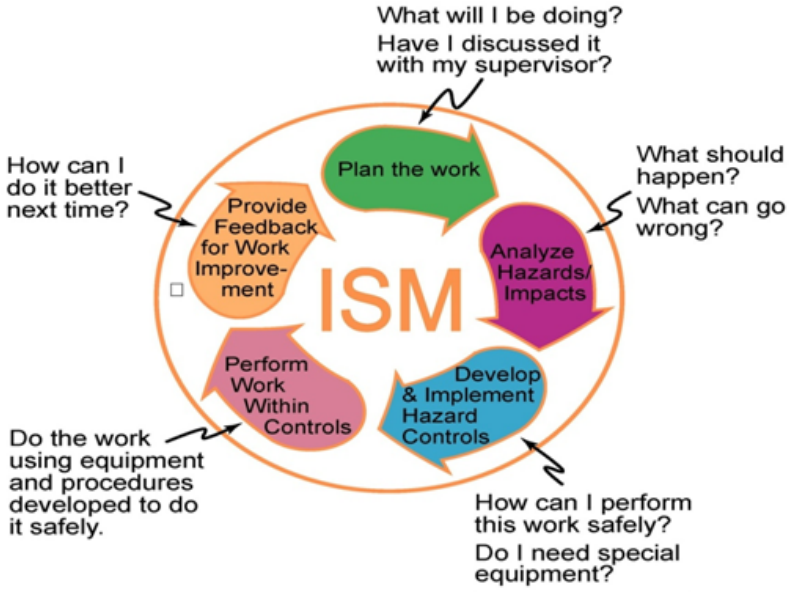
Chemical Sciences Division (CSD)

Integrated Safety Management (ISM) Plan



Revised: May 2016

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Chemical Sciences Division Integrated Safety Management Plan

1.0 Integrated Safety Management (ISM) Policy Statement

The Chemical Sciences Division 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 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).

2.0 Scope of Plan

The requirements described in this ISM Plan apply, as appropriate, to faculty, staff, matrix staff, postdoctoral scholars, graduate students, affiliates, visitors, users, vendors, and contractors performing work under the management of the division. The Chemical Sciences Division has approximately 350 employees and affiliates. Most of the division's research is performed by small research groups of PhD scientists, postdoctoral scholars, and graduate students, under the direction of a principal investigator (PI). Many of the Chemical Sciences Division Principal Investigators (PIs) and researchers hold shared appointments at LBNL and the University of California, Berkeley (UCB), and/or similarly with The Joint Center for Artificial Photosynthesis (JCAP).

Except where noted, this plan applies to work conducted in LBNL facilities and does not apply to work performed by Chemical Sciences Division personnel on the campus of UCB. Work carried out on the UCB campus in spaces under the control of UCB will be carried out in accordance with the '*Partnership Agreement between UCB and LBNL Concerning Environment, Health and Safety Policy and Procedures, March 2004'*. As stated in this partnership agreement, the UCB office of Environment, Health and Safety has responsibility for developing EHS policies and requirements for work conducted in campus spaces. However, LBNL principal investigators conducting work on the UCB campus are encouraged to implement controls and other measures beyond the UCB institutional requirements if they deem it appropriate.

The work conducted at the Joint Center for Artificial Photosynthesis (JCAP) falls under the scope of this plan as well as adhering to the Integrated Safety Management (ISM) Plan for the Joint Center for Artificial Photosynthesis.

3.0 Scope of Work Authorized

The Chemical Sciences Division conducts research not limited to but primarily including basic research in chemical physics and the dynamics of chemical reactions, catalysis, electron spectroscopy, photochemistry, theoretical chemistry, physical chemistry, atomic physics, and chemistry of the actinide and lanthanide elements. Current CSD research programs at LBNL employ high harmonic laser systems, synchrotron end-stations, chemical and materials synthesis, vacuum systems, pressure systems, high voltage electrical equipment, and work with radiological materials. Principal Investigators 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 Principal Investigator prepares EHS documentation and obtains all required approvals for potentially hazardous or regulated work as defined in Chapter 6 of PUB-3000 'Safe Work Authorizations' prior to commencement of that work.

Everyone who does work in the Chemical Sciences Division is a part of the division's 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 Chemical Sciences Division personnel.

4.0 Roles, Responsibility and Accountability

Roles, responsibilities and accountability for personnel associated with LBNL are documented in PUB-3000, Chapter 1, 'General Policy and Responsibilities'. The Chemical Sciences Division adheres to all institutional requirements, including Chapter 1. The following section defines key roles and responsibilities for implementing EHS within the division.

4.01 Division Director:

Responsibility and accountability for safety within the division begins with the Division Director. The Division Director is ultimately responsible for the safety and compliance of all activities within the Chemical Sciences Division. The Division 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 Division Self-Assessment Plan.
3. Reviews and approves safety documentation for the most hazardous activities performed within the division.
4. Reviews and approves any incident reports within the division.
5. Reviews and approves updates to the division ISM Plan.

The division director also supports on-going safety efforts through a variety of channels such as:

1. Safety incentive programs like the SPOT award.
2. Leadership at quarterly Division Safety Management Meeting.
3. Periodic "level-1" emails promoting safety.
4. Open safety communication with the division's personnel during walk arounds.

4.02 Principal Investigators:

Principal Investigators are responsible and accountable directly to the Division 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 Principal Investigator must consult with qualified specialists (e.g. the Chemical Sciences Division Safety Coordinator, and/or EHS division subject matter experts) where needed, to acquire technically correct information 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 Principal Investigator. Some specific responsibilities of principal investigators 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-specific training, and all on-the-job training (OJT) that is necessary to perform their work safely.
4. Ensuring working conditions within the lab meet institutional and division requirements through mechanisms such as periodic workspace inspections, discussion of safety topics at staff meetings, and cooperation with the division'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, to the extent appropriate, of workplace injuries.
8. Ensuring subcontractors/vendors are properly managed through the subcontractor Job Hazard Analysis (sJHA) program before initiating work.
9. Including safety performance in employee performance reviews.

10. Advising line management and/or the safety coordinator of plans to vacate permanent research space in order to allow time for the disposal of hazardous materials, and clean-up of the space.

4.03 Supervisors, Project Leads, and Activity Leads:

It is the expectation of the division management that all Chemical Sciences Division 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 Principal Investigator or the Division 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 within their management area is conducted in accordance with LBNL and division 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.
2. Ensure work under their management remains within the authorized scopes of work.
3. Provide necessary on–the-job training (OJT) 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's concerns (even if this is limited to directing the concerns to the Principal Investigator, division safety staff or to the EHS division).
6. Participate in the investigation of workplace injuries to the extent that is 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, http://www2.lbl.gov/ehs/refs/stopwork.shtml. The specific policy and procedure for stopping work is found in LBNL/PUB-3000, Chapter 1, Section 1.5 'Stopping Unsafe Work'.

The supervision of students is of particular concern. In the context of student training in the Chemical Sciences Division, a 'student' is anyone who is learning something new. This may range from an inexperienced intern to a seasoned Principal Investigator learning a new technique. 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.

4.04 Employees and Affiliates:

While Principal Investigators and Supervisors are responsible for assuring that EHS requirements are followed by their subordinates and visitors, Chemical Sciences Division 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 to cooperate with division and LBNL EHS efforts. All CSD personnel are expected to implement Integrated Safety Management by:

1. Initiating work only when authorized to do so.
2. Performing work within the controls authorized.
3. Ensuring work remains within the authorized scopes 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, http://www2.lbl.gov/ehs/refs/stopwork.shtml

4.05 Matrixed Personnel:

The home division and host division of matrixed personnel have complementary responsibilities for safety. The Chemical Sciences Division as the host division has the responsibility to provide a work environment where recognized hazards are

controlled, to ensure the work is authorized, and to ensure adequate training. The home division must also 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 Chemical Sciences Division will participate to the extent appropriate.

4.06 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.

4.07 Division Ergo Advocates:

Division Ergo Advocates are volunteers who support the division by being the eyes and ears for the EHS Ergonomics Department. Advocates meet with incoming staff and students to outline ergonomic resources, provide in-office and in-lab ergo evaluations, and follow-up with the EHS Ergonomics Department to make sure anyone experiencing ergonomic discomfort receives the support they need to work pain and injury free.

4.08 Area Safety Leads:

To support the division safety program each Chemical Sciences Division Principal Investigator assigns a primary safety contact ("area safety lead") for each of their division laboratory spaces. These safety leads frequent these laboratories on a regular basis, are familiar with their processes and hazards, and serve as the point of contact for questions regarding Integrated Safety Management (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 Principal Investigator retains all responsibility for the safety of their personnel.

4.09 Division Safety Management Committee:

The Chemical Sciences Division Safety Management Committee meets quarterly and consists of representatives from the Chemical Sciences Division, the Division Safety Coordinator, the division representative to the LBNL Safety Advisory Committee (SAC), and the division 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 the division in promoting general EHS awareness and practice.

4.10 Division Safety Coordinator:

The Division Safety Coordinator is accountable to the Division Director directly or through her/his Deputy for Operations and is responsible for assisting with implementation of the LBNL safety programs within the division. 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 database (CATS).
4. Planning and moderating the division Safety Management Meeting.
5. Attending the safety coordinator meetings.
6. Maintaining the Chemical Sciences Division ISM Plan on behalf of the Division Director.
7. Assuring that the division's ongoing program of self-assessment is conducted annually.

5.0 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) or Temporary Work Authorization (TWA), 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 division 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, but they include:

1. Personnel requests for ergonomic evaluations.
2. High hazard chemical usage (as defined by the EHS Exposure Assessment procedures).
3. Noisy operations.
4. High risk lifting operations.

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

6.0 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 principal investigator. 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 Principal Investigator. The Principal Investigator (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, as time permits, 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.

6.01 On-The-Job Training (OJT):

We are a learning 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 and it is the expectation of division management that new workers receive the appropriate hands-on or on-the-job training necessary to work safely. Sufficient on-the-job training (OJT) will be provided as needed by the Principal Investigator, Supervisor, Activity Lead or designee so that they are confident that the workers can conduct their tasks and work safely in the lab. This training, where appropriate, must be documented in the Work Planning and Control 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 Work Planning and Control activity for the work. For all other activities, the documentation of OJT is accomplished in Work Planning and Control when the Activity Lead changes the worker's authorization level from "Work with Supervision" to "Work Unsupervised".

6.02 Student Training:

In the context of student training in the Chemical Sciences Division, a 'student' is anyone who is learning something new. This may range from an inexperienced intern to a seasoned Principal Investigator learning a new technique. Supervisors, Area Safety Leads, and Activity Leads, must be especially attentive to student training, assuring that each researcher completes the training appropriate for their work activities, is provided appropriate on-the-job training (OJT), and introduction to other knowledgeable personnel that can provide continuity of support and oversight.

6.03 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 determines a worker is qualified to work safely and effectively may that worker work without supervision.

6.04 Working Alone:

Chemical Sciences Division 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 insured through two separate mechanisms: evaluation of the severity of the hazards during the Work Planning and Control (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 scope of work of the formal authorization, and are to be communicated to workers when the on-the-job training (OJT) is provided for the authorized project. If the need for a partner or observer is determined, then the Principal Investigator (or designee) is responsible for ensuring that support is provided when the designated tasks are performed.

It is possible that even though a task is not considered sufficiently hazardous to require restrictions on working alone, a Supervisor or Activity Lead may want to restrict an individual from performing a task alone without further training or demonstrating competency. 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.

7.0 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 Principal Investigator, either directly or through his/her designee, is responsible for ensuring controls are effectively communicated to the worker, and followed by the worker. To ensure compliance with established institutional requirements and to ensure that the Chemical Sciences Division personnel are working within the boundaries of their authorized work, the division engages in a variety of assessment activities as outlined below.

8.0 Feedback and Continuous Improvement

Feedback and continuous improvement is the fifth and last core function of Integrated Safety Management. There are a variety of feedback and continuous improvement mechanisms in place within the Chemical Sciences Division.

8.01 Feedback:

The most formal method for feedback within the division is the Division Safety Management Meeting. Safety committee members and staff are able to provide feedback on all aspects of the division safety program during these meetings.

Chemical sciences personnel have other mechanisms to provide feedback within the division, including:

1. Feedback to Area Safety Leads, Activity Leads, Project Leads, Principal Investigators and Supervisors.
2. Direct communication with the Division Safety Coordinator, EHS Division Liaison and health and safety representative.

3. Online at EHS Safety Concerns, http://www2.lbl.gov/ehs/safety/safety-concerns-form.shtml.
4. Email sent to ergo@lbl.gov requesting ergonomic assistance or a request to a Division Ergo Advocate.
5. Safety performance feedback is incorporated for all division staff (including Principal Investigators and Supervisors) on their annual performance review as well.
6. By calling the LBNL Hotline at, 1-800-403-4744.
7. By calling the LBNL Internal Audit Service at 510-486-4472.
8. By mail at, US DOE employee concerns program manager, 9800 S. Cass Ave., Argonne IL 60439.

Feedback is also provided to the division from external sources such as the EHS Division or DOE from audits and inspections. This feedback typically occurs via the EHS Technical Assurance Program (TAP) or through notification of safety violations and non-conformances.

8.02 Safety Inspections:

Safety inspections of workspaces occur on a regular basis, and are conducted by the Division Safety Coordinator, the Principal Investigator, and/or the Area Safety Lead. During these inspections, division personnel walk through workspaces verifying compliance with safety requirements and speak with division personnel to determine if safety requirements are being adequately communicated and that division personnel understand their safety responsibilities. In addition, as part of the Principal Investigators', Supervisors', Activity Leads' and Area Safety Leads' responsibilities, they are continually observing safety performance in their labs and correcting deficiencies observed.

8.03 Division Self Assessment:

At the beginning of each fiscal year, the division identifies focus areas for detailed self-assessment. A Division Self-Assessment Plan is completed annually. This plan is reviewed and approved by division leadership and provided to the LBNL Office of Contract Assurance for review. As each focus area self-assessment is completed, a report is generated which is also reviewed and approved by division leadership. Corrective actions are identified to address root causes and, if appropriate, entered into CATS or Safety Concerns.

8.04 Incident Investigations:

LBNL accidents, injuries and close calls will be investigated by the division. 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 a plan of action is established. Corrective actions are recommended to division management and, if appropriate, entered into CATS or Safety Concerns.

Incidents involving division personnel occurring on the UC Berkeley campus are governed by UC Berkeley EH&S rules in accordance with the '*Partnership Agreement between UCB and LBNL Concerning Environment, Health and Safety Policy and Procedures* (March 15, 2004)'. However, LBNL EHS and Chemical Sciences Division personnel may assist UC Berkeley EH&S personnel with the investigation, if it is appropriate to do so.

8.05 Continuous Improvement:

The entire process of 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 the division self-assessment, which assess areas of greatest concern for the division and strive to implement improved solutions designed to raise awareness and to better control hazards. Continuous improvement efforts happen regularly through multiple channels such as:

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 division safety staff and ergo advocates with division personnel.
10. “Level-1” email distribution to all division members addressing relevant safety topics.