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BERKELEY NATIONAL LABORATORY**

**ENVIRONMENT, SAFETY & HEALTH  
SELF-ASSESSMENT REPORT  
FISCAL YEAR 2001**

**Environment, Health and Safety Division  
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## Executive Summary

Berkeley Lab successfully implemented Integrated Safety Management (ISM) at the institutional and divisional levels before the FY01 performance year. For this reason, Berkeley Lab's Self-Assessment Program focused on sustaining ISM during the FY01 performance year. The Laboratory uses a four-tiered approach to assess the efficacy of sustaining ISM, both institutionally and in the divisions. The four types of assessments are Division Self-Assessments, Safety Review Committee (SRC) Management of Environment, Safety, and Health (MESH) reviews, Integrated Functional Appraisals (IFAs), and Berkeley Lab's contract with the Department of Energy (Contract 98, Appendix F). These assessments offer different perspectives at various working levels. The Division Self-Assessments, MESH reviews, and Appendix F contract ES& Self-Assessment outcome measures are aligned with the five core functions and seven guiding principles of ISM. The IFAs concentrate on division controls of medium- and high-hazard facilities and operations.

The results of the Division Self-Assessments, the SRC MESH reviews, and the IFAs indicate that the institution is effectively sustaining ISM. Full implementation and effectiveness of ISM is evident for all divisions again this year. This is the fourth year that the Division Self-Assessment is aligned along the functions and principles of ISM. Berkeley Lab's divisions continued to improve their performance from the previous year. A clear pattern has been established that shows gradual improvement each year in performance metrics for each of the five core functions of ISM. This year, in particular, division performance in the "Perform Work" indicators is approaching the level of excellence attained previously in the performance indicators for the other core functions of ISM. A comparison of this year's Division Self-Assessment performance with performance in the previous three years of ISM oriented self-assessment is displayed in the table below.

<b>Division ES&amp;H Self-Assessment Performance Rating</b>				
<b>ISM-Based Performance Criteria</b>	<b>FY98 Performance Rating</b>	<b>FY99 Performance Rating</b>	<b>FY00 Performance Rating</b>	<b>FY01 Performance Rating</b>
1. Define the scope of work	91.7%	97.4%	99.5%	<b>99.5%</b>
2. Identify and analyze hazards	95.8%	97.0%	100%	<b>100%</b>
3. Control the hazards	91.0%	99.0%	100%	<b>99.3%</b>
4. Perform the work	82.8%	87.3%	91.9%	<b>95.2%</b>
5. Feedback and improvements	89.9%	94.8%	98.4%	<b>96.9%</b>
Overall Performance Rating	90.2%	93.5%	96.5%	<b>97.3%</b>

Division accomplishments from this year's Division Self-Assessments, MESH reviews, and IFAs include:

- **Proactive self-assessment activities.** The divisions have well-established self-assessment programs that incorporate senior management, line management, and staff participation in ES&H workspace walkthroughs. Many divisions assemble teams to inspect all divisional locations. Most divisions are effectively documenting and tracking deficiencies in the institutional corrective actions database.
- **Ergonomics.** Identified as an opportunity for improvement in the FY00 ES&H Self-Assessment report, divisions used great ingenuity to curb ergonomic hazards. Ergonomics-related training increased significantly this year, with several divisions requiring staff to take ergonomic awareness training. Many divisions aggressively conducted ergonomic workstation evaluations. Divisions also used various methods of communicating ergonomic concerns, including holding meetings focused on ergonomic hazards, distributing literature, and conducting surveys. Divisions also provided shop, labor, and technical workers with ergonomic tools.
- **Effective ES&H communication.** Divisions have developed methods of effectively communicating ES&H issues with staff. All divisions have active safety committees. In many divisions, group and all-hands meetings include safety on the agenda. In numerous divisions, safety is discussed at senior management meetings. Division newsletters frequently discuss ES&H topics, and many divisions have ES&H Web sites.
- **Senior management support.** In previous years' reports, line management support has been identified as a common division accomplishment. While that remains true this year, it is clear that senior management support is integral in promoting line-management involvement. Division directors and deputies participate in walkthroughs of staff workspaces and in division safety committee meetings. Safety is discussed at senior management meetings in many divisions. Senior management also demonstrates commitment to safety via all-hands meetings and e-mail to all staff. ES&H is also incorporated into employee performance reviews in all divisions.

The assessments of the FY01 Self-Assessment Program also noted deficiencies that should be addressed institutionally. The institutional opportunities for improvement are:

- **Chemical Inventory.** There is still a need to develop a less labor-intensive and more valuable information system for users. EH&S staff have been using students to update the chemical inventory database. The chemical inventory for the entire institution was updated during the self-assessment year. However, this service doesn't provide a database that remains current or allows for readily retrievable information by researchers or other chemical owners. EH&S is in the process of employing a more interactive system. Small improvements, such as creating a Web-based system, have been made, but a more significant overhaul is required. Additional funding is needed to achieve this goal. The chemical inventory has been identified as an institutional opportunity for improvement in previous annual Self-Assessment Reports.
- **Matrixed Employees Policy.** The ES&H roles and responsibilities for the Laboratory's matrixed employees are poorly defined by management and not clearly conveyed to staff. Host and home divisions are unsure of ES&H responsibilities with regard to matrixed employees. Safety roles and lines of communication for matrixed personnel are not well understood by supervisors or staff. The Laboratory should create a formal policy for ES&H of matrixed employees.

## Introduction

Berkeley Lab's environment, safety, and health (ES&H) Self-Assessment Program is a tool for ensuring that the tenets of Integrated Safety Management are implemented institutionally and by all divisions. The Self-Assessment Program performed by Berkeley Lab's Office of Assessment and Assurance (OAA) is an internal evaluation of all ES&H programs and systems at Berkeley Lab. The functions of the program are to ensure that work is conducted safely with minimal negative impact to workers, the public, and the environment. The program is composed of four distinct assessments: Division Self-Assessments, Integrated Functional Appraisals (IFAs), Management of ES&H (MESH) reviews, and Appendix F Self-Assessments.

The Division Self-Assessment uses the five core functions and seven guiding principles of ISM as the basis of evaluation. Performance indicators are selected as a measure of division performance in addressing the core functions and guiding principles, as well as promoting compliance with applicable regulatory requirements. Performance indicators are developed by consensus with OAA, division representatives, and EH&S Division program managers. The Division Self-Assessment is performed annually by line management of all divisions. The focus of the review is workplace safety.

The Integrated Functional Appraisal is an in-depth ES&H technical review of division work activities and operations. The focus of the IFA is on higher-hazard work, particularly work requiring formal authorizations. The assessment concentrates on adequacy of authorizations, effective control of hazards, balance of operation and safety priorities, and applicability of institutional standards and regulatory requirements. Another function of the IFA is to update the Hazards, Equipment, Authorizations, and Review (HEAR) database. The IFA is conducted by EH&S Division technical experts. Each division receives an IFA once every three years.

The MESH review is an evaluation of division management of environment, safety, and health in its research and operations, focusing on implementation and effectiveness of the division's ISM plan. It is a peer review performed by members of the Berkeley Lab's Safety Review Committee (SRC), with staff support from OAA. The SRC includes representation from each research and operation division at the Lab. Each division receives a MESH review on a triennial basis.

Information obtained from the Division Self-Assessment, IFAs, and MESH reviews address performance requirements in the Appendix F Self-Assessment. The Division Self-Assessment performance criteria, in particular, are closely aligned with the performance objectives, criteria, and measurements (POCMs) of Appendix F. The Appendix F POCMs are based on the core functions and guiding principles of ISM. Additional information required for Appendix F is provided by EH&S Division functional managers. The Appendix F Report is prepared quarterly, with an annual report submitted at the close of the fiscal year. This assessment is the primary mechanism for evaluating the Laboratory's contract performance for ISM.

## Division Self-Assessment

### Performance Rating

Rating the division ES&H performance is based on a color-coded system of determining whether each performance criterion and expectation is fully met, partially met, or marginally met. Points are assigned for the three performance gradients, and a percent performance is calculated for each performance indicator and for overall division performance. A green rating, which means division performance is excellent to outstanding for an expectation, is worth three points. A division is assigned two points for a yellow rating, which means it is partially meeting performance requirements for the metric. A red rating, which is worth one point, communicates that a division's performance is marginal for a performance indicator. Finally, a gray rating denotes that a performance metric is not applicable to the division. Rating determinations for each performance metric are detailed in Appendix B.

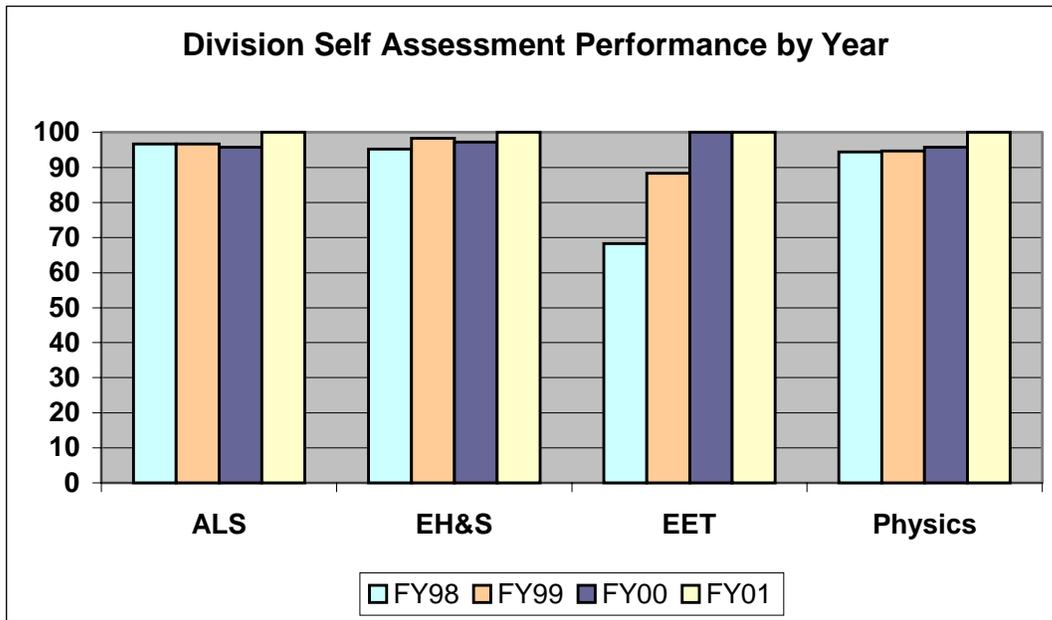
### Overall Performance Results

The divisions have demonstrated improved performance for the FY01 ES&H self-assessment performance year compared to last year. Since the performance metrics have been based on the ISM core functions and guiding principles, divisions have consistently improved performance from one year to the next. This trend has existed since the FY98 self-assessment performance year.

For the last two self-assessment periods (FY99 and FY00), divisions performed very well in the metrics under the "Define Work," "Identify Hazards," "Control Hazards," and "Feedback and Improvement" core functions. Performance in metrics under the "Perform Work" core function, however, lagged compared to the other performance metrics. Perhaps because of past success in the other core functions, performance in the "Perform Work" metrics improved significantly this year, from an average score of 91.9% in FY00 to an average score of 95.2% in FY01. In FY01, the level of excellence demonstrated in the other core functions is also achieved in the "Perform Work" core function.

Four divisions received outstanding ratings for each performance criterion in the FY01 Self-Assessment Report. The Advanced Light Source (ALS); Environment, Health and Safety (EH&S); Environmental Energy Technologies (EETD); and Physics Divisions all received perfect scores in this year's report. All four divisions have notable practices that strengthen their ES&H programs.

Figure 1 shows the overall performance ratings for these divisions for the past four review periods.



**Figure 1.** Overall performance ratings for four divisions for the past four review periods.

The ALS has a very mature and robust safety program, as evidenced by consistently high scores in the ES&H self-assessment reports. ALS stresses communication and integration of ES&H into all work planning. The Division Director sends an annual safety policy reminder to all staff, and the division safety committee meets monthly. QUEST teams, which include all division personnel, meet at least once a year to discuss workplace inspection findings and related safety concerns. The activities of the QUEST teams are an integral component of the ALS self-assessment program. QUEST teams inspect all division workspaces annually and note findings in the LSAD database. Over 200 entries were tracked in the database during the FY01 performance year, and approximately 97% of the deficiencies were corrected or on schedule for resolution. The ALS has dedicated accounts for safety and ergonomics that fund mitigation of inspection findings.

EH&S has excellent communication and line-management involvement in their ES&H program. Safety activities were discussed at the division all-hands meeting. The division safety committee meets monthly, communicates activities to all groups in the division, and makes ES&H recommendations to senior management. Safety is also a standing agenda item at all group meetings in the division. Line managers have an important part in the division's safety program. Group leaders discuss safety at group meetings and one-on-one meetings with staff. Line managers inspect their staff workspaces annually. Senior management also inspects all division workspaces during the year. The division has formed an accident review board that includes senior and line management membership. The Deputy Division Director chairs the division safety committee. The Division Director approved of the aforementioned recommendations from the safety committee and communicated expectations to group leaders.

EETD has a model ES&H program and, for the second consecutive year, received outstanding ratings for each performance criterion. The division has a very effective system of hazard review and a model ergonomics program. A project safety review process is in place to ensure that hazards are assessed at least annually. Division facilities are required to complete either a Hazard Assessment Guide table or the HEAR client input form. These forms are completed during each project's annual renewal and when

new projects originate. The division safety coordinator visits all workspaces during the year, ensuring that the project safety review process has accounted for all hazards. In addition, principal investigators perform numerous inspections of their workspaces during the year. Noting that half of all division staff injuries in the last six years were ergonomics-related, EETD formed an ergonomics committee. From this committee, an action plan was designed to address the division's ergonomic hazards. As a result, ergonomic awareness training is required for all staff, workstation evaluations have increased, and educational materials have been distributed.

Physics has shown constant improvement in self-assessment performance as the division continues to refine the ES&H program. Physics has a very thorough hazard review system that allows for senior management involvement. The Project Safety Review Questionnaire is used to document hazard reviews for all work in the division. This form is completed for each project annually. The division safety committee, which includes senior management, reviews all new and revised questionnaires. In this way, senior management is aware of all hazards encountered in the division's work. The division safety committee and group leaders also perform physical inspections of all workspace annually.

### **Performance Results by Criteria and Expectation**

The divisions use the FY01 Self-Assessment Performance Criteria and expectations to evaluate their ES&H programs and systems. Divisions report the results of these evaluations in the self-assessment reports. These reports are reviewed by OAA and the content is validated in meetings with division representatives. The results of the reports and validation activities are summarized below, grouped by ISM core function. Noteworthy practices and opportunities for improvement for each division are provided in Appendix C.

Throughout the following discussion, the following abbreviations are used for certain Berkeley Lab divisions: AFRD (Accelerator and Fusion Research Division); ALS (Advanced Light Source); CSD (Chemical Sciences Division); EETD (Environmental Energy Technologies Division); EHS (Environment, Health and Safety Division); ESD (Earth Sciences Division); LSD (Life Sciences Division); MSD (Materials Sciences Division); NSD (Nuclear Sciences Division); PBD (Physical Biosciences Division); and PGF (Production Genomics Facility).

**Criterion 1: Define the Scope of Work**  
**Performance Rating: 99.5 %**

#### **Criteria**

Divisions demonstrate that ES&H is integrated into work and activities. Line management is responsible for protection of staff, the public, and the environment. Lines of authority and responsibility for ES&H are clearly established and maintained at all organizational levels. Resources are allocated to effectively balance programmatic and ES&H considerations.

#### **Division Performance**

All the divisions have robust systems for communicating ES&H issues and concerns to all staff. All divisions have active safety committees, and several divisions (AFRD, ALS, NSD, PBD, Facilities) have multiple safety committees. Along with division safety committees, divisions communicate to employees through various means. Many divisions (ESD, EHS, EETD, Facilities, NSD, Physics, PGF) had ES&H

all-hands meetings or included ES&H as part of their division all-hands meetings. The division directors of AFRD and ALS sent an annual e-mail to all staff describing their ES&H responsibilities. Some divisions (Computing Sciences, Engineering, EETD, Facilities) have newsletters that include safety communications.

Line management continues to play an important and active role in implementation of the divisions' safety programs. Line-management involvement in ES&H has increased over the last few years. In most divisions, line managers, including principal investigators, department heads, and group leads, discuss safety in staff meetings. This is an excellent way of providing a forum for all workers to discuss ES&H issues. In several divisions (Directorate, EHS, MSD, NSD, PGF), the division deputy is part of the division safety committee. In many divisions, the division director includes safety in senior management meetings.

In all divisions, staff is held responsible for ES&H in performance reviews. Divisions also employ numerous mechanisms to ensure that participating guests are aware of their ES&H responsibilities. Institutionally, all participating guests receive an ISM brochure when they first arrive at the Laboratory. All divisions take advantage of this program, but several provide additional means of ensuring that guests are aware of ES&H. Several divisions (ALS, EHS, EETD, LSD, MSD, NSD, Physics) require guests to complete a Job Hazards Questionnaire (JHQ) and required training. Chemical Sciences and Materials Sciences require all principal investigators (PIs) to certify that staff, including participating guests, is accountable for ES&H. Some divisions (ESD, PBD, Computing Sciences, PGF) provide notification, either written or electronic, of ES&H requirements to all participating guests.

All divisions reviewed and updated their ISM plans during the performance year. A few divisions (PGF, Engineering, Computing Sciences, ALS) have distinct accounts to provide funding for ES&H issues or self-assessment activities. EETD provided money for laboratory chemical cleanouts. Three divisions (NSD, Physics, Directorate) hired additional personnel to enhance their ES&H programs.

**Criterion 2: Identify and Analyze Hazards**  
**Performance Rating: 100 %**

### **Criteria**

Line management evaluates work to identify hazards and establish authorizations for performing work safely. Line management systematically evaluates hazards to mitigate risks posed by work in their area.

### **Division Performance**

All divisions have inventoried hazards inherent in their workspaces and operations. All formal authorizations were reviewed during the performance year. Most divisions use the HEAR database to document hazards for self-authorized work and to identify formal authorizations. Many divisions also document assurance by line management that hazards for self-authorized work are controlled. This is an effective way of ensuring that hazards are both inventoried and effectively controlled. In several divisions (CSD, ALS, LSD, MSD, ESD, EETD), PIs certify that annual hazard reviews were performed. In Computing Sciences, group leaders and department heads perform semiannual reviews of workspaces and staff activities for hazards. Other divisions (Physics, ALS, NSD, Facilities) certify reviews by project or experiment. Due to the high number of activity hazard documents (AHDs) (approximately 30), Materials Sciences has an AHD database that tracks reviews and updates of formal authorizations.

Divisions are reminded that hazard reviews involve inventorying hazards, and assurance or certification that hazards are controlled. All divisions effectively inventory hazards, mainly through the use of the HEAR database. However, some divisions do not document assurance that hazards are controlled. Many divisions acknowledge line management responsibility through the use of space and project review questionnaires, or safety assurance statements. In the future the HEAR database will include certifications of hazard control.

All divisions that use chemicals have updated the chemical inventory database in the past year. Most divisions used EH&S personnel to complete this task. EETD principal investigators completed online updates of their chemical inventory. Physical Biosciences uses a bar-code system to perform internal updates of their chemical inventory.

Management of the chemical inventory database continues to be an institutional opportunity for improvement. Berkeley Lab is developing an institutional online database with bar-coding capabilities that will reduce the labor presently involved in keeping the database current.

**Criterion 3: Control the Hazards**  
**Performance Rating: 99.3 %**

**Criteria**

Laboratory divisions ensure that engineering and administrative controls are in place to mitigate the identified hazards. Certification of engineering controls and safety instrumentation is current. Emergency contact information is appropriate. Ergonomic issues are effectively addressed.

**Division Performance**

All divisions verified that their engineering controls are effective and currently certified. Divisions rely on an institutional program to check all hoods, glove boxes, safety cabinets, and required monitors. This program is implemented by the EH&S Division. Divisions are aware, however, that their line management is responsible for ensuring that engineering controls are operating properly, and include review of engineering controls in walkthroughs and other self-assessment activities.

All divisions have current and accurate emergency contact information posted at areas that require these notifications, as identified in the institutional Chemical Hygiene and Safety Plan. Most divisions post this information at the entrances to labs and shops. The Production Genomics Facility posts emergency contact information in a highly visible, centrally located area, as this is the most effective means of communicating this information at the facility.

Ergonomics was identified in last year's self-assessment report as an institutional opportunity for improvement. In response to this, many divisions have aggressively addressed ergonomic issues in their areas, using various ingenious means. Several divisions (LSD, Facilities, EETD, EHS, Computing Sciences, PBD) concentrated on emphasizing widespread ergonomic evaluations and workstation upgrades. Three divisions (EETD, Computing Sciences, EHS) required ergonomic awareness training for all staff. Chemical Sciences required ergonomic awareness training for all employees that work, on average, more than four hours a day at a computer. PGF and Physics emphasized integrating ergonomic improvements into work processes, including lab work. PGF also sent an ergonomic survey to all staff soliciting information on workstation design and comfort, as well as training and evaluation requests. Physics had an all-hands meeting to present an ergonomic awareness program specifically designed for

division staff and work hazards. Facilities supplied ergonomically friendly tools to staff. EETD formed an ergonomic awareness committee. The Directorate hired a new safety coordinator to address ergonomic hazards in staff work. ALS established a separate account for ergonomic issues. All divisions have active ergonomic programs.

The requirement to inspect for and document counterfeit and suspect parts primarily affects Engineering and Facilities. Although efforts are made to consider suspect and counterfeit parts, Berkeley Lab should review requirements, training, and awareness of this issue.

**Criterion 4: Perform the Work**  
**Performance Rating: 95.2 %**

**Criteria**

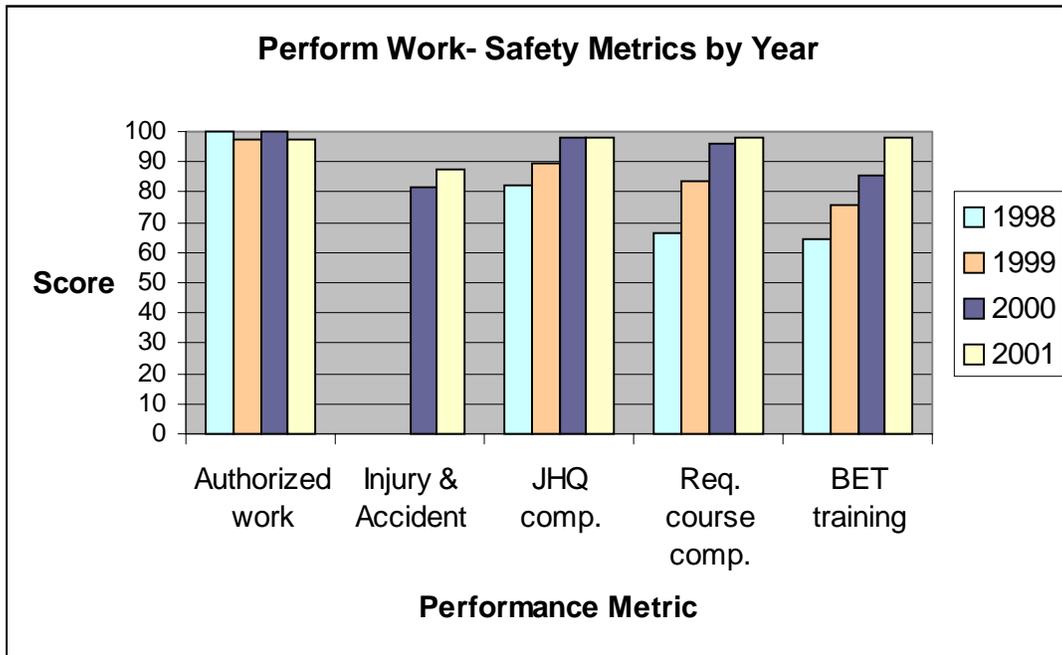
Laboratory divisions perform work within the requirements and conditions of work authorizations. Work is conducted in a manner that protects staff, the public, and the environment. Division line management ensures that staff possesses proficiency and knowledge necessary to work safely.

**Division Performance**

The divisions continue to show the most significant improvement in this metric. The average score for all “Perform Work” performance metrics has risen from 82.8% in FY98 to 87.3% in FY99 to 91.9% in FY00. The average score for FY01 of 95.2% continues the consistent improvement demonstrated in the last three years. Figures 2 and 3 demonstrate Labwide performance of each performance metric in the last four years of division self-assessments. For the purpose of displaying scores over the last four years, the performance indicators have been broken up into two figures, safety metrics (Figure 2) and environmental metrics (Figure 3). The scores presented represent the average of the divisional performance on the At A Glance chart (Appendix B) (green rating: 3 out of 3 points, yellow rating: 2 out of 3 points, red rating: 1 out of 3 points, gray rating: NA, 0 out of 0 points), converted into percentages.

In the performance metrics that focus on safety, divisions have shown a steady improvement in each of the last three years. As has been consistent for the last four years, there have been very few instances of work not performed within authorization requirements. For this performance year, there were five instances of authorization violations, all for Radiological Work Authorization (RWA) violations.

Injury and accident rates have only been tracked in the Self-Assessment Report for the last two years, and the divisions showed improvements in reducing total recordable case (TRC) rates from last year to this year. Overall, Berkeley Lab's TRC rate has declined from 3.2 in the FY00 self-assessment period to 2.4 in the FY01 self-assessment period. Two divisions—AFRD and Nuclear Sciences—had no recordable injuries this self-assessment year. Five divisions—ALS, PBD, Physics, LSD, and MSD—had one recordable injury. Three other divisions showed significant improvement in injury rates. PGF reduced its TRC by 72%, EH&S reduced its TRC by 65%, and Facilities reduced its TRC by 30%. A few divisions (CSD, Computing Sciences, Engineering, and ESD) had increased TRC rates. Divisions should continue to focus on safe work practices and behavior.

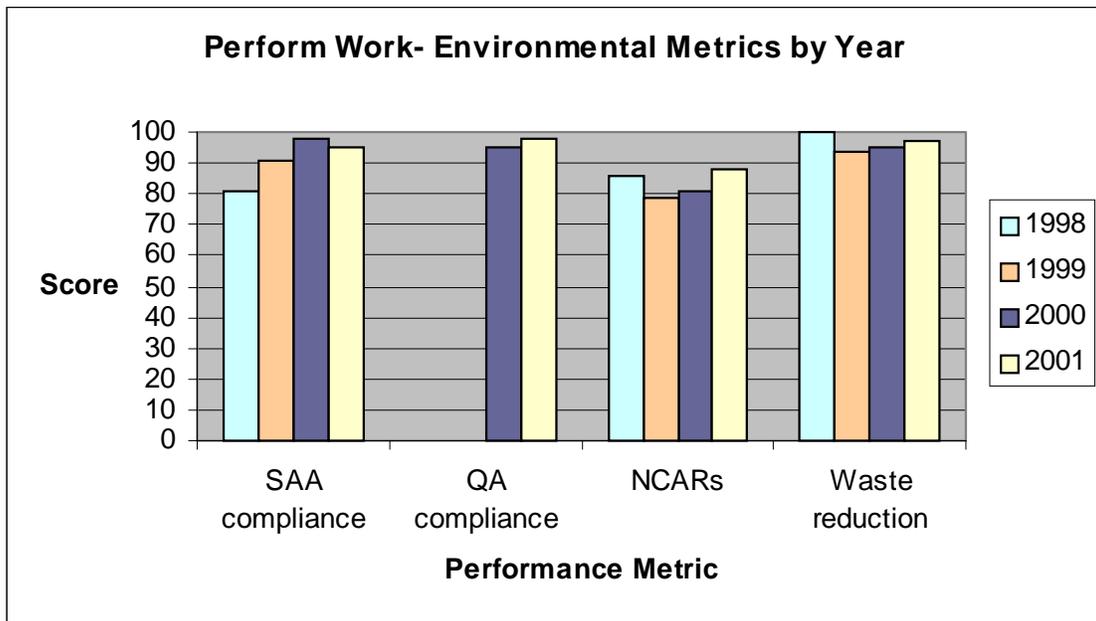


**Figure 2.** Average Labwide safety performance scores for the last four review periods.

Training performance, for JHQ completion, required course completion, and required emergency team course completion, has risen steadily in each of the last three years. In the FY01 performance period, a high percentage of staff in almost every division completed a job hazard profile. Of those classes required by the JHQ, employees of most divisions were diligent in completing required training classes. Only Facilities and PGF had difficulties with job hazard completion and required course completion, respectively.

Divisions also showed great improvement in building emergency team members completing required training. This area was identified as an opportunity for improvement last year, and division response resulted in a very strong performance by almost every division. Only PBD failed to fully train at least 85% of emergency team members. Several divisions (Engineering, Directorate, Computing Sciences, Facilities, EETD, LSD) have at least 25 employees assigned to emergency teams, an effort that makes the Laboratory a safer place for all workers.

In the indicators that focus on environmental performance, divisions have shown general improvement over the last four years. The average divisional score in SAA compliance, which includes waste storage in satellite accumulation areas (SAAs), mixed waste SAAs, and radioactive waste storage areas, declined slightly from the FY00 to FY01 performance period. However, the FY01 performance continues to demonstrate a high compliance rate for waste storage across most divisions. Only ESD and PGF are not consistently in regulatory compliance for waste storage.



**Figure 3.** Average Labwide environmental performance scores for the last four review periods.

Sample QA compliance has only been measured for two years, as this metric used to be included in the Nonconformance and Corrective Action (NCAR) performance indicator. Divisions have gradually improved their waste characterization over the last few years, as reflected by the performance in the QA compliance indicator. For the FY01 performance year, all divisions are consistently characterizing their waste with great accuracy. The NCAR metric is a measure of significant waste storage and waste characterization deficiencies. Divisions continue to improve their performance in this area. Only three divisions (CSD, MSD, PBD) received NCARs for the FY01 self-assessment period. Materials Sciences continues to struggle with the regulatory requirement of storing waste for less than one year.

The waste reduction measure has changed somewhat over the last few years in an attempt to find a metric that is equally applicable to all divisions. The performance metric was formerly based on the amount of waste reduced by each division from the previous year. This year's measurement targeted waste stream specific goals in each division. While it is difficult to compare performance from this year to previous years, the divisions continue to effectively minimize waste. This year only AFRD did not meet the specific goals established by the division and the Waste Management group.

**Criterion 5: Feedback and Improvement**  
**Performance Rating: 96.9 %**

**Criteria**

To promote feedback and continuous improvement in the workplace, Laboratory divisions implement improvement based on feedback from ES&H data and reports, including self-assessment, lessons learned, benchmarking, and Appendix F. Line management actively participates in corrective action planning and ensures that plans are effectively executed.

## **Division Performance**

All divisions were very diligent in inspecting their workspaces during the self-assessment year. Most divisions successfully engaged their line management to inspect workspaces. In every division, the division director participated in workspace inspections and walkthroughs. In most divisions, line management and principal investigators were involved in inspections and self-assessment activities. Only in PGF was line management not involved in walkthroughs, as there was an over-reliance on the safety coordinator to perform inspections. Several divisions (ALS, AFRD, EHS, Engineering, Physics, MSD) had formal self-assessment teams and/or division safety committee members perform inspections. PBD had a unique approach to workspace inspections: they required each employee to perform a personal workspace inspection. Approximately 88% of PBD employees participated in this activity. Overall, divisions were very successful in engaging line management, from senior management to PIs and supervisors, to perform workplace inspections.

Most divisions used the Laboratory Self-Assessment database (LSAD) to track safety deficiencies detected during self-assessment activities. Several divisions (MSD, EETD, EHS, ALS, AFRD) were very active in tracking deficiencies and corrective actions. MSD and ALS, in particular, each tracked over 200 findings. Only PGF did not use LSAD or a similar mechanism to track deficiencies and corrective actions. Use of the database was very uneven. While some divisions were very active in tracking deficiencies, a few divisions had less than 20 findings. All divisions should familiarize themselves with the new Laboratory Corrective Action Tracking System (LCATS) database and actively track safety deficiencies detected in the FY02 self-assessment year.

Most divisions were proficient in completing Supervisor's Accident Analysis Reports (SAARs), including identifying root causes and implementing corrective actions. Early in the self-assessment year, ESD was not sufficiently addressing root causes and corrective actions on SAARs. Later in the performance year, ESD began discussing all SAARs at division safety committee meetings. This technique is also employed by EETD. Three divisions (Facilities, EHS, Engineering) have accident review boards that consider injury causes and future preventative measures. Discussion of injuries and accidents at division safety committee meetings and accident review board meetings is beneficial in effectively investigating root causes and implementing corrective actions.

All divisions use methods to promote continuous improvement of their ES&H systems and programs. All divisions have active safety committees that discuss self-assessment activities and lessons learned. Divisions have additional ways to promote continuous improvement, including dissemination and posting of safety notes, discussion at senior management meetings, and ISM plan revision.

## **Integrated Functional Appraisals (IFAs)**

Integrated Functional Appraisals (IFAs) complement the division self-assessment programs by evaluating higher-hazard or more complex operations that demand subject matter expertise from the EH&S Division. In FY01, five divisions were subject to IFA reviews.

Environmental Energy Technologies (May 2001)  
Physical Biosciences (June 2001)  
Computing Sciences/ Directorate (June 2001)  
Directorate/ Operations (August 2001)  
Engineering (August 2001)

### **Integrated Functional Appraisal Results**

The five IFAs conducted in FY01 indicated that the five divisions assessed were operating within the constraints of their formal authorizations [AHDs, RWAs, RWPs (Radiological Work Permits)] and self-authorized work. All authorizations were appropriate for the work performed. EH&S technical experts determined that all significant hazards were effectively controlled, and divisions met all applicable regulatory requirements. A few minor safety deficiencies were noted in the appraisals. Noteworthy practices and opportunities for improvement for each of the five assessed divisions are listed in Appendix D.

Common noteworthy practices from the five IFAs are the following:

- Divisions have been proactive in addressing ergonomic concerns. Divisions have implemented ergonomic awareness training requirements, promoted ergonomic evaluations, and increased staff cognizance of ergonomic hazards.
- Management commitment to ES&H is evident in many divisions. Senior management participates in safety committee meetings and self-assessment activities. Safety is effectively communicated to staff. As a result, staff is knowledgeable of division ES&H policies and procedures.
- Demonstrating management commitment to ES&H, several divisions hired new safety coordinators this year. Some of the new coordinators have experience as researchers and are experts of division work hazards.

Opportunities for improvement include:

- Although the divisions have been actively addressing ergonomic concerns, many ergonomic hazards are still evident in staff workspace. Many computer workstations across the Laboratory are ergonomically deficient. In addition, divisions should continue to emphasize supervisor and staff awareness of ergonomic issues.
- Many of the Laboratory's work areas have housekeeping problems that should be resolved. General clutter and blockage of egress routes and electrical panels is a common finding. Seismic hazards are also common throughout staff workspace.
- Many laboratories can better manage chemical storage and safety. Inspections indicated that chemicals are often stored with incompatible chemicals and lacking secondary containment. Adequate spill response materials were missing in some locations. Staff should also pay greater attention to chemical hygiene and safety.

## Safety Review Committee Management of ES&H (MESH) Reviews

The Safety Review Committee (SRC) conducts peer reviews to evaluate the management of ES&H programs by Laboratory divisions from the perspective of researchers and line managers. For FY01, MESH reviews were conducted in the following divisions:

Earth Sciences (March 2001)  
Facilities (March 2001)  
Nuclear Sciences (May 2001)  
Engineering (June 2001)  
Life Sciences (June 2001)

The FY01 MESH reviews confirmed that the assessed divisions have satisfactory management systems for ensuring staff and public safety and minimizing adverse environmental impacts. The divisions were following their ISM plans. There were a few instances of minor noncompliance with authorizations, and concerns were noted in all of the reviews. Noteworthy practices and opportunities for improvements for each of the divisions are described in Appendix E.

Common noteworthy practices found in most of assessed divisions include:

- Division line management is actively involved in ES&H activities, and senior management has demonstrated a strong commitment to a safe workplace. Division staff participates in the ES&H programs, including self-assessment functions.
- The divisions have active systems of communicating ES&H to staff. Several methods are used to facilitate communication, including safety committee meetings, all-hands meetings, newsletters, and Web sites.
- Divisions have improved performance in completion of job hazard profiles and required courses, including emergency team training.
- Divisions have successfully reduced the amount of waste generated in the last few years. Decreases have occurred in generation of hazardous, low-level radioactive, and mixed radioactive waste.

Common deficiencies are listed below.

- The ES&H roles and responsibilities of matrixed employees are poorly defined by division line management and not effectively communicated to staff. The source of this deficiency is the lack of a formal policy or guidance on the part of the institution.
- Hazard reviews were not consistently performed for all projects. Management oversight and follow-through was lacking for some projects. Not all staff workspaces were subject to line-management or self-assessment walkthroughs.
- Division workspaces had several recurring, minor safety deficiencies, including general clutter resulting in blocked electrical panels and exit routes, seismic hazards, and chemical storage concerns.

## ES&H Institutional Improvements

### Status of FY00 Self-Assessment Corrective Actions

Each year, as a result of the annual ES&H self-assessment reports, the Laboratory identifies institutional issues that require management action. The status of the corrective actions for the institutional issues identified in the FY00 ES&H Self-Assessment Report is described below.

1. **Chemical Inventory Database.** EH&S staff have been using students to update the chemical inventory database. The chemical inventory was updated for the entire institution during the self-assessment year. A funding request has been submitted to improve the current system to one that is less labor intensive. Small upgrades have been made, such as making the inventory a Web-based system. However, until the necessary funds are available, the system will not receive the overhaul it requires.
2. **Corrective Action Database.** Divisions used the LSAD database with greater consistency in the FY01 performance year, and findings forwarded to the Work Request Center were pursued with greater diligence. The Web-based LCATS database is currently operational. As divisions become familiar with the new system, usage should increase to greater levels than that of the LSAD database. The new system allows for greater oversight from OAA, which will ensure greater consistency in assignment of institutional and noninstitutional findings and assessment of hazard levels. The new database also allows for easier interaction with the Work Request Center.
3. **ES&H Training.** The EH&S training database is now capable of hosting division-specific JHQs on the Web site. This allows an administrator to directly input customized JHQs into the system without the additional step of manually completing and entering profiles. EH&S continues to work with divisions that use internal systems for tracking training.
4. **Ergonomics.** Divisions aggressively promoted ergonomic awareness during the FY01 performance year. Divisions used many different and effective means of addressing ergonomic concerns in their work. In addition to divisional initiatives, the Safety Review Committee recommended an institutional requirement for ergonomic awareness training for personnel who use computers four hours or greater, on average, per day. This recommendation has been approved by Laboratory management and was implemented Labwide on July 1, 2001.

### FY01 Recommendations for Institutional Improvements

Based on the results of the FY01 Division Self-Assessments, Integrated Functional Appraisals, and the SRC MESH reviews, the following opportunities for institutional improvement are recommended by the Office of Assessment and Assurance.

- **Chemical Inventory.** There is still a need to develop a less labor-intensive and more valuable information system for users than currently exists. EH&S staff have been using students to update the chemical inventory database. The chemical inventory for the entire institution was updated during the self-assessment year. However, this service doesn't provide a database that remains current or allows for readily retrievable information by researchers or other chemical owners. EH&S is in the process of employing a more interactive system. Small improvements, such as creating a Web-based

system, have been made, but a more significant overhaul is required. Additional funding is required to achieve this goal.

- **Matrixed Employees Policy.** The ES&H roles and responsibilities for the Laboratory's matrixed employees are poorly defined by management and not clearly conveyed to staff. Host and home divisions are unsure of ES&H responsibilities with regard to matrixed employees. Safety roles and lines of communication for matrixed personnel are not well understood by supervisors or staff. The Laboratory should create a formal policy for ES&H of matrixed employees.

## **ES&H Divisional Improvements**

### **Status of FY00 Self-Assessment Corrective Actions**

The FY00 ES&H Self-Assessment Report identified many opportunities for improvement for individual divisions. Divisions made conscious efforts to improve performance in these areas. During this self-assessment period, the divisions implemented corrective actions to the deficiencies, and most of the opportunities for improvement were effectively addressed. In a few cases, however, divisions did not fully resolve all findings.

A few divisional opportunities for improvement were identified under the “Define Work” performance criterion. AFRD, Chemical Sciences, and Earth Sciences increased line manager involvement in walkthroughs of staff workspace. Many of these walkthroughs were documented. Earth Sciences also stressed line management involvement in promoting safety, and incorporated staff safety expectations into supervisors' performance reviews.

In the “Control Hazards” performance criterion, all opportunities for improvement involved division ergonomic programs. The Directorate, Life Sciences, Nuclear Sciences, and Physics all sufficiently addressed concerns. The divisions were more aggressive in their ergonomic programs than in previous years and systematic in performing staff training and evaluations.

Most of the opportunities for improvement cited in the FY00 report were in the “Perform Work” performance criterion. ALS, Engineering, and EH&S all implemented corrective actions and improved their waste characterization in the FY01 performance year. In order to mitigate an increase in waste generation in the FY00 performance year, Physics worked more closely with Waste Management and met their waste minimization goals for FY01. Facilities, Life Sciences, and PGF emphasized training of emergency team members and improved markedly from last year. PGF, in particular, improved from 50% to 100% of team members completing all three required training courses. Physics also corrected a training-related deficiency and improved staff completion of the JHQ and required courses. Facilities and PGF successfully executed corrective actions to reduce injuries. Facilities and PGF both improved dramatically in the FY01 performance year, reducing recordable injuries by 30% and 72%, respectively.

The opportunities for improvement in the “Feedback and Improvement” performance criterion identified use of the corrective-action database in several divisions. AFRD and ALS worked with the Work Request Center to correct numerous findings that were not resolved. Nuclear Sciences and Physics both used the database more actively than they had in the FY00 performance year.

Only three opportunities for improvement were not fully resolved. Materials Sciences continued to struggle with waste characterization, and received multiple NCARs this performance year. Earth Sciences had an increase in recordable injuries. Although an injury reduction plan has been developed, it was not been fully implemented by the end of the performance year. PGF did not use the LSAD database or a comparable system to track safety deficiencies and corrective actions. The divisions should increase attention to these shortcomings and work to resolve them during the FY02 performance period.

## Appendix A

### FY01 Self-Assessment Performance Criteria

PERFORMANCE CRITERIA	EXPECTATIONS	VALIDATION
<p><b>1. Define Work</b></p> <ul style="list-style-type: none"> <li>• The Division integrates ES&amp;H into work and activities.</li> <li>• Line management is responsible for protection of the public, the workers, and the environment.</li> <li>• Clear and unambiguous lines of authority and responsibility for ensuring ES&amp;H are established and maintained at all organizational levels.</li> <li>• Resources are effectively allocated to balance programmatic, operational, and ES&amp;H considerations.</li> </ul>	<p>1A. Division Director and line managers communicate ES&amp;H expectations, goals, and policies to all staff. Examples of appropriate communication include: [I, II, IV]*</p> <ul style="list-style-type: none"> <li>• Annual all-hands division meeting</li> <li>• Research procedures and protocols include safety notes</li> <li>• Availability of ES&amp;H committee minutes</li> </ul> <p>Division staff has clear lines of communication to convey ES&amp;H issues to Laboratory and division management, including evidence of clear policy for all staff to communicate safety concerns.</p> <p>1B. The ES&amp;H committee and the division safety management group are active in addressing ES&amp;H for division work activities. [I, II, VII]</p> <p>1C. Demonstrate that participating guests are made aware of and held accountable for ES&amp;H.</p> <p>1D. Division holds employees accountable for ES&amp;H.</p> <p>1E. Division has an approved and validated ISM plan. [I, IV]</p> <p>1F. Adequate funds and resources are allocated for controls of ES&amp;H hazards. [IV]</p>	<p>V1. Is there evidence of ongoing and two-way communication of ES&amp;H between line management and staff?</p> <p>V2. Is there evidence that the ES&amp;H safety committee and/or the division safety management group is active in analyzing ES&amp;H information, communicating resulting ES&amp;H issues to senior management, and implementing systems and programs that promote the protection of the public, the worker, and the environment ?</p> <p>V3. Are participating guests provided with the LBNL ISM brochure? Alternatively, they may sign off on an assurance memo that states they understand and will follow LBNL ES&amp;H policies and procedures.</p> <p>V4. Are division employees held accountable for ES&amp;H in their annual P2R?</p> <p>V5. Has the division reviewed and updated its ISM plan within the past year?</p> <p>V6. Are there ES&amp;H issues or problems resulting from insufficient funds or resources? Query division liaison and sample LSADs.</p>

PERFORMANCE CRITERIA	EXPECTATIONS	VALIDATION
<p><b>2. Identify Hazards</b></p> <ul style="list-style-type: none"> <li>Line management evaluates work (new and modifications) to identify hazards before work is performed and to establish authorization for performing work safely.</li> <li>Line management systematically evaluates hazards to mitigate risk posed by work in their area.</li> </ul>	<p>2A. Line managers use Chapter 6 of LNBL/PUB-3000 or equivalent for evaluating hazards and necessary authorizations for doing work safely. All appropriate authorizations have been issued. [II, V, VI, VII]</p> <p>2B. Division maintains an inventory of its hazardous chemicals. [VII]</p>	<p>V7. For all division projects and programs, have hazard reviews, including work under formal authorizations (i.e., AHDs, RWAs, SSAs) and self-authorized work (i.e., division approval only) been performed within the required review schedule) and documented to the division office? Do the reviews cover both new work and modification of existing work?</p> <p>V8. Does the division update its chemical inventory annually? Delays as a result of other parties (i.e., EH&amp;S or Facilities) authorized to perform the work must be taken into consideration. The division must demonstrate it has been proactive and timely in seeking assistance.</p>
<p><b>3. Control Hazards</b></p> <ul style="list-style-type: none"> <li>Administrative and engineering controls tailored to the hazards have been implemented.</li> </ul>	<p>3A. Certification of engineering controls and safety instrumentation are up to date. [V]</p> <p>3B. Emergency contact information is appropriate for the work and associated hazards.[VII]</p>	<p>V9. Are fume hoods, biocabinets, and glove boxes being certified/checked within the required test schedule (including reporting hoods lacking flow meters)? Are required monitors (toxic and flammable gas, stack emission, dosimetry) being calibrated and serviced annually or within the required maintenance schedule? Delays as a result of other parties (i.e., EH&amp;S or Facilities) authorized to perform the work must be taken into consideration. The division must demonstrate it has been proactive and timely in seeking assistance.</p> <p>V10. Do Laboratory-built safety systems and critical applications have documentation of conformance for parts that are known to be suspect/counterfeit (e.g., graded fasteners, circuit breakers, valves, electronic components, etc.)? Do division shops and stores inspect for suspect/counterfeit items as part of their self-assessment?</p> <p>V11. Does the division update its emergency contact information on its signage and postings at least annually?</p>

PERFORMANCE CRITERIA	EXPECTATIONS	VALIDATION
	3C. Line managers ensure that ergonomic issues are effectively addressed for their work stations and/or work processes. [V, VI]	V12. Does the division have an active ergonomic program for its employees, including ergonomic evaluations, training and controls for work stations and work processes? Divisions with high ergonomic TRC rates should actively address ergonomic hazards.
<b>4. Perform Work</b> <ul style="list-style-type: none"> <li>• Work is consistently performed within authorization.</li> <li>• Work is conducted in manner that protects the worker, the public, and the environment.</li> <li>• Line management ensures that staff possesses the proficiency and knowledge commensurate with conducting their assigned work safely.</li> </ul>	4A. Line managers ensure that their work is performed within authorization, safely, and in a manner that protects the environment. Waste characterization is accurate, and waste storage is compliant with legal requirements. Site- and task-specific training under authorizations (division, RWA, SSA, AHD) is current. [I, VI]  4B. Training records document that required training for staff is current. [III]  4C. Line managers ensure that building emergency team members are fully trained to perform their responsibilities during an emergency.  4D. Stewardship: Waste minimization performance goals are met or exceeded (goals determined by EH&S Waste Management Group, in consultation with the division). [IV]	V13. Conformance indicators: % compliance RWAs, including completion of training required by the authorization Waste Management : % compliance SAAs (including MWSAAs, RWCAs), % compliance QA waste samples, # NCARs  V14. Is TRC rate under the DOE contract control level of 3.0, or is there evidence of divisional improvement?  V15. % completion of JHQs or equivalent system.  V16. Based on JHQs or training profiles, % completion rate for required courses.  V17. % division emergency team members who have completed all required emergency team training.  V18. Does the division satisfy the waste minimization requirements agreed to with the Waste Management Group?

<p><b>5. Feedback and Improvement</b></p> <ul style="list-style-type: none"> <li>Line management actively participates in corrective-action planning and ensures that plans are effectively executed.</li> <li>Divisions implement improvements based on feedback from self-assessment, lessons learned, benchmarking, Appendix F, and other vehicles that promote continuous improvement.</li> </ul>	<p>5A. Based on the work, associated hazards, and safety performance, line managers and staff (including division directors, principal investigators, and senior/mid managers) participate in walkthroughs and other ES&amp;H activities. [I, II, IV]</p> <p>5B. Supervisor's Accident Analysis Reports (SAARs) are processed in a timely manner and actively involve root-cause analysis and corrective actions by the injured employee, the supervisor, the safety coordinator, the division liaison, and—as appropriate—the division director and/or other senior managers.</p> <p>5C. Division tracks the corrective actions of findings identified in its self-assessment. [I]</p> <p>5D. Division ES&amp;H committee and/or the division safety management group uses ES&amp;H data and information from lessons learned, SAARs, incident reports, EH&amp;S monitoring reports, Appendix F performance measures, etc., to institute appropriate mitigation measures or opportunities for improvement. [I, II, VII]</p>	<p>V19. % division workspace inspected.</p> <p>V20. Is there evidence that line managers, including the division director, principal investigators, and senior/mid managers, regularly conduct walkthroughs of division workspaces?</p> <p>V21. Are SAARs completed in a timely manner? Are all appropriate parties involved?</p> <p>V22. % completion rates for Levels 1, 2, and 3 LSAD-recorded deficiencies.</p> <p>V23. Is the division safety management group and/or safety committee active in reviewing ES&amp;H data and reports, such as injury and accident rates, occurrence reports, performance metric results, and lessons learned, to mitigate hazards and improve the state of ES&amp;H?</p>
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\*ISMS principles related to expectations:

- I. Line management accountability
- II. Clear roles and responsibilities
- III. Competence commensurate with responsibilities
- IV. Balanced priorities

- V. Identification of safety standards
- VI. Requirements and operations authorization
- VII. Hazard controls tailored to work being performed

## Appendix B

### FY01 Division Self-Assessment Performance Ratings

Rating each division's ES&H performance is based on a color-coded system of determining whether each performance criterion and expectation is fully met, partially met, or marginally met. Points are assigned for the three performance gradients, and a percent performance is calculated for each criterion and expectation and for overall division performance. The color-code and point system is as follows:

**3 pts**

Green indicates that the criterion/expectation is fully met at a >85% performance level, and performance is deemed to be excellent to outstanding. For waste management performance, there are no Nonconformance and Corrective Action Reports (NCARs), a QA compliance rate >95% or only one failure, an SAA compliance rate >90%, and meets division-specific waste minimization goals. For injury and accident rates, there is a total reportable case (TRC) rate >25% below 3.0, or a 20% improvement from last year, or one case or fewer. More than 90% of authorized work is performed without a major deficiency. More than 90% of corrective actions are resolved on schedule .

**2 pts.**

Yellow indicates that the criterion/expectation is partially met at a 60–85% performance level, and performance is deemed to be marginal to good/excellent. For waste management performance, there are only Type 1 NCARs and no Type 2 NCARs, a QA compliance rate between 92% and 95%, an SAA compliance rate between 75% and 90%, and a net waste increase. For injury and accident rates, there is a TRC rate <25% below or above 3.0, or a 10% improvement from last year, or two cases. Between 75% and 90% of authorized work is performed without a major deficiency. Between 75% and 90% of corrective actions are resolved on schedule .

**1 pt.**

Red indicates that the criterion/expectation is marginally met at a <60% performance level, and performance is deemed to be unsatisfactory to marginal. For waste management performance, there are one or more Type 2 NCARs, a QA compliance rate <92%, and an SAA compliance rate <75%. For injury and accident rates, there is a TRC >25% above 3.0. Less than 75% of authorized work is performed without a major deficiency. Less than 75% of corrective actions are resolved on schedule .

**0 pt.**

Not applicable to the division.

FY01 Division Self Assessment Performance

Criteria	Divisions Expectations	AFRD	ALS	Chemical Sciences	Computing Sciences	Directorate	EH&S	Engr	Environ. Energy Tech	ESD	Facilities	LSD	MSD	Nuclear Sciences	Phys Biosci.	Physics	PGF	Expectation Score
<b>1</b>	Evidence of strong ES&H communication	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	partial	yes	yes	yes	yes	97.9%
	Employees and participating accountable for ES&H	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	100%
	ISM Plan is reviewed and updated annually	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	100%
	Resources and funds adequate to address all ES&H issues	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	100%
<b>2</b>	% formal authorizations and self-authorized work reviewed within required schedule	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Chemical inventory updated within past 12 months	yes	yes	yes	NA	NA	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	100%
<b>3</b>	% Engineering controls certified & calibrated	100%	100%	100%	NA	NA	>97%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Emergency contact information updated within past 12 months	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	100%
	Evidence of effective ergonomics program	yes	yes	yes	yes	yes	yes	yes	yes	partial	yes	yes	yes	yes	yes	yes	yes	97.9%
<b>4</b>	% Authorized work w/o major deficiencies	100%	100%	>90%	NA	NA	100%	100%	100%	100%	NA	86%	100%	100%	100%	100%	NA	97.2%
	% SAAs (incl. MWSAAs, RWCAs) in compliance	100%	100%	97%	NA	NA	91%	100%	98%	83%	92%	96%	88%	91%	100%	100%	83%	95.2%
	% QA compliance rate	100%	100%	97.8%	NA	NA	98.6%	100%	95.5%	97.5%	100%	96.4%	92.9%	100%	100%	100%	100%	97.6%
	# NCARS	0	0	1 "Type 1"	NA	NA	0	0	0	0	0	0	7	0	1	0	0	88.1%
	Injury & accident case rates (TRC)	0.0	1.6	2.9	2.7	2.8	1.7	2.7	0.9	5.8	6.7 30% imp.	0.7	0.5	0.0	1.6	1.0	3.7 72% imp.	87.5%
	% Job hazard questionnaire (JHQ) completed	92%	98%	91%	87%	96%	89%	98%	93%	86%	75%	95%	97%	93%	94%	88%	90%	97.9%
	% Completion rate of required courses	91%	95%	90%	93%	94%	88%	95%	86%	90%	94%	94%	97%	89%	92%	86%	63%	97.9%
	% Completion for emergency response training	100%	93%	100%	97%	87%	100%	85%	88%	89%	88%	92%	93%	100%	79%	100%	100%	97.9%
Waste reduction (haz., rad., & mixed)	partial	yes	yes	yes	NA	yes	yes	yes	yes	NA	yes	yes	yes	yes	yes	yes	NA	97.4%
<b>5</b>	% work space inspected	100%	100%	100%	100%	100%	100%	100%	100%	96%	100%	100%	100%	90%	100%	100%	100%	100%
	L/M participating in assessment (i.e., regular walkthroughs)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	partial	97.9%
	LSAD completion rate	80%	97%	100%	90%	100%	96%	97%	99%	100%	100%	100%	78%	82%	100%	90%	no system	89.6%
	evidence of active safety management group	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	Division Score	97.0%	100%	97.0%	97.9%	97.8%	100%	98.5%	100%	93.7%	98.4%	98.5%	92.4%	98.5%	95.5%	100%	91.7%	97.3%

## Appendix C

### FY01 Division Self-Assessment Noteworthy Practices and Opportunities for Improvement

Division	Noteworthy Practices	Opportunities for Improvement
Accelerator and Fusion Research	<ul style="list-style-type: none"> <li>• AFRD has a very active and aggressive self-assessment inspection program. These inspections, conducted by the QUEST teams and safety management group, identified approximately 143 safety deficiencies, far more than most divisions.</li> <li>• The QUEST teams include participation of the majority of division staff. This engages the staff in ES&amp;H issues and facilitates communication.</li> <li>• The division has an active hazard identification program that is systematic and current. All authorizations were reviewed during the performance period. Lesser hazards, identified during self-assessment activities, are entered into the HEAR database.</li> <li>• AFRD has an outstanding record of performing work safely and compliantly. Staff incurred no recordable injuries during the performance year. Staff is well trained. Work is performed within constraints of the authorizations.</li> </ul>	<ul style="list-style-type: none"> <li>• Because of funding constraints, only 80% of identified safety deficiencies have been resolved. Most deficiencies are related to ergonomics and seismic safety.</li> </ul>
Advanced Light Source	<ul style="list-style-type: none"> <li>• The ALS has an extremely active and robust safety structure that facilitates ongoing communication and planning for work activities. Communications include an annual safety reminder from the Division Director to all staff, monthly safety committee meetings, and QUEST safety circles.</li> <li>• The division performed work within authorization, safely, and in a manner that protects the environment. Staff is well trained, and there was only one</li> </ul>	

Division	Noteworthy Practices	Opportunities for Improvement
Advanced Light Source (continued)	<p>recordable injury. In addition, waste is managed appropriately.</p> <ul style="list-style-type: none"> <li>Over 200 LSAD entries were tracked this year, and approximately 97% of deficiencies have been or are on schedule to be corrected. The ALS has a dedicated safety fund to remedy any safety findings.</li> </ul>	
Chemical Sciences	<ul style="list-style-type: none"> <li>Division management requires all PIs to sign a safety assurance statement. This is a certification that PIs provide a safe workplace and that staff is aware of their ES&amp;H responsibilities.</li> <li>Chemical Sciences has a very proactive approach to ergonomic hazards. The division required all staff who used computer workstations more than four hours a day to complete EHS060, ergonomic awareness training. This was implemented prior to the institutional requirement.</li> </ul>	<ul style="list-style-type: none"> <li>Chemical Sciences should consider more frequent division safety committee meetings.</li> <li>The division should develop a more formal process of review for Activity Hazard Documents.</li> </ul>
Computing Sciences	<ul style="list-style-type: none"> <li>As part of the semiannual wall-to-wall inspections of all division workspaces, Computing Sciences group leaders and department heads complete staff and space safety checklists.</li> <li>Computing Sciences has the most proactive ergonomic awareness program of any division. During the performance year all staff and their workstations were subject to ergonomic reviews.</li> <li>Computing Sciences has eliminated the generation of hazardous waste.</li> </ul>	<ul style="list-style-type: none"> <li>The division experienced an increase in recordable injuries over the previous year.</li> </ul>
Directorate/ Operations	<ul style="list-style-type: none"> <li>All Directorate/ Operations workspaces have been inspected by the responsible functional unit. Inspections and safety deficiencies are very well documented.</li> <li>The Deputy Laboratory Director is very involved in ES&amp;H activities of the Directorate/ Operations. She</li> </ul>	

Division	Noteworthy Practices	Opportunities for Improvement
Directorate/ Operations (continued)	<p>participates in self-assessment activities and chairs the umbrella safety committee of the organization.</p> <ul style="list-style-type: none"> <li>• The Directorate allocated funding to hire a full-time safety coordinator. This resulted in improvements in ergonomic awareness, accident investigation, and ES&amp;H self-assessments.</li> <li>• The department continues to proactively address ergonomic hazards. During the performance year, over 50 workstation evaluations were performed and 166 employees completed ergonomic awareness training.</li> </ul>	
Earth Sciences	<ul style="list-style-type: none"> <li>• Earth Sciences has already begun to address the opportunities for improvement identified in this report. The ISM plan has received substantial changes based upon prior assessments and the FY01 MESH review. The revisions address responsibility and accountability for ES&amp;H. Changes clearly reflect that line management is responsible for ES&amp;H. A new accident investigation program is also stressed in the revised ISM plan. In addition, ES&amp;H will have a greater impact on annual staff reviews.</li> </ul>	<ul style="list-style-type: none"> <li>• The feedback and improvement system in the division requires improvement. SAARs are not being appropriately investigated, and, in some cases, corrective actions are absent or do not address root causes.</li> <li>• Earth Sciences had a TRC rate of 5.8, highest among all scientific divisions at the Lab. This continues a trend established last year.</li> <li>• The division should pay greater attention to ergonomic hazards and improper workstation configuration. Three recordable injuries were ergonomics-related.</li> </ul>
Engineering	<ul style="list-style-type: none"> <li>• Engineering has an active ergonomics program that addresses concerns beyond those normally associated with workstation hazards. For example, they also consider repetitive work performed with tools.</li> <li>• The division has a very effective self-assessment program. The division uses six teams to inspect all division workspaces. Teams are organized by type of hazard, and include experts in the fields they assess.</li> <li>• Engineering has a commendable SAAR review process. This process</li> </ul>	<ul style="list-style-type: none"> <li>• Engineering experienced an increase in the TRC rate.</li> </ul>

Division	Noteworthy Practices	Opportunities for Improvement
Engineering (continued)	<p>includes the use of Health Services accident scene photos. The supervisor, division safety coordinator, and EH&amp;S liaison all review the accident to ensure corrective actions are appropriate and will prevent recurrence.</p> <ul style="list-style-type: none"> <li>• The division has an effective and robust system of ES&amp;H communication. ES&amp;H issues are communicated through electronic newsletters and meeting minutes. Safety is an agenda item at group and department meetings within the division. Safety is also a topic at the Division Director's biweekly managers meeting. The division also has an ES&amp;H Web site that is current and relevant to staff and work processes.</li> </ul>	
Environmental Energy Technologies	<ul style="list-style-type: none"> <li>• EETD is very effective at performing work safely and in compliance with environmental regulations. Staff is well trained with few recordable injuries. All work is performed within authorization. Waste is managed appropriately.</li> <li>• The division has an exemplary ergonomics program. An ergonomics committee was established, and it developed an action plan to address ergonomic hazards. This plan included distribution of literature on ergonomic hazards, required ergonomic awareness training (EHS060) for all staff who regularly work at computer stations more than four hours a day, and emphasized workstation evaluations.</li> <li>• The division has a very mature system of ES&amp;H communication. The division had two all-hands meetings that included safety on the agenda. The ES&amp;H Web site is updated quarterly and includes a division safety coordinator newsletter. The division has an active safety</li> </ul>	

Division	Noteworthy Practices	Opportunities for Improvement
Environmental Energy Technologies (continued)	<p>committee, and safety is also discussed at Division Council meetings.</p> <ul style="list-style-type: none"> <li>EETD has a thorough process of identifying hazards. Line management is responsible for documenting hazards in the division hazard review checklist and HEAR form. There is also a project safety review process that ensures all programs have identified hazards inherent in their work.</li> </ul>	
Environment, Health and Safety	<ul style="list-style-type: none"> <li>EH&amp;S has a robust communication system. ES&amp;H was discussed at the division all hands meeting, the division safety committee met monthly and distributed minutes, and ES&amp;H is a standing agenda item at all group meetings.</li> <li>Line management is very involved in promoting ES&amp;H. A Deputy Division Director memo to all group leaders described their ES&amp;H responsibilities. Group leaders were responsible for discussing safety at all group meetings and performing walkthroughs of their space. The Deputy Division Director chairs the division safety committee.</li> <li>The division has a very proactive ergonomics program. All division staff is required to complete ergonomic awareness training (EHS060). Ergonomic evaluations of workstations are emphasized. MoveSmart training is required for staff whose jobs involve bending and lifting.</li> </ul>	<ul style="list-style-type: none"> <li>The division needs to develop a more formal hazard review system beyond updating the HEAR database. This system, at present, is only a hazard inventory and does not ensure that hazards are controlled.</li> </ul>
Facilities	<ul style="list-style-type: none"> <li>Facilities has a very effective communications program to promote safety. It is multifaceted and includes an all-hands meeting, face-to-face meetings, electronic displays, distribution of notes, and a newsletter. Analyzing accidents by department and providing that information to</li> </ul>	<ul style="list-style-type: none"> <li>Only 75% of department staff completed a job hazard profile.</li> </ul>

Division	Noteworthy Practices	Opportunities for Improvement
Facilities (continued)	<p>supervisors is an effective means of ensuring that supervisors clearly understand staff safety issues.</p> <ul style="list-style-type: none"> <li>The department uses several methods to identify hazards. For work orders, a Facilities Department Hazard Evaluation is used to identify hazards. For larger jobs, a pre-job safety checklist is completed prior to commencing work. Facilities projects also incorporate meetings with ES&amp;H specialists as part of their procedures.</li> </ul>	
Life Sciences	<ul style="list-style-type: none"> <li>LSD has developed a space-information database. This database is updated annually by all responsible PIs and maintained by the division safety coordinator. The database provides hazard identification and emergency contact information for all division workspace.</li> <li>The division has made a concerted effort to conduct ergonomic evaluations of staff workstations. Approximately 95% of all division workstations have been reviewed for ergonomic hazards.</li> <li>Division staff is well trained and experiences a low frequency of injuries. In addition, waste is managed according to Laboratory and regulatory requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Life Sciences had four authorization violations during the self-assessment performance period. All of the violations were related to RWAs.</li> </ul>
Materials Sciences	<ul style="list-style-type: none"> <li>The division has a very active self-assessment team that inspects all workspaces. These inspections resulted in the discovery of nearly 300 safety deficiencies. The Division Director and Division Deputy participated in workspace walkthroughs.</li> <li>MSD is proactive and aggressive in ensuring that staff completes JHQs and all required courses prior to commencing work activities. This is far more stringent than the institutional policy. It is also well implemented, as</li> </ul>	<ul style="list-style-type: none"> <li>The Materials Sciences system of ES&amp;H communication is not proactive or robust. There is no assurance that the dissemination of ES&amp;H policies and procedures to all staff are uniform and consistent. E-mail is the primary means of communication, but there is no e-mail communication to all staff. In addition, there is no all-hands meeting. The division safety committee met once during the year, and members don't have an active role in communicating ES&amp;H issues.</li> </ul>

Division	Noteworthy Practices	Opportunities for Improvement
Materials Sciences (continued)	<p>97% of staff completed all required training prior to performing work.</p> <ul style="list-style-type: none"> <li>The division safety coordinator has an AHD database to track renewal of authorizations for division work. With 30 AHDs in the division, this is an effective system for ensuring that authorizations remain current.</li> </ul>	<ul style="list-style-type: none"> <li>The division closed out 78%, or 221 of 282, LSAD findings. While highly successful in mitigating almost all deficiencies discovered in buildings 62 and 66, most findings from building 2 went unresolved.</li> <li>The division continues to have difficulties managing waste compliantly, with seven NCARs this year.</li> </ul>
Nuclear Sciences	<ul style="list-style-type: none"> <li>Nuclear Sciences does a commendable job of performing work safely and within compliance of authorizations and regulations. Staff is well trained, all work met authorization requirements, and waste was managed compliantly.</li> <li>The division had no recordable injuries for the performance year. This marks the second straight year the NSD had a TRC of 0.0.</li> </ul>	<ul style="list-style-type: none"> <li>The division should increase tracking of safety deficiencies, as only eleven LSAD findings were recorded. Also, there should be greater diligence in resolving deficiencies. 82% of findings were closed within the required schedule. NSD should expand use of the LCATs database for the FY02 self-assessment period.</li> <li>NSD should continue to promote ES&amp;H communication within the division. Progress has been made in this area, but lines of communication are not clearly defined. Also, more emphasis should be placed on ES&amp;H communication at the group level.</li> </ul>
Physical Biosciences	<ul style="list-style-type: none"> <li>Physical Biosciences has a robust and mature safety organization to ensure that ES&amp;H policies, rules, and procedures are considered for all division work and operations. The division is effective at integrating ES&amp;H into all aspects of work planning and decision making. Key to this effort is the strong safety leadership provided by the division director and the safety planning team.</li> <li>PBD has done an excellent job of identifying hazards during the renovation in the Calvin Lab. As they conduct the remodeling they are systematically evaluating for hazards, such as radioactive legacy material, lead, asbestos, and mercury. The</li> </ul>	<ul style="list-style-type: none"> <li>The division received one NCAR for mischaracterization of waste.</li> <li>The training completion rate of emergency team members is 79%.</li> </ul>

Division	Noteworthy Practices	Opportunities for Improvement
Physical Biosciences (continued)	<p>division has also made a significant investment in installing state-of-the-art hazard containment systems (i.e. fume hoods, safety cabinets) as part of the renovation.</p> <ul style="list-style-type: none"> <li>The division asks each employee to participate in the division self-assessment by using a safety checklist to inspect their personal work areas. 88% of division employees participated in this process. This information is reviewed by the Safety Planning Team to track corrective actions and identify trends. The personal workspace inspections are in addition to self-assessment activities performed by line and senior management, including the Division Director.</li> </ul>	
Physics	<ul style="list-style-type: none"> <li>The division performs annual reviews of all work, including self-authorized work, through the use of the Project Safety Review Questionnaire (PSRQ). All new and revised PSRQs are reviewed by the division safety committee, which provides an excellent opportunity for senior management feedback.</li> <li>The division has taken a proactive approach in addressing ergonomic hazards. A division-wide ergonomics meeting, tailored to address hazards presented in work performed by Physics Division staff, was conducted. Part of the focus of this class involved the use of microscopes.</li> <li>Physics does an outstanding job of performing work compliantly and within authorization requirements. The division had no authorization deficiencies, instances of waste storage noncompliance, QA sample failures, or NCARs.</li> </ul>	<ul style="list-style-type: none"> <li>With the addition of administrative support for data entry, use of the LSAD database improved last year. The division should continue to expand recording and tracking of safety deficiencies through the LCATs database.</li> </ul>

Division	Noteworthy Practices	Opportunities for Improvement
Production Genomics Facility	<ul style="list-style-type: none"> <li>• PGF has an excellent program for familiarizing new employees and guests with their ES&amp;H responsibilities. The division distributes a packet that includes relevant documentation, including a division-tailored JHQ, the Employee ISM Brochure (LBNL/PUB-811), and safety memos from division management and the safety coordinator. This packet also includes a supervisor–new employee checklist that provides an excellent mechanism for ensuring ES&amp;H is discussed with all new personnel.</li> <li>• PGF has recognized ergonomics as a significant hazard for division operations. In light of this fact, surveys were sent out to all staff inquiring about ergonomic hazards inherent in workspaces and job tasks. This was an important tool in promoting ergonomic awareness as well as encouraging ergonomic training and workstation evaluations.</li> </ul>	<ul style="list-style-type: none"> <li>• Line management is not actively involved in inspecting division workspaces. Supervisors are not engaged in inspecting the workspaces for which they are responsible. There is an overreliance on the division safety coordinator and EH&amp;S liaison to perform inspections, as the division does not have a formal self-assessment team.</li> <li>• PGF lacks a systematic process for tracking safety deficiencies. There is no established mechanism to document discovery and resolution of findings, assign responsible individuals, and evaluate degree of hazard. The division did not use the LSAD database, and an e-mail system used did not effectively capture the necessary components to track ES&amp;H issues.</li> <li>• Staff completed only 63% of all required courses prompted by the job hazard questionnaire.</li> </ul>

## Appendix D

### FY01 Integrated Functional Appraisal Noteworthy Practices and Opportunities for Improvement

Division	Noteworthy Practices	Opportunities for Improvement
<p>Computing Sciences/            Directorate</p>	<ul style="list-style-type: none"> <li>• The division has been very proactive at addressing ergonomic hazards. Ergonomic awareness training (EHS060) is a requirement for all staff. This policy was formulated more than a year before the institutional requirement. Also, the division has performed ergonomic evaluations of 175 workstations.</li> <li>• The Information Systems and Services Department implemented an Office Behavior-based Accident Prevention (OBAP) program. This program has successfully reinforced safe work practices and increased ergonomic awareness.</li> <li>• Safety Messages are published regularly in the Computing Sciences weekly newsletter "In the Loop."</li> </ul>	<ul style="list-style-type: none"> <li>• ITSD has experienced an increase in recordable injuries and illnesses, primarily due to delays in employees reporting ergonomic concerns to their supervisor. This has led to a higher frequency of cases needing subsequent medical treatment. The accident rate can be reduced through early injury reporting/intervention and active line-management involvement.</li> </ul>
<p>Directorate/            Operations</p>	<ul style="list-style-type: none"> <li>• Top management commitment is visible and communicated. Constructive progress is being made to integrate safety into work activities in a comprehensive manner.</li> <li>• Resources have been committed to support the ESH function by hiring a full-time safety coordinator.</li> <li>• The department developed a tailored safety plan for the Administrative Services Department (ASD) (the largest unit in the Directorate).</li> <li>• Directorate/Ops has taken several steps to address ergonomic hazards. Ergonomic evaluations for all</li> </ul>	<ul style="list-style-type: none"> <li>• Manager and supervisor training in ergonomics awareness and ES&amp;H essentials (SAAR investigations, Office Safety, ISM roles and responsibilities, etc.) will help strengthen understanding and implementation of safety.</li> <li>• Directorate/Ops should consider launching a pilot "Office Behavior-based Accident Prevention (OBAP) program and wellness initiatives. Such proactive efforts will help reinforce consistently safe work practices, especially office ergonomics, and improve the quality of work life.</li> <li>• Electronic recording and tracking of</li> </ul>

Division	Noteworthy Practices	Opportunities for Improvement
Directorate/ Operations (continued)	employees are completed on a biennial to triennial cycle. Offices have been equipped with ergonomic furniture and accessories. ASD Tutorials were developed to enhance office safety and ergonomics awareness.	hazard data via LCATs and HEAR databases will help to maintain a current inventory of hazards and efficacy in management of hazard mitigation.
Engineering	<ul style="list-style-type: none"> <li>• All formal work authorizations (six Activity Hazard Documents and seven Sealed Sources Authorizations) are collaboratively and thoroughly reviewed by line management, the division safety coordinator, and the EH&amp;S Division.</li> <li>• Interviews with division employees demonstrated knowledge of operations and related ES&amp;H issues.</li> </ul>	<ul style="list-style-type: none"> <li>• Housekeeping, labeling of refrigerators, access to electrical panels, seismic hazards, and chemical storage management in some areas require greater attention.</li> <li>• Several compressed gas cylinders did not have required pressure relief devices installed on them.</li> <li>• Machine guarding in the Building 77 sheet metal shop needs improvement.</li> </ul>
Environmental Energy Technologies	<ul style="list-style-type: none"> <li>• EETD has commendable management support and a proactive safety program that is both innovative and effective. Management commitment is evidenced by the condition of the spaces evaluated and the safety conscious attitude demonstrated by management and scientific staff.</li> </ul>	<ul style="list-style-type: none"> <li>• Some division workspaces contain electrical and chemical hazards that can be better controlled. Several safety showers and eyewashes are located near electrical sources. Equipment modification has created electrical hazards as well. Incompatible chemicals were stored together, and some chemicals lack secondary containment. A lack of appropriate spill response equipment was also common.</li> <li>• Several workstations create ergonomic hazards. The division has an initiative under way to identify and correct these conditions.</li> <li>• Several spaces had seismic hazards that required resolution. General clutter that obstructed egress routes was also a concern.</li> </ul>

<b>Division</b>	<b>Noteworthy Practices</b>	<b>Opportunities for Improvement</b>
Physical Biosciences	<ul style="list-style-type: none"> <li>• In order to underscore the importance of safety throughout the division, a scientist, Dr. Jeffrey Pelton, was appointed safety coordinator.</li> <li>• PBD staff is well trained. 94% of staff has completed the JHQ, and 92% of required courses have been completed. In addition, the division ensures that staff assigned to campus space is tracked and receive the appropriate LBNL ES&amp;H training. This exceeds the requirements of the LBNL UC Berkeley Memorandum of Understanding on Environment, Health, and Safety Policies and Procedures.</li> <li>• Waste storage compliance for the Division is 100%.</li> </ul>	<ul style="list-style-type: none"> <li>• Many computer workstations were deficient for ergonomic considerations. The division should continue to emphasize identification and mitigation of ergonomic hazards.</li> <li>• Some research and office equipment in the division has deficiencies in electrical and seismic safety.</li> <li>• Staff should pay greater attention to chemical safety and industrial hygiene. Good hygiene practices and personal protective equipment use when handling chemicals were lacking in some locations.</li> </ul>

## Appendix E

### FY01 SRC MESH Reviews

### Noteworthy Practices and Opportunities for Improvement

Division	Noteworthy Practices	Opportunities for Improvement
Earth Sciences	<ul style="list-style-type: none"> <li>• The “New Employee Instructions and Guidelines” effectively communicate to new employees their ES&amp;H responsibilities and expectations. The document describes responsibilities for completing a Job Hazard Questionnaire and all required training courses. The guidelines ask new employees to address ergonomic concerns.</li> <li>• ESD staff performs a limited amount of high-hazard work. All of this work is properly identified, and inherent risks are appropriately mitigated, including issuing authorizations.</li> <li>• The Division has several authorizations, including radioactive, laser, and X-ray authorizations. There were no authorization violations in the past year, and no radiation-related events in the past year. The total effective dose equivalent for the division in calendar year 2000 was 0.00 person-rem.</li> <li>• The Division has had no reportable occurrences for the last three years.</li> <li>• ESD has done an admirable job reducing the amount of waste they generated. In each of the last two self-assessment performance years, the Division has generated a lesser amount of hazardous, radioactive and mixed waste than in the previous year.</li> </ul>	<ul style="list-style-type: none"> <li>• The Division Safety Coordinator is the primary source of safety and health communication within the Division. Although ES&amp;H communications take place, there is little evidence that line management reinforces these communications. Department and group meetings are sporadic in addressing ES&amp;H.</li> <li>• The organization chart, while effectively managing the scientific disciplines of the Division, may create ambiguous lines of ES&amp;H authority. Some line managers in the Division feel that the supervisory structure of the organization can create confusion that impacts safety accountability of Division staff.</li> <li>• The division safety coordinator believes some DOE projects elude the initial and annual hazard review mechanism. Also, documentation of certification of the Off-Site Safety and Environmental Protection Plan is inconsistent.</li> <li>• There are several recurring safety concerns in division workspaces: blocked electrical panels, lack of seismic bracing, space limitations leading to general clutter, unlabeled chemicals, questionable securing of compressed gas cylinders, ergonomically deficient workstations, and invalid signage.</li> <li>• Repetitive motion injuries are a significant fraction of the total injuries within the Division, yet ergonomically incorrect workstations are persistent in the Division. Line management has not</li> </ul>

Division	Noteworthy Practices	Opportunities for Improvement
Earth Sciences (continued)		<p>been proactive in addressing these concerns. There is general confusion about Division requirements regarding ergonomic training and evaluations.</p> <ul style="list-style-type: none"> <li>For the second straight year, ESD staff recorded injuries at a higher rate than the other scientific divisions. It should be noted that the majority of these injuries were minor in nature and did not result in lost workdays.</li> </ul>
Engineering	<ul style="list-style-type: none"> <li>The Division has demonstrated a strong commitment of communicating safety to its personnel. Safety is a standing item in the Division Director's senior management meetings, there are quarterly lessons learned summaries and ES&amp;H information in the Division newsletters, and there is broad-based involvement of Engineering personnel in the Division's self-assessment activities.</li> <li>The staff at the Ultra High Vacuum Facility (B77) meet daily to discuss construction safety issues and other safety concerns. Such a proactive approach accentuates ES&amp;H awareness among staff, which has no recordable injuries and accidents and no regulatory violations for the past several years. The operation appears to be well organized, cleanly operated, and staffed with proficient personnel.</li> <li>Engineering has a consistently high completion rate for completing the JHQ and required ES&amp;H training, including training for building emergency team members. The division's current JHQ completion rate is 98%, and completion of required training is 95%. Many employees have also completed recommended training. Of particular note is the staff at B77 and B25, where they have completed additional training to address high-hazard work with chemicals.</li> </ul>	<ul style="list-style-type: none"> <li>The Engineering Division has a large number of employees and operating units matrixed to other divisions. The ES&amp;H roles and responsibilities for the Division's matrixed employees are poorly defined by management and not conveyed clearly to personnel. Safety roles and lines of communication by various combinations of matrixed employees/supervisors and host employees/supervisors are not well understood or documented. This problem is due in large part to the lack of formal policy and guidance by the Laboratory (i.e., the institution).</li> <li>Hazard reviews, in particular design and fabrication projects and lower-hazard activities, are not done consistently throughout the Division. There is minimal oversight to ensure that line managers are performing reviews and implementing follow-up actions for all projects. The Project/Facility Safety Review Questionnaire, which is intended to document such reviews, is not widely used.</li> <li>Reviews of Activity Hazard Documents (AHDs) are informal or incomplete. The scope and rigor of the AHD reviews are inadequate for projects that are identified as highly hazardous operations, such as the Photo Fabrication Shop and the Ultra High Vacuum Facility.</li> </ul>

Division	Noteworthy Practices	Opportunities for Improvement
<p>Engineering (continued)</p>	<ul style="list-style-type: none"> <li>• For the past two years, Engineering has performed exceptionally well in its ES&amp;H self-assessment evaluation. This is reflective of a division that is operating at a very safe level and has an active ES&amp;H program.</li> <li>• The Division Director is intimately involved in the day-to-day operations of the safety program. He is the chair of the Division Safety Committee and works closely with the Safety Coordinator and the EH&amp;S Division Liaison. The Director has performed, by his estimate, 20–30 safety walkthroughs of Engineering facilities this past year.</li> <li>• The self-assessment teams involve a broad spectrum of Engineering personnel. Team members are well trained and provided resources in specific areas of ES&amp;H on which each team concentrates. The teams are proficient and afford the Division with an active self-assessment program. It is noted that currently there are many vacancies on the teams, and it is imperative that these vacancies be filled to sustain past efforts.</li> </ul>	
<p>Facilities</p>	<ul style="list-style-type: none"> <li>• Facilities has established a broad-based system of safety committees that integrates safety into the day-to-day operations of staff and managers. The department-wide committee, the supervisor group committee, and the BBAP steering committee are excellent vehicles for involving staff. The executive safety committee resolves safety issues at the highest level and directs the resources and funding to support safety actions.</li> <li>• Facilities has an active program in communicating safety to its employees. In addition to normal safety communication generated from safety</li> </ul>	<ul style="list-style-type: none"> <li>• There is a discrepancy between staff completion of JHQs (72%) and completing of required training (90%). Individuals that do not complete their JHQs do not appear in the EH&amp;S required training database. A review of the Facilities training records indicates that approximately 94 employees, primarily long-term subcontractors, have not completed their JHQ or required training.</li> <li>• Quarterly cross-shop inspections are an excellent vehicle to meet self-assessment requirements. However, not all workspace under the control of Facilities are being inspected through</li> </ul>

Division	Noteworthy Practices	Opportunities for Improvement
Facilities (continued)	<p>committees and all-hands meetings, there is a safety column in the department newsletter. The department also uses electronic display boards and safety bulletin boards in various locations.</p> <ul style="list-style-type: none"> <li>• The program to screen the hiring of safe and environmentally responsible subcontractors, especially construction subcontractors, is comprehensive and effective. Subcontractors are required to have a safety program and must meet satisfactory safety performance in past projects. Once hired, unsatisfactory safety performance is grounds for dismissal and/or denying future work.</li> <li>• Each shop and operating unit within the department has a one-page sheet listing the safety policies and procedures required of each employee in that particular work environment. Employees sign the document at the bottom of the page to acknowledge their understanding of the work rules and safety requirements.</li> <li>• Facilities has been proactive in providing state-of-the-art safety equipment and supplies for its workers.</li> <li>• Facilities staff has made a concerted effort to complete courses that lead to certification or proficiency recognition. The Facilities training database alerts employees of certification opportunities and renewal requirements. The department has an excellent record for certification/ proficiency for forklift operations, crane operations, asbestos and lead removal, and HVAC work.</li> <li>• Facilities has established a comprehensive roof access program to minimize potential exposure to chemicals, magnetic fields, and radiological hazards for staff working on roofs.</li> </ul>	<p>this program. Other work areas, such as offices, non-shop work stations, sheds, supply rooms, cafeteria, and storage rooms, are not being inspected on a regular basis.</p> <ul style="list-style-type: none"> <li>• Most department workspaces are orderly and safe. However, several concerns were noted, including lack of seismic bracing, storage and signage issues, chemical hazards, and a blocked electrical panel.</li> <li>• Facilities does not track its safety corrective actions through the Work Request Center database or through other tracking systems, such as LSAD. During the MESH review, the department was unable to generate a comprehensive listing of past safety actions. Such information is essential for feedback and continuous improvement.</li> </ul>

Division	Noteworthy Practices	Opportunities for Improvement
Facilities (continued)	<ul style="list-style-type: none"> <li>• The department has significantly decreased its injuries and accidents. The TRC and LWC rates are greatly improved from the previous fiscal year. Of particular note is the establishment of the Facilities Accident Review Board.</li> <li>• A key feedback and improvement program is the Behavior-Based Accident Prevention (BBAP) Program. Part of BBAP is the Workers Observing Workers (WOW) program. The BBAP Program is cost effective in reducing injuries and accidents within the Department.</li> <li>• Facilities has contracted an independent firm to audit operations for compliance with life and safety regulations, building codes, and environmental regulations. This has helped the department identify key deficiencies and correct them in an expeditious manner.</li> <li>• Some of the crafts operations, including the rigging group, have instituted a process to evaluate work just completed (i.e., post-operation meetings). Reviewing the specific job problems encountered results in lessons learned that can be used in future work.</li> </ul>	
Life Sciences	<ul style="list-style-type: none"> <li>• Senior management support is a vital component of Life Sciences' ES&amp;H program. The Division Deputy has demonstrated a strong commitment to the ES&amp;H program and providing a safe workplace for staff. The Deputy's management support should serve as a model for effectiveness and involvement from senior management.</li> <li>• The division has an active Safety Committee that is intimately involved in issue resolution as well as lessons learned. The Safety Committee membership is representative of each</li> </ul>	<ul style="list-style-type: none"> <li>• The ES&amp;H Coordinator has done an outstanding job of instituting an effective safety program in a division with a large population that encounters a wide range of hazards. In light of additional job responsibilities for the ES&amp;H Coordinator, the division should consider allocating additional personnel support for the Division ES&amp;H program.</li> <li>• Although Life Sciences has established appropriate controls, there have been instances in which minor violations have occurred. The division had four</li> </ul>

Division	Noteworthy Practices	Opportunities for Improvement
<p>Life Sciences (continued)</p>	<p>research group in the division, with a total membership of approximately 25 people. These individuals also communicate safety issues and committee activities at group meetings.</p> <ul style="list-style-type: none"> <li>• The Space Hazard Review is an excellent tool for capturing all hazards by location. Each room where work is performed has a corresponding Space Hazard Review sheet. This form inventories special hazards (such as lasers and X-rays), radioactive hazards, and waste generation. The form also designates a responsible party and provides a mechanism for a yearly review and recertification.</li> <li>• Life Sciences staff has been diligent in completion of job hazards questionnaires and required training classes identified by the JHQ. Division staff has also shown great improvement in attendance at required building emergency team training.</li> <li>• The division has had no major waste characterization deficiencies (NCARs) in the past year. LSD has a waste characterization compliance rate of 95.7%.</li> <li>• LSD has done an notable job reducing the amount of radioactive and mixed waste generated. In each of the last two self-assessment performance years, the Division has generated a lesser amount of radioactive and mixed waste than in the previous year. Division staff has worked with EH&amp;S Division personnel to employ technologies that reduce radioactive and mixed waste generation.</li> </ul>	<p>RWA violations last year. In one case, the corrective actions employed as a result of the violation were not being followed.</p>

Division	Noteworthy Practices	Opportunities for Improvement
Nuclear Sciences	<ul style="list-style-type: none"><li>• The 88 Inch Cyclotron PAC and instructions to users is an excellent tool for work planning. The Cyclotron Web page, with its visitor instructions for approved beam time, provides users with information on safety training and administrative requirements prior to performing work at LBNL.</li><li>• Nuclear Sciences has a good record of performing work within the limits of authorization documents. SAA compliance rate is in the mid-90th percentile. The division has an exemplary accident/injury record, with no recordable accidents in the past year.</li></ul>	<ul style="list-style-type: none"><li>• The northeast door of Building 88 is a potential hazard in that access through this door allows entry to a controlled area. The staff of the 88" Cyclotron is considering card access as a means to limit entry to the area. The MESH team commends the Division for identifying this issue and strongly recommends that it be pursued quickly to resolution.</li><li>• There are several Engineering Division staff members matrixed to NSD. The division is pursuing an MOU with the Engineering Division to better define training needs and tracking responsibilities.</li></ul>

## **Appendix F**

### **List of Acronyms and Abbreviations**

AFRD	Accelerator and Fusion Research Division
AHD	Activity Hazard Document
ALS	Advanced Light Source
ASD	Administrative Services Department
BBAP	Behavior-Based Accident Prevention
CSD	Chemical Sciences Division
DOE	Department of Energy (U.S.)
EETD	Environmental Energy Technologies Division
EH&S, EHS	Environment, Health and Safety Division (LBNL)
ESD	Earth Sciences Division
ES&H	Environment, Safety, and Health (DOE term)
HEAR	Hazards, Equipment, Authorizations, and Review System
IFA	Integrated Functional Appraisal
ISM	Integrated Safety Management
JHQ	Job Hazards Questionnaire
LCATS	Laboratory corrective-action tracking system
LSAD	Laboratory self-assessment database
LSD	Life Sciences Division
MESH	Management of ES&H
MOU	Memorandum of understanding
MSD	Materials Sciences Division
MWSAA	Mixed waste satellite accumulation area
NCAR	Nonconformance and corrective action report
NSD	Nuclear Sciences Division
OAA	Office of Assessment and Assurance
OBAP	Office behavior-based accident prevention
P2R	Performance and Progress Review
PBD	Physical Biosciences Division
PI	Principal Investigator
PGF	Production Genomics Facility
POCM	Performance objectives, criteria, and measurement
PSRQ	Project Safety Review Questionnaire
QA	Quality assurance
RWA	Radiological Work Authorization
RWCA	Radioactive waste collection area
RWP	Radiological Work Permit
SAA	Satellite accumulation area
SAAR	Supervisor Accident Analysis Report
SRC	Safety Review Committee
SSA	Sealed Source Authorization
TRC	Total reportable cases
UC	University of California
WOW	Workers Observing Workers