

Biosciences Area Integrated Safety Management (ISM) Plan



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1. Executive summary:

The Biosciences Area forges multidisciplinary teams to solve national challenges in energy, environment, health issues, and technology development, as well as advance the engineering of biological systems for sustainable manufacturing.

Biosciences Area (BSA) research is coordinated through three Divisions and one User Facility:

- Biological Systems and Engineering (BSE)
- Environmental Genomics and Systems Biology (EGSB)
- Molecular Biophysics and Integrated Bioimaging (MBIB)
- Department of Energy (DOE) Joint Genome Institute, a DOE Office of Science User Facility (JGI)

In October 2015, the Biosciences Area was reorganized. The three divisions (BSE, EGSB, MBIB) are geographically dispersed and operational support functions, including safety oversight, are centralized and managed through three operations centers: Biosciences Operations at Berkeley, Emery Station East, and the Integrative Genomics Building. The Division Safety Coordinator is accountable to the Division Director directly or through her/his Deputy of Operations and is responsible for assisting with implementation of the Lawrence Berkeley National Laboratory (LBNL) safety programs within the division.

The three operations centers are managed by:

- Biosciences Operations at Berkeley (BSBK) – Deputy of Operations, Nikki Humphreys
- Emery Station East (ESE) – Deputy of Operations, Diane Pierotti
- Integrative Genomics Building (IGB) – Deputy of Operations, Nick Everson

At LBNL and in the Biosciences Area, Integrated Safety Management (ISM) is implemented via the Work Planning and Control (WPC) program. This process is employed for defining work activities, identifying hazards, and assigning controls for each work activity. In addition, the WPC program includes a process for recording worker assignments to activities, assessing worker competency to perform work safely, and recording individual worker authorizations. Each division/facility within the Biosciences Area takes a risk-based approach for safety. Worker training and safety is the top priority for the Biosciences Area line management.

2. Overview:

The Lawrence Berkeley National Laboratory (LBNL) takes a comprehensive institutional approach to its Integrated Safety Management System (ISMS). The Biosciences area remains firmly committed to the LBNL ISM plan. The objective of ISM is to perform work in a safe and environmentally sound manner. More specifically, as described in DOE P

450.4, Safety Management System Policy: "The Department and contractors must systematically integrate safety into management and work practices at all levels so that missions are accomplished while protecting the public, the worker, and the environment. This is to be accomplished through effective integration of safety management into all facets of work planning and execution." Berkeley Lab incorporates this policy into its Lab-wide Integrated Environment, Safety, and Health (ES&H) Management Plan.

Seven principles set the fundamental policies for guiding Berkeley Lab's actions:

1. Line Management Responsibility
2. Clear Roles and Responsibilities
3. Competence Commensurate with Responsibilities
4. Balanced Priorities
5. Identification of EHS Standards and Requirements
6. Hazard Controls Tailored to Work Being Performed
7. Operations Authorization

Five core functions then provide the necessary structure for work activities that pose a hazard to the workers, the public, and the environment:

1. Define the Scope of Work
2. Analyze the Hazards
3. Develop and Implement Hazard Controls
4. Perform Work within Controls
5. Provide Feedback and Continuous Improvement

3. Policy Statement

The Biosciences Area, including the Biosciences Area Office, will conduct operations in a manner that protects the health and safety of its employees and affiliates; does not endanger the environment; and is consistent with applicable LBNL, University of California, and other government agency policies and regulations. LBNL's environment, health, and safety policies and requirements are contained in the [LBNL Regulations and Procedures Manual \(RPM\)](#), The Health and Safety Manual ([LBNL Publication 3000](#)), and the Integrated Environment, Safety & Health Management Plan ([LBNL ISM](#)).

Key to implementing this policy are the following core safety values:

- The institution demonstrates a strong commitment to safety by ensuring the appropriate resources are devoted and leadership is engaged resulting in safety being integrated into all facets of its work.
- Managers, supervisors, and activity leads are actively involved and demonstrate leadership in performing work safely.
- Individuals take ownership for safety and continuously strive to improve.
- Individuals demonstrate an awareness of and concern for the safety of others.

This plan has been developed and is updated periodically to assist in ensuring that the Area's ES&H objectives are met. The Laboratory is committed to doing this while meeting the requirements of Clause I.86 of Contract 31 and implementing the policy provided in DOE P 450.4 (Safety Management System Policy).

4. Scope of Plan

The requirements described in this ISM plan apply, as appropriate, to staff, matrixed employees, postdoctoral scholars, graduate students, affiliates, visitors, users, vendors, and contractors performing work under the management of each unit. Much of Biosciences Area research is performed by research groups of PhD scientists, postdoctoral scholars, research associates, and graduate students, under the direction of a principal investigator (PI). Several PIs and researchers hold shared appointments at LBNL and the University of California, Berkeley (UCB) or the University of California, San Francisco (UCSF). Except where noted, this plan applies to work conducted in LBNL facilities and on field sites, and does not apply to work subcontracted to a UC campus. Work carried out on the UC Berkeley campus in spaces under the control of said campus will be carried out in accordance with the Memorandum of Agreement between UCB and LBNL Concerning Environment, Safety, and Health (ESH) Policy and Procedures, April 2017. As stated in this partnership agreement, the campus office of Environment, Safety, and Health has responsibility for developing ES&H policies and requirements for work conducted in campus spaces. However, LBNL principal investigators conducting work on the campus are encouraged to implement controls and other measures beyond the institutional requirements if they are deemed appropriate.

5. Scope of Work Authorized

Biosciences Area scientists conduct research in the biological sciences relevant to national-scale challenges in energy, environment, health, biomanufacturing, and technology development.

To conduct research in these areas, PIs are responsible for both identifying the potential hazards of their proposed research activities and for working with appropriate LBNL staff to assure that the research can be pursued safely prior to commencement of experiments.

In addition, each PI prepares EHS documentation and obtains all required approvals for potentially hazardous or regulated work as defined in Chapter 6 of PUB-3000 "Work Planning and Control" prior to commencement of that work. Every person who does work in the BSA is a part of a division safety management chain. This chain links every staff member and participating affiliate, from the individual worker through each supervisor and mentor to senior management, including the division director. Safety awareness and practice is a required work expectation of all personnel.

6. Roles, Responsibility, and Accountability

Roles, responsibilities, and accountability for personnel associated with LBNL are documented in PUB-3000, Chapter 1, General Policy and Responsibilities. Biosciences Area units adhere to all institutional requirements. The following section defines key roles and responsibilities for implementing EHS within the divisions.

6.01 Division or User Facility Director

Responsibility and accountability for safety within a division or user facility begins with the division or user facility director. The director is ultimately responsible for the safety and compliance of all activities within their respective unit.

A director, either directly or through her/his deputies and delegations, performs the following tasks:

1. Ensures safety performance is included in annual performance reviews.
2. Reviews and approves the annual self-assessment.
3. Reviews and approves safety documentation for the most hazardous activities performed within the division/user facility.
4. Reviews any incident reports within their unit.
5. Reviews and approves updates to the ISM plan. The director also supports ongoing safety efforts through a variety of channels such as:
 - a. Safety incentive programs like the SPOT award.
 - b. Periodic "level-1" emails promoting safety.
 - c. Open safety communication with personnel during walk-arounds and all-hands meetings.
 - d. Periodic participation in walk-throughs and other hands-on evaluations of division/user facility execution of safety principles.

6.02 Principal Investigators (PIs)

PIs are responsible and accountable directly to their respective director for assuring that all activities under their direction are conducted in a safe manner, protect the environment, and comply with EHS policies and requirements. The PI must consult with qualified specialists (e.g. a Biosciences Area division safety coordinator and/or EHS subject matter experts) where needed to acquire technically correct guidance about safety and environmental protection consistent with LBNL EHS policy and regulatory requirements. Although tasks associated with implementation of the safety program can be delegated, the full responsibility and accountability remains with the PI.

Some specific responsibilities of PIs include:

1. Ensuring that new or significantly modified projects or facilities are reviewed for hazards and appropriate authorizations are implemented and are current.
2. Ensuring that employees have been added to all applicable WPC activities.

3. Ensuring employees and affiliates have completed all institutional training classes, division/facility-specific training, and all on-the-job training that is necessary to perform their work safely.
4. Ensuring working conditions within the lab meet institutional and division/facility requirements through mechanisms such as periodic workspace inspections, discussion of safety topics at staff meetings, and cooperation with the unit's safety staff to implement the institution's safety programs.
5. Ensuring that before work begins the hazards are identified and controls are implemented.
6. Execution of new institutional safety programs and policies when implemented by LBNL.
7. Participating in the investigation of workplace injuries to the extent appropriate.
8. Ensuring subcontractors/vendors are properly managed through the subcontractor Job Hazard Analysis (sJHA) program before initiating work. This may include additional processes and approvals based on individual ops centers.
9. Ensuring safety performance is included in employee performance reviews.
10. Advising line management and the safety coordinator of plans to vacate permanent research space.
11. The PI is responsible for the safe disposal of all hazards and for leaving the space in a clean and usable state before vacating.

6.03 Supervisors and Activity Leads

It is the expectation of line management that all Biosciences Area personnel have the necessary technical skills, knowledge, training, personal protective equipment, and certifications required by law and by laboratory policy to perform their duties safely and in a manner protective of the environment. Supervisors, project leads, and activity leads are a critical part of the LBNL safety structure and operate under the authority of a PI or the director. Supervisors, project leads, and activity leads must be familiar with the hazards and safety controls of activities in their management area and must ensure that all work performed under their purview is conducted in accordance with LBNL and division/facility safety policies and procedures.

Responsibilities of supervisors, project leads, and activity leads include:

1. Review and approve the WPC activities: written scope of work, hazards, controls, and training requirements. Ensure that WPC activities are promptly updated when there is any change in the scope of work of that activity.

2. Ensure work under their management remains within the authorized scope(s) of work.
3. Provide necessary on-the-job training to ensure employees can work safely.
4. Ensure employees are sufficiently qualified to work safely within their labs before allowing work without supervision.
5. Promptly respond to employee concerns (even if this is limited to directing the concerns to the PI, division safety coordinator, or to the EHS division).
6. Participate in the investigation of workplace injuries to the extent appropriate.
7. Implement corrective actions for safety deficiencies identified through safety inspections, injury investigations, and employee concerns.
8. Stopping any work you believe is unsafe or could harm the environment.

For more detail see the [LBNL stop work policy](#). The specific policy and procedure for stopping work is found in LBNL/PUB-3000, Chapter 1, Section 1.5 Stopping Unsafe Work.

Supervision is required for anyone who is learning something new that involves hazards. This may range from a student or intern to an experienced investigator learning a new technique.

The supervision of students is of particular concern. On a regular basis, supervisors of students must assure that each student receives appropriate training and close supervision from staff that are present in the laboratory.

6.04 Employees and Affiliates

While PIs and supervisors are responsible for assuring that EHS requirements are followed by their subordinates and visitors, Biosciences Area personnel are also individually responsible for following the EHS requirements that pertain to the hazards of their work. Employees and affiliates are expected to work safely, follow institutional and division safety requirements, watch out for the safety of others, and cooperate with local and LBNL EHS efforts. All Biosciences Area personnel are expected to implement ISM by:

1. Initiating work only when authorized to do so.
2. Performing work within the controls authorized.
3. Ensuring work remains within the authorized scope of work.
4. Continuously assessing safety conditions, seeking feedback from safety staff, and making improvements as needed.
5. Stopping any work you believe is unsafe or could harm the environment.

For more detail see the [LBNL stop work policy](#).

6.05 Matrixed Personnel

The home division and host division/facility of matrixed personnel have complementary responsibilities for safety.

The **host** unit has the responsibility to provide a work environment where recognized hazards are controlled, and to ensure the work is authorized and adequate training has been completed.

The **home** division also must ensure that the work is authorized appropriately and that the worker is adequately trained.

In the event of an injury, it is ultimately the **home** division that is responsible for an investigation; however, the **host** unit will participate to the extent appropriate.

6.06 Subcontractors and Vendors

All “hands-on” work performed by subcontractors or vendors as defined by LBNL PUB 3000 Chapter 31 must be reviewed through the Subcontractor Job Hazard Analysis (sJHA) program before work may begin. Workers performing the hands-on work must complete all additional institution requirements including a pre-job meeting, General Employee Radiation Training (GERT), and any additional permits or safety documents required for the work.

6.07 Division Ergo Advocates

Ergo advocates are volunteers who are the eyes and ears for Berkeley Lab Ergonomics. Advocates meet with incoming staff and students to outline ergonomic resources, provide on-site office, telework office, and in-lab ergo evaluations, and follow-up with the EHS Ergonomics team to make sure anyone experiencing ergonomic discomfort receives the support they need to work pain- and injury-free.

6.08 Area Safety Leads

To support the safety program each Biosciences Area PI assigns a primary safety contact (area safety lead/representative) for each of their laboratory spaces. These safety leads/representatives are familiar with laboratory processes and hazards, and serve as the point of contact for questions regarding ISM and compliance in these spaces. Appointing a safety lead serves to spread a culture of safety more broadly throughout the workplace; however, as the designated supervisor, the PI retains all responsibility for the safety of their personnel and space.

6.09 Division Safety Management Committees

Biosciences Area safety management committees meet monthly and consist of representatives from the division/user facility, the division safety coordinator, the

representative to the LBNL Safety Advisory Committee, and the EHS liaison. In addition, other EHS division staff members may be invited to attend when their interest or expertise would be useful. These representatives serve each unit in promoting general EHS awareness and practice.

6.10 Division Safety Coordinator

The division safety coordinator is accountable to the director or their deputy of operations and is responsible for assisting with implementation of the LBNL safety programs within the division/facility. The responsibilities of this individual include:

1. Serving as a point of contact for division employees regarding the implementation and interpretation of the LBNL's EHS policies.
2. Overseeing the coordination and management of required safety documentation.
3. Entering safety deficiencies into the corrective action tracking system (CATS).
4. Planning and moderating the unit's safety committee meeting.
5. Regularly attending the safety coordinator meetings and other safety-related meetings as needed.
6. Maintaining the Biosciences Area ISM Plan on behalf of directors.
7. Assuring that the unit's ongoing program of self-assessment is conducted annually.

7. Scope of Work, Hazard Assessment, and Hazard Controls

Defining the scope of work, assessing the hazards, and identifying controls are the first three core functions of ISM. The primary process to address each of these core functions is managed through the Work Planning and Control (WPC) program and through other formal authorizations, such as Subcontractor Job Hazard Analysis (sJHA), as applicable. To complete these work authorizations, the project lead and/or activity lead reviews and documents the work to be performed, assesses the hazards, and develops the controls for the hazards identified. The information is then reviewed and ultimately approved by appropriate individuals. The review and approval of work is the responsibility of line management; however, it may involve consultation from the EHS division depending on the hazard level of the activity. The division safety coordinator is available to assist with this process upon request. In some situations, a more detailed hazard assessment may be necessary. Additional assessments vary and may include, but are not limited to, the following:

1. Requests for ergonomic evaluations.
2. High-hazard chemical usage ((as identified by Biosciences line management or defined by the EHS Exposure Assessment procedures).
3. Noisy operations.
4. High-risk lifting operations.

5. Annual Biosafety Cabinet certification.
6. Work involving high-hazard activities

Additional controls may be implemented following these types of assessments, and, if appropriate, the underlying safety documentation will be revised as needed.

8. Work Authorization, Qualification, and Training

Working safely is the responsibility of anyone performing any task. However, providing safe working conditions is ultimately the responsibility of the line management. The tasks associated with work authorization and training are often delegated to a project lead, supervisor, or activity lead; however, the responsibility is retained by the line management. The project lead (or designee) will document the preliminary scope of work, potential hazards, and required controls for activities performed within their projects. Each worker assigned to these activities will then have specific training assigned based upon the work that the worker will be performing. The worker then needs to complete all required training courses within the first 30 days of task assignment. A person may begin work prior to completion of all training; however, the worker is not allowed to perform a task related to the deficient training unless under direct supervision of a fully trained worker. In some cases, such as work involving radiological hazards or Class 3B/4 lasers, all required training must be completed prior to starting work.

8.01 On-the-job training

We are a research institution, and part of that learning process is teaching researchers how to do science with safety in mind. We do not assume new workers know how to work safely or to be experienced in the required techniques and tasks, and it is the expectation of line management that new workers receive the appropriate hands-on or on-the-job training necessary to work safely.

Sufficient on-the-job training will be provided as needed to any worker by the PI, supervisor, activity lead, or designee so that they are confident that the workers can conduct their tasks and work safely. This training, where appropriate, must be documented in the WPC program. Specific documentation of on-the-job training is required for some high-risk activities such as laser work, and this documentation should be attached to the WPC activity for the work. For all other activities, the documentation of on-the-job training is accomplished in WPCI when the activity lead changes the worker's authorization level from "Work with Supervision" to "Authorized to Work."

8.02 Student Training

Supervisors, area safety leads, and activity leads must be especially attentive to student training, assuring that each student researcher completes the training appropriate for their work activities. They must be provided appropriate on-the-job training, and are introduced to other knowledgeable personnel that can

provide continuity of support and oversight. In the Biosciences Area, undergraduate and high school students are not allowed to work alone in any technical areas at any time.

8.03 Work Without Supervision

In addition to the review of safety hazards and training courses, supervisors and activity leads must also determine when an individual worker is qualified to perform work without direct supervision. This is a judgment decision for each supervisor and activity lead. Only after a supervisor and activity lead determine a worker is qualified to work safely and effectively may that worker work without supervision.

8.04 Working Alone

In the Biosciences Area, staff and associated affiliates are not allowed to work alone when the mitigated hazards associated with their work could incapacitate them to such a degree that they cannot “self-rescue” or activate emergency services. Compliance with the [LBNL Work Alone Policy](#) is ensured through two separate mechanisms: evaluation of the severity of the hazards during the WPC process, and evaluation of the qualifications and competency of the individual staff members and affiliates. As part of the preparation of formal work authorizations for the activity, project leads and activity leads, with assistance from the division safety coordinator and appropriate EHS personnel, are to assess and identify any tasks that warrant restrictions regarding working alone. These restrictions are to be included within the restriction section on the workers page of the WPC authorization, and are to be communicated to workers when the on-the-job training is provided for the authorized project. If the need for a partner or observer is determined, the principal investigator (or designee) is responsible for ensuring that support is provided when the designated tasks are performed. Regardless of hazards, a supervisor or activity lead may want to restrict an individual from performing a task alone. If such a case arises, the supervisor or activity lead will communicate these restrictions to the individual and inform them of what further training or experience is necessary before they will be permitted to work alone. In the Biosciences Area, undergraduate and high school students are not allowed to work alone at any time.

9. Working within Controls

The fourth core function of ISM is performing work within controls. Controls are typically identified and documented through formal written work authorization documents. It is the responsibility of the individual employee to work within the controls outlined in these documents or communicated through training. If the individual employee feels that the controls are inappropriate, they must contact their activity lead and/or supervisor for clarification. The line manager, either directly or through his/her designee, is responsible for ensuring controls are effectively communicated to the worker, and followed by the worker.

10. Feedback and Continuous Improvement

Feedback and continuous improvement is the fifth and last core function of ISM. There are a variety of feedback and continuous improvement mechanisms in place within the Biosciences Area.

10.01 Feedback

The most formal method for feedback within Biosciences Area is at a division/facility/ops center safety committee meeting. Safety committee members and staff are able to provide feedback on all aspects of unit/area safety programs during these meetings. Biosciences Area personnel have other mechanisms to provide feedback within their units, including:

1. Feedback to line managers, area safety leads, activity leads, project leads, principal investigators, supervisors, division/user facility directors, and division safety coordinator.
2. Direct communication with the division safety coordinator, EHS Division Liaison, and health and safety representative online at [EHS Safety Concerns](#).
3. Email sent to ergo@lbl.gov requesting ergonomic assistance or a request to a division ergo advocate.
4. Safety performance feedback is incorporated for all staff (including PIs and supervisors) on their annual performance review.
5. By calling the University of California Whistleblower hotline at 1-800-403-4744 or reporting or [reporting online](#).
6. By calling the LBNL Internal Audit Service at 510-486-4472.
7. By mail at US DOE employee concerns program manager, 9800 S. Cass Ave., Argonne IL 60439.

10.02 Safety Inspections

Safety inspections of workspaces occur on a regular basis, and are conducted by the division safety coordinator, the PI, division/user facility director, and/or the area safety lead. During these inspections, division/facility personnel walk through workspaces to verify compliance with safety requirements, and speak with staff to determine whether safety requirements are being adequately communicated and that staff understand their safety responsibilities. In addition, as part of their responsibilities, PIs, supervisors, activity leads, and area safety leads continually monitor safety performance in their labs and correct any deficiencies they observe.

10.03 Exposure Assessment

Workers and line management can request additional information or guidance on potential exposures to workplace hazards through several mechanisms. EHS subject matter experts and other representatives can be contacted directly, or

through the DSC. Exposure assessments can be requested through the 'EA' (exposure assessment) link in any WPC Activity.

10.03 Division/User Facility Self Assessment

At the beginning of each fiscal year, the division/user facility identifies focus areas for detailed self-assessment. As each focus area self-assessment is completed, a report is generated which is also reviewed and approved by leadership. Corrective actions are identified to address root causes and, if appropriate, entered into CATS or the [Safety Concerns website](#).

10.04 Incident Investigations

LBNL accidents, injuries, and "close calls" will be investigated by the relevant division(s)/facilities. The purpose of the investigation is to identify the cause of the incident and identify corrective actions that will prevent similar future occurrences. The division safety coordinator will work with the EHS Division to ensure that these incidents are investigated in a timely manner, and that a plan of action is established. Corrective actions are recommended to line management and, if appropriate, entered into CATS or the [Safety Concerns website](#). Incidents involving lab employees that occur on the UC Berkeley campus are governed by UC Berkeley EHS rules in accordance with the Memorandum of Agreement between UCB and LBNL Concerning Environment, Safety and Health (ESH) Policy and Procedures, April 2017. However, LBNL EHS and Biosciences Area personnel may assist UC Berkeley EHS personnel with the investigation, if it is appropriate to do so.

10.05 Continuous Improvement

The entire WPCI and other processes of risk assessment, hazard identification, determination of controls, approval of work, self-assessments, and feedback are designed to drive continuous improvement. The most formal method of continuous improvement is through division/facility safety self-assessment. This process is designed to raise safety awareness, better understand hazards, and improve controls. Continuous improvement efforts happen regularly through the following channels:

1. Incident investigations and subsequent corrective actions.
2. The SPOT award incentive program.
3. Feedback/safety discussions at staff meetings and group meetings.
4. Inclusion of safety performance on annual performance reviews.
5. Periodic safety inspections and subsequent corrective actions.
6. Safety deficiencies entered into CATS.
7. Reporting and investigation of near misses.
8. Development and/or communication of Lessons Learned.
9. Interaction between safety staff and ergo advocates with division/facility personnel.

10. "Level-1" email distribution to all members addressing relevant safety topics.

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