stairs, elevators, and egress routes as well as heat sources?	Y	N
6. Are compressed gas cylinders stored vertically?	Y	N
7. Are compressed gas cylinders clearly identified as to contents?	Y	N
8. Are compressed gas cylinders tagged: full, empty or in use	Y	N

Attachment 2

Seismic Safety Guidelines

Earthquake Safety Committee
7 Feb 91

The goal of the seismic safety program at SLAC is to help prepare the lab for a large earthquake, thereby protecting life, minimizing injury, and maintaining the basic mission of the lab in the event of such an earthquake. To this end, the Earthquake Safety Committee performs seismic safety inspections to identify and rectify the detailed safety problems relating to seismicity at SLAC. However, for this self-assessment tour, you will be itemizing these seismic hazards. This provides basic guidelines for accomplishing the task.

During your tour, it is important to continually re-focus on the fundamental goal of seismic safety and the tour: safety and health. After a major earthquake, SLAC will be a mess. Our goal is not so much to minimize the post-quake mess as to minimize the hazards. For instance, falling books could clutter the floor. This is a mess. However, if they fall and block a doorway or hallway, this is a hazard.

Basic Criteria

We are readying the lab for a large earthquake on the peninsula section of the San Andreas fault. This earthquake could be a magnitude 7 -8 on the Richter scale, and last up to 60 seconds, with numerous large aftershocks. At its peak, it could produce lateral ground accelerations of up to.75 times gravity. Thus, everything at SLAC should be able to withstand this amount of movement. By comparison, during the Loma Prieta earthquake of October, 1989, SLAC experienced a maximum ground acceleration of.28 g. So just because something survived in 1989 does not mean it is seismically safe.

During the tour, use the following criteria to determine seismic safety--or the lack thereof. The standard method of mitigating a hazard is to brace, bolt, or otherwise secure it to the floor or wall. If such mounting exists, you need to determine if it is sufficient, and if not, write it up.

What Needs To Be Checked For Seismic Safety?

- All permanent structures, equipment and furnishings.
- All temporary structures, or equipment under construction or in transition, which are in place for more than 6 weeks.
- Any room or building which is inhabited or frequented on a daily basis. Non-occupied areas must be checked if they contain a hazard which could spread, like gas from a stored chemical.

What To Look For: Direct Threats to Personnel Safety

- Anything which could fall on someone.
- Anything which could block a path of egress if dislodged or knocked down.

What To Look For: Indirect Threats to Personnel Safety

- Anything with a failure mode which could produce indirect threats to safety, like release of toxic or asphyxiating gas, or rupture of a vessel.
- Any equipment or structure containing, holding, storing, or using a hazardous material, compressed gas, or radioactive material.
- Anything which could obstruct or disable fire protection equipment, or electrical or gas shut-offs

Typical Examples

Earthquake Safety Committee
7 Feb 91

Here is a list of hazards that the Earthquake Safety Committee typically finds, and standard methods by which the hazard can be mitigated. This should cover 95% of hazards you find during the tour. Questions about other hazards can be addressed to the Earthquake Safety Committee.

Office and Lab Contents

Type	Hazard	Method of Mitigation
File cabinets	•Could fall and block egress •Top-heavy files fall easily	•Bolt to wall, floor, or each other •Trap by other furniture •Latches should work
Storage cabinets	•Could fall and block egress	•Bolt to wall, floor, or each other •Trap by other furniture •Latches should work
Shelf units	•Could fall and block egress •Low units on desks pose risk of falling	•Bolt to wall or floor •Bolt to desk
Wall shelves (wood shelves with brackets	•Restrained books may pull down entire shelf at once •High shelves over desk pose danger •Heavy equipment on shelves	•Leave books to fall free •Shelves not stacked to ceiling •Keep heavy objects (>10 lbs) off high shelves
Workbenches	•Equipment on shelves above bench	•Bolt benches to floor and shelves to benches •Restrain equipment on shelves
Computers, copiers	•Look for secondary electrical hazards	•Quake-grip Velcro holds equipment in place

Industrial and Electronic Equipment

Type	Hazard	Method of Mitigation
Electronic Racks	•Narrow, high, and heavy racks can easily tip over •Secondary electrical hazard	•Mount to floor, wall or ceiling •Connect to other racks for added stability
Large copy machines, blueprint machines	•Big machines, often on wheels, can tip or block hallways •Secondary chemical hazard (ammonia in blueprint machine)	•Block wheels or corral machine •Bolt to floor •Use Quake-grip Velcro
Machine shop equipment	•Heavy equipment can fall or walk, and trap people	•Mount to concrete floor or foundation
Air conditioners	•Heavy equipment on roof can fall off or through roof	•Secure to roof •Use seismic isolators or brackets (vibration isolators not sufficient)
Cable trays	•Long runs of full trays can swing and fall, or rear out cables	•Laterally brace trays at regular intervals •Leave slack in entering cables

Industrial and Electronic Equipment

Type	Hazard	Method of Mitigation
Piping, heavy conduit	•Long, unsupported runs of pipe can swing and break or fall •Short runs coming out of bldg. and into ground can break	•Laterally brace pipe at regular intervals •Put in a flexible section to allow "give" when building sways
Glass bottles, six packs, storage vessels	•Falling bottles can explode •Moving vessels can rupture pipes	•Restrain to building or foundation •Use flexible piping near tanks

Civil Structures

Type	Hazard	Method of Mitigation
Buildings	•Structural damage	•Check with Plant Engineering (P.E.) that bldg. was checked by them
Portables buildings and trailers	•Can fall off its base or foundation •Sliding can break power, gas lines	•Mount building to foundation or brace to support pad•Check with P.E.
Suspended ceiling	•Raining ceiling panels •Falling/swinging light fixtures	•Angled restraint wires above ceiling (look for it) •Separate restraint wires for fixtures
Shielding blocks and walls	Blocks can slide or tip over	•Secure to foundation or each other •Check with P.E.

Engineered Equipment

Type	Hazard	Method of Mitigation
Magnets and heavy beamline equipment	•Motion can destroy device, or vacuum system, causing extensive and costly damage	•Mount device securely to girder •Check strength of girder supports •Check with Mechanical Engineering (M.E.)
Near-beamline equipment	•Shaking can batter beamline equipment	•Leave plenty of room for differential motion •Check with M.E>
Pressure vessels, large storage tanks	•Ruptured vessel or piping may cause secondary hazards	•Check with M.E. or MESI, that vessel is approved
Detectors	•Large detectors can walk, endangering nearby people •Umbilicals can break, causing secondary hazards	•Secure detector to foundation •Check with P.E. and M.E. regarding analysis

Additional Items for Electrical Safety Inspections from DOE/ev-0051/1

	Everything in Order	
1. Adequate lighting around electrical equipment.	Y	N
2. Automatic emergency lighting provided in areas where electrical hazards may be encountered.	Y	N
3. Adequate ventilation in area where electrical fault may produce noxious fumes and where high voltage may produce ozone.	Y	N
4. Identify hazardous ar3as and the nature of the hazard with warning sign, flashing lights or audible alarms.	Y	N
5. Metal cabinets & enclosures are grounded.	Y	N
6, Safety grounding hooks provided for hazardous electrical equipment with: (1) Bare, flexible conductor #2AWG or larger. (2) Conductor securely fastened to connector and ground. (3) Bare conductor clearly visible through insulating sheath.	Y	N
7. Grounding strips on unused capacitors.	Y	N
8. Emergency shut–down switches clearly marked and readily accessible.	Y	N
9. Main power disconnect capable of being padlocked in the disconnect position.	Y	N
10. Circuit breakers labeled as to the loads they control and loads labeled as to circuit breakers.	Y	N
11. Temporary physical barriers and warning signs are provided when hazardous electrical equipment is being serviced.	Y	N
12. Persons working on electrical equipment must not wear metallic key chains, wrist–bands or rings or use metal flashlights.	Y	N
13. Written procedures should exist for all electrical repairs and servicing of hazardous electrical equipment.	Y	N
14. Safety glasses should be worn when servicing hazardous electrical equipment.	Y	N
15. In experimental locations where cables are run across the floor (highly undesirable) suitable protection is provided.	Y	N
16. Protective covers and labels exist for high voltage (e.g., 115 V) terminals inside cabinets when these terminals would be normally energized when the covers are removable.	Y	N

SM509

Attachment 3

SLAC SELF ASSESSMENT HAZARD LEVEL GUIDELINES

HAZARD LEVEL	ACTION REQUIRED	SAFETY & HEALTH	ENVIRONMENT
1	IMMEDIATE SHUTDOWN OR ELIMINATION OF THE HAZARD; OR IMMEDIATE REDUCTION OF THE HAZARD TO A LEVEL 3 OR LOWER.	THERE IS AN IMMINENT DANGER OF IMMEDIATE DEATH OR SERIOUS PHYSICAL HARM. THERE IS A DANGER OF DEATH OR SERIOUS PHYSICAL HARM BEFORE THE DANGER CAN BE ELIMINATED THROUGH NORMAL PROCEDURES. THERE IS A REASONABLE EXPECTATION THAT EXPOSURE TO DANGEROUS FUMES, DUSTS OR GASES WILL CAUSE IMMEDIATE AND IRREVERSIBLE HARM SUCH AS SHORTENED LIFE OR A REDUCTION IN PHYSICAL OR MENTAL ABILITY.	THERE IS A CLEAR AND PRESENT DANGER OF CONTAMINATION OF THE ON-SITE OR OFF-SITE ENVIRONMENT WHICH WOULD BE HAZARDOUS TO WORKERS OR THE PUBLIC.
2	ELIMINATION OR REDUCTION OF THE HAZARD TO A LEVEL 3 OR LOWER SHOULD NOT BE DELAYED UNTIL PREPARATION OF THE FORMAL REPORT.	HAS A POTENTIAL FOR CAUSING MINOR INJURY, MINOR OCCUPATIONAL ILLNESS, OR MAJOR PROPERTY DAMAGE. HAS A POTENTIAL FOR RESULTING IN, OR CONTRIBUTING TO UNNECESSARY EXPOSURE TO RADIATION OR TOXIC SUBSTANCES.	THERE IS THE POTENTIAL FOR CONTAMINATION OF THE ON-SITE OR OFF-SITE ENVIRONMENT WHICH WOULD BE HAZARDOUS TO WORKERS OR THE PUBLIC.
3	A PLAN FOR ACTION WILL BE DEVELOPED AS NECESSARY, AFTER ISSUANCE OF THE FORMAL REPORT.	SIGNIFICANT NONCOMPLIANCE WITH DOE ORDERS, BUILDING CODES, FIRE CODES, OSHA REGULATIONS; OR THE NEED TO IMPROVE THE MARGIN OF SAFETY, BUT THE DEFICIENCIES HAVE LITTLE POTENTIAL FOR THREATENING SAFETY, HEALTH, OR PROPERTY.	SIGNIFICANT NONCOMPLIANCE WITH ENVIRONMENTAL LAW, BUT THE DEFICIENCIES HAVE LITTLE POTENTIAL FOR THREATENING THE ENVIRONMENT.
4	A PLAN FOR ACTION MAY BE DEVELOPED AS NECESSARY AFTER ISSUANCE OF THE FINAL REPORT.	NON COMPLIANCE WITH GOOD PRACTICE AS DERIVED FROM EXPERIENCE BUT NOT BASED ON A NATIONAL CONSENSUS STANDARDS.	NON COMPLIANCE WITH GOOD PRACTICE AS DERIVED FROM EXPERIENCE BUT NOT BASED ON A NATIONAL CONSENSUS STANDARDS.

SLAC SELF ASSESSMENT - Report by Division, Dept, Bldg, Problem Type

Entered By	Team Leader	ID No (Unit-Team-Record)	Tag No	Inspec No	Eval Needed	Hazard Level	Target Date	Actual Date	Assign to	Verified?	Verifier	Comments	Bldg No.	Room	Outside	Location	Est Cost	Division - Dept/Group	Appr. Date	Appr. Type	Prob. Type	Assigned Dept	Prob. Descrip:	Correction:	Status:
MILLER K	Donaldson T	1-8-214	798	24		3	/ /	07/25/91		N			25	115			.1	TD . 07 Mechanical Fabrications	02/21/91	SLAC Self Assessment	Electrical Safety		Plating shop 115A; cord pulling loose from plug.	Cords removed.	C
MILLER K	Donaldson T	1-8-225	838	22		2	/ /	06/01/91		N			25	115A				TD . 07 Mechanical Fabrications	02/21/91	SLAC Self Assessment	Electrical Safety		Failure to apply lock and tag procedure to breaker within a 480vac breaker panel PP5G, used a masking tape label.	Proper procedures followed.	C
MILLER K	Donaldson T	1-8-226	835	22		2	/ /	06/01/91		N			25	115A			.2	TD . 07 Mechanical Fabrications	02/21/91	SLAC Self Assessment	Electrical Safety		High current power supply (1000 amps) has an exposed polarity reversal switch.	Completed modification by SLAC electricians.	C
MILLER K	Donaldson T	1-8-227	836	22		2	/ /	06/01/91		N			25	115A			.3	TD . 07 Mechanical Fabrications	02/21/91	SLAC Self Assessment	Electrical Safety		Anodizing process tank uses a 100 volt -- 300 amp power supply with inadequate insulation on the output bus bars, and exposed metallic terminals. PC #17219.	Covers installed.	C
MILLER K	Donaldson T	1-8-228	837	22		2	/ /	06/01/91		N			25	115A				TD . 07 Mechanical Fabrications	02/21/91	SLAC Self Assessment	Electrical Safety		Power supply output leads for PC #17219 should be signed, indicating volts and currently to inform users of hazard.	Safety signs installed.	C
MILLER K	Donaldson T	1-8-237	0	23		4	/ /	06/01/91		N			25				.6	TD . 07 Mechanical Fabrications	02/21/91	SLAC Self Assessment	Electrical Safety		Plating shop; sand blaster #18830 and PC #17200 need permanent electrical wiring.	Permanent wiring installed.	C
MILLER K	Donaldson T	1-8-240	802	23		3	/ /	06/11/91		N			25	115A				TD . 07 Mechanical Fabrications	02/21/91	SLAC Self Assessment	Electrical Safety		Plating shop; floor fan has bad power cord and improper strain relief on an extension cord.	Fan removed and salvaged.	C

Attachment 4

08/30/91 10:50:45
Page 1

[Report: divldpbtL]

B
Acronyms and Abbreviations

A

ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
AROD	Accelerator Research and Operations Division

B

BAAQMD	Bay Area Air Quality Management District
BSD	Business Services Division

C

CARD	Computing and Administrative Resources Division
CATER	Computer–aided Trouble Entry and Reporting
CEH	Collider Experimental Hall
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CWA	Clean Water Act

D

DEPOT	Database for Electronic Parts and Other Things
DOE	Department of Energy
DOELAP	Department of Energy Laboratory Accreditation Program
DOT	Department of Transportation

E

EFD	Experimental Facilities Department
EOC	Emergency Operations Center
EP&WM	Environmental Protection and Waste Management
EPA	Environmental Protection Agency
EPIP	Emergency Plan Implementing Procedures
ERWM	Environment Restoration and Waste Management
ES&HCC	Environment, Safety, and Health Coordinating Council
ESO	Environmental Safety Office
EXAFS	Extended X–ray Absorption–edge Fine Structure

F

FFTB	Final Focus Test Beam
FIFRA	Federal Insecticide Fungicide and Rodenticide Act
FTE	Full Time Employee

H

HEEC	Hazardous Experimental Equipment Committee

I

IH	Industrial Hygiene
IR	Interaction Regions

L

LBL	Lawrence Berkeley Laboratory
LEP	Large Electron–Positron
LLNL	Lawrence Livermore National Laboratory

M

MCC	Main Control Center,
MESI	Mechanical Engineering Safety Inspection
MSDS	Material Safety Data Sheets

N

NDE	Non-destructive examination
NEC	National Electrical Code
NESHAP	National Emission Standards for Hazardous Air Pollutants
NPDES	National Pollution Discharge Elimination System
NRC	Nuclear Regulatory Commission

O

OR	Occurrence Reports
OSHA	Occupational Safety and Health Administration

P

P&T	Packaging and Transportation

PAMF	Palo Alto Medical Foundation
PCB	Polychlorinated biphenyl
PE	Plant Engineering
PEP	Positron–Electron Project
PROD	Photon Research and Operations Division

Q

QA	Quality Assurance

R

R&D	Research and Development
RCRA	Resource Conservation and Recovery Act
RCRA	Resource Conservations and Recovery Act
RWQCB	Regional Water Quality Control Board

S

SAA	Satellite Accumulation Area
SAD	Safety Analysis Document
SAIC	Science Applications International Corporation
SAR	Safety Analysis Review
SARA	Superfund Amendments Reauthorization Act
SATF	Self–Assessment Task Force
SBSA	South Bayside Systems Authority
SHS	Safety and Health Self Assessment
SLC	Stanford Linear Collider
SLD	Stanford Large Detector,
SPCC	Spill Prevention Control and Countermeasures
SPEAR	Stanford Positron Electron Accelerator Ring
SSRL	Stanford Synchrotron Radiation Laboratory

T

TAC	Toxic Air Contaminant
TLD	Thermo–luminescent Dosimeter
TSCA	Toxic Substance Control Act
TSD	Treatment, Storage, and Disposal

U

UOR	Unusual Occurrence Report
USW	United Stanford Workers

W

WAA	Waste Accumulation Area