Physical Biosciences Division
Integrated Safety Management Plan–2013

To: John Heim, LBNL EH&S Liaison
From: Adam Arkin, Physical Biosciences Division Director
Date: January 18, 2013
Subject: Annual Review and Update of ISM Plan

The Physical Biosciences Division ISM plan was reviewed, and revised as follows:

1. Roles and Responsibilities were more clearly defined (§2).
2. PBD SAA Policy was updated to meet user needs (§3.2).
3. Weight lifting guidance update (§3.2)
4. Working Alone Policy Added (§3.2).

Prior revision history and specific summary of changes is provided in Appendix 3.

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Physical Biosciences Division
Integrated Safety Management Plan–2013

The Physical Biosciences Division (PBD) will conduct all of its operations in a manner that protects both the health and safety of its employees and affiliates and the environment, as defined by the Laboratory's ES&H policies and requirements contained in the *Regulations and Procedure Manual* (RPM), the *Health & Safety Manual* (PUB-3000), the *Integrated EHSS Management Plan* (PUB-3140), the *Operating and Quality Management Plan* (OQMP), and the *Environment, Safety and Health Standards Set for LBNL* (EHSS Standards) set. This Division-level ISM plan has been established to assist in ensuring that the Division's ES&H objectives are met.

1. Scope of the Plan

PBD has an annual budget of approximately $102.2M, and a staff of about 580. Much of the Division's research is performed by small self-contained groups of scientists, technical staff, postdoctoral fellows, and students, under the direction of a Principal Investigator (PI). LBNL-based research is conducted in Bldgs. 1 (Donner), 4, 6, 64, 66, 80, 972 and 978. The Division has two user facilities: the Berkeley Center for Structural Biology (BCSB) and the National Center for X-ray Tomography (NCXT); they are located in Bldgs. 6 and 80. Other major centers in the Division include the Computational Crystallography Initiative in Bldg. 64, the Berkeley Structural Genomics Center (Donner), the Genomes-to-Life Institute (GTL) in Bldg. 978 (and on UCB campus in Hildebrand), the Joint BioEnergy Institute (JBEI) located in Bldg. 978, the Advanced Biofuels Process Demonstration Unit (ABPDU) in Bldg. 978, and the Integrated Knowledgebase program (KBase) in Bldg. 972. Information and practices specific to JBEI and the ABPDU are described in their respective facility specific safety plans available on the PBD website.

Approximately 40% of the PIs within the Division conduct their research on the University of California Berkeley (UCB) campus. The work of these PIs and their associated employees and affiliates is carried out in accordance with the *Partnership Agreement between UCB and LBNL Concerning Environment, Health and Safety Policy and Procedures* as amended through 08/26/2008. As stated in the Partnership agreement, the UCB campus EH&S Department has responsibility for developing ES&H policies and requirements for work conducted in campus space (with the exception of Donner Hall, see above). The Division has an interest in assuring that work in UCB space is performed safely in accordance with campus standards, and that the UCB safety program provides a level of ES&H protection equivalent to that established at LBNL. Specific measures are discussed in §3.5. Lab PIs conducting LBNL-sponsored work are encouraged to implement controls and other measures beyond the institutional requirements if they deem additional measures appropriate.

2. Roles and Responsibilities

2.1 Division Management Responsibilities

The *Division Director* is ultimately responsible for the activities in PBD. Reporting to the LBNL Director, the Division Director conducts annual inspections of all LBNL work areas, and conveys to Principal Investigators (PIs) and managers their roles and responsibilities within the ISM plan.

- Perform annual walk-through of technical areas, observing work and discussing safety with the Division Staff.
- Assure the Division adheres to the principles and functions of the PBD ISM Plan.
- Foster a strong safety culture and awareness within the Division.
- Meet regularly with the Division Safety Coordinator to discuss ES&H within the Division.
- Charter investigations of safety incidents within the Division and oversee corrective actions to prevent similar problems in the future.

2.2 Supervisor (PI) Responsibilities

Line Managers, Supervisors and Principal Investigators (PIs) are responsible and accountable to their direct supervisor (either Division Director or another Manager) for assuring that all activities under their direction are carried out in a safe and environmentally protective manner in accordance with LBNL ES&H policies and requirements.

The term *Line Management* describes the direct supervisorial relationship connecting the LBNL Director, the Division Director, Managers and Principal Investigators, and Employees and Affiliates.

- Perform regular walk-throughs of technical areas, including discussion of safety with staff. Supervisors and Work Leads are responsible for formulating their own walk-around plans and schedules, and discussing these plans, reviews and corrective actions with their supervisors and direct reports. Supervisors are encouraged to share their walk-through observations and findings with their peers and the Division Safety Coordinator. Supervisors and Work Leads conducting walk-throughs will document the conditions and criteria employed during the course of their walk-throughs, and maintain their documentation in a form suitable for independent inspection.
- Report work-related injuries, illnesses, and near-misses promptly to the Division Director and/or Safety Coordinator.
- Appoint Area Safety Leader for technical areas (if not self).
- Appoint Work Lead for direct reports including affiliates (if not self).
- Hold their employees accountable for adhering to ES&H regulations and provide a means for the discussion of safety issues among their members.
- Ensure completion of the Job Hazard Analysis (JHA) and training for direct reports.
- Provide proper personal protective equipment (PPE) for direct reports and guests.

- Develop and maintain any required formal work authorizations (Activity Hazard Document, Biological Use Authorization, Radiological Work Authorization, etc.) as required for high hazard work.
- Determine if any of the work under supervisor's control requires a work alone prohibition, and include controls in the work authorization document (Activity Hazard Document, Biological Use Authorization, Radiological Work Authorization, JHA, etc.) to prevent working alone. Working alone is performing work when no one is within earshot or eyesight who can help rescue the worker. Work is too hazardous to work alone when:
    - If there is an accident, the worker could be unable to self-rescue due to the hazards of the work.
    - The worker is an undergraduate student. Undergraduate students are not allowed to work alone except for computer or office tasks.
    - The worker is using the machine tools in the machine shop. Personnel may not work alone using machine tools in the machine shop.
- Report work-related:
    - Injuries of direct reports (report to Safety Coordinator),
    - Ergonomic discomfort of direct reports (report to Safety Coordinator),
    - Near Hits (report to Safety Coordinator), and
    - Safety problems (report to Safety Coordinator).
- Anyone authorizing or hosting contracted work, including Supervisors Managers and PIs, is responsible for the safety of the work by assuring that qualified contractors/service vendors are selected, hazards are identified, and work is performed safely to LBNL (or applicable) standards within PBD space using the LBNL Subcontractor Job Hazard Analysis (SJHA).

2.3 Work Lead Responsibilities

Work Leads are individuals who are not necessarily line management supervisors, but who nevertheless oversee or instruct other personnel. In practice, Work Leads are often experienced technical staff, postdoctoral fellows, or graduate students who serve as safety resources in laboratories where the Manager or PI is not present on a daily basis.

- Oversee JHA training and compliance for direct reports, including annual review and approval of JHAs.
- Prevent direct reports from working until JHA and training is complete and accurate.
- Require direct reports to work with direct supervision for tasks where the required training is incomplete.
- Provide On-the-Job Training (OJT) for direct reports.
- Assign work lead duties when away from Lab for an extended time.

- Along with supervisor, determine if any of the work under work lead's control requires a work alone prohibition, and include controls in the work authorization (Activity Hazard Document, radiation authorization, JHA) to prevent working alone. Working alone is performing work when no one is within earshot or eyesight who can help rescue the worker. Work is too hazardous to work alone when:
    - If there is an accident, the worker could be unable to self-rescue due to the hazards of the work.
    - The worker is an undergraduate student. Undergraduate students are not allowed to work alone except for computer or office tasks.
    - The worker is using the machine tools in the machine shop. Personnel may not work alone using machine tools in the machine shop.
- Report work-related:
    - Injuries of direct reports (report to Division Safety Coordinator),
    - Ergonomic discomfort of direct reports (report to Division Safety Coordinator),
    - Near Hits (report to Division Safety Coordinator), and
    - Safety problems or concerns (report to Division Safety Coordinator)
- Maintain up to date chemical inventory in the Chemical Management System (CMS) database and properly label and store all chemicals.
- Anyone authorizing or hosting contracted work, including Work Leads, is responsible for the safety of the work by assuring that qualified contractors/service vendors are selected, hazards are identified, and work is performed safely to LBNL (or applicable) standards within PBD space using the LBNL Subcontractor Job Hazard Analysis (SJHA).

2.4 Area Safety Leader Responsibilities

- Determine minimum PPE for technical areas and enforce requirements.
- Maintain entrance signs with correct hazards, PPE requirements, and contact information.
- Maintain up to date chemical inventory in the Chemical Management System (CMS) database and properly label and store all chemicals.
- Maintain good housekeeping in technical areas.

2.5 Worker Safety Responsibilities

PBD employees and *affiliates* are accountable to their supervisors for learning and adhering to ES&H requirements, participating in BOB (Bio-scientists Observing Bio-scientists) program as described in Appendix 2, and reporting accidents and work-related illnesses and injuries promptly to the supervisor. The Division does not make a distinction between students (including affiliates) and other types of LBNL-associated personnel. Students compensated by LBNL are considered employees, and if not compensated, they are considered affiliates. In either case, students are afforded the same safety protection, and in turn have the same safety obligations as all other LBNL personnel.

- Complete an accurate JHA (annually) and complete all training in a timely manner. Division managed card key access will not be granted until online training has been

completed. Card key access may be removed by the Division Safety Coordinator if training is not completed by the worker in a timely manner.

- Work according to all controls listed in work authorizations (JHA, Activity Hazard Document, Biological Use Authorization, Radiological Work Authorization, etc.), including PPE requirements in PUB-3000.
- Ask questions of your work lead if you are unclear on your task and its associated hazard controls.
- Store all hazardous materials properly in a laboratory.
- Refrain from work without proper authorization (JHA, Activity Hazard Document, Biological Use Authorization, Radiological Work Authorization, etc.).
- Stop any work for any worker that poses an imminent danger.
- Participate in investigations of safety incidents within the division as directed by Division Management.
- Follow safety requirements for LBL and host location when working off-site.
- Report work-related:
    - Injuries to self (report to Work Lead, Supervisor or Health Services),
    - Ergonomic discomfort (report to Work Lead, Supervisor or Safety Coordinator),
    - Near Hits (report to Safety Coordinator), and
    - Safety problems (report to Work Lead, Supervisor or Safety Coordinator).
- Maintain up to date chemical inventory in the Chemical Management System (CMS) database and properly label and store all chemicals.
- Anyone authorizing or hosting contracted work, including Workers, is responsible for the safety of the work by assuring that qualified contractors/service vendors are selected, hazards are identified, and work is performed safely to LBNL (or applicable) standards within PBD space using the LBNL Subcontractor Job Hazard Analysis (SJHA).

2.2 Supporting Roles for ISM Planning

The **Division Safety Coordinator** (DSC) represents the Division Director on safety issues and is the programmatic lead for ES&H with responsibilities including:

- Oversight of the division self-assessment program and other inspection processes,
- Creates and implements systems, programs and procedures for Work Planning and Control (WP&C) and ES&H documentation.
- Aids in the reporting, investigation and communication of occupational injuries, illnesses, and significant safety events within the Division.
- Develops corrective action plans, and
- Promotes the functions and principles of the PBD ISM Plan.

Division Safety Committee

The PBD Safety Committee is comprised of Work Leads or Supervisors from each group within the Division. All research groups occupying LBNL space or receiving funds through LBNL are required to be represented.

- The Committee meets approximately monthly, and is chaired by the DSC.
- Charter and membership lists are listed on the PBD Website.

- Committee members participate in presentations by safety experts, review safety policies, and report back to their groups with regard to safety issues.
- Attendance is recorded in the minutes.
- The minutes together with action items and lessons learned are posted on bulletin boards dedicated to safety and are distributed to all Division employees through group leaders and group safety representatives, as well as through Division Level One emails.
- PIs and Safety Committee members consult with qualified specialists and subject matter experts to achieve the required expertise to comply with ES&H requirements.

Safety Planning Team

The Safety Planning Team (SPT) consists of the DSC, PBD Business Manager, PBD Safety Committee Secretary/PBD Safety Administrator, the PBD Facility Manager/Assistant Safety Coordinator, and the PBD Scientific Safety Advisor.

- The team meets weekly to track progress of ISM plan implementation, and oversees other safety activities. These activities include Safety Committee meetings, the Self Assessment process, routine safety inspections, and promoting safety awareness throughout the Division.
- Findings and corrective actions arising from safety reviews are tracked in the CATS database and are corrected with guidance from the SPT and EHSS.
- The team also prepares the annual Self Assessment Report and reviews the Division Integrated Safety Management Plan.

Ergonomic Advocates

The planning team includes one or more Ergonomic Advocates who receive special training from the EHSS Division (EHS0061), and who act as a first point of contact for issues of computer workstation and lab ergonomics in the Division.

PBD Incident Review Team

An ad-hoc Incident Review Team comprised of the DSC, EHSS Liaison and/or Incident Review Manager, managing supervisor, and injured employee reviews each DOE recordable injury or other significant injury, in accordance with PUB-3000 §5.1. The team discusses the event and appropriate corrective actions, then tracks implementation of the remedies and communicates lessons learned to the Division Safety Committee. Similar procedures are used to review other reportable occurrences in accordance with PUB-3000.

PBD EH&S Liaison

The PBD EHSS Liaison is the liaison between Physical Biosciences and the EHSS division with responsibilities including:

- Contact for EHSS issues
- Member of the PBD Safety Committee
- Communication of pending EH&S program changes
- Information and process support for the Safety Coordinator
- Promotes the functions and principles of the Division ISM plan.

3. Implementation of ISM

PBD conducts basic research in the areas of structural biology, computational and theoretical biology, advanced microscopies, chemical biology, and molecular design, using as main tools X-ray crystallography, spectroscopy (infrared, ultrafast, EPR, and NMR), and high resolution microscopy. These research programs at LBNL and on the UCB campus employ lasers, X-ray equipment, magnets, synchrotron sources, biochemistry labs, and other equipment and facilities.

3.1 Hazard Identification

Hazards associated with Division operations are described in the Hazards Management System, which is updated on a continuous basis through the EHSS Division as hazards change. Division research activities with associated hazards beyond general laboratory work are reviewed and managed through the LBNL's Formal Authorization process. The PI or Work Lead is responsible for considering ES&H hazards, risks, and concerns during the work planning process, and for engaging the DSC and/or EHSS Liaison in the review process to ensure adequate hazard analysis. All high hazard work in PBD is documented through the Formal Authorization process and is reviewed at least annually with the PI, DSC and EHSS SME to ensure that all aspects of the work are in compliance with all applicable requirements and guidelines.

Field Work Proposals, Work for Others Requests, Cooperative Research and Development Agreements, and Laboratory Directed Research and Development documents are carefully reviewed for compliance with the National Environmental Policy Act and California Environmental Quality Act by the NEPA/CEQA coordinator.

3.2 Administrative Controls

Work recognized as posing an elevated hazard level is planned and authorized as described in Chapter 6 of PUB 3000, the ISMS, and the OQMP. This type of work is regulated by Activity Hazard Documents (AHDs), Radiation Work Authorizations (RWAs), and Biological Use Authorizations (BUAs). Current PBD work authorizations are listed in the Safety section of the PBD website.

Routine work is authorized when new employees or affiliates first report in. At that time, the Supervisor (or Work Lead) is required to help the new worker complete the online JHA to identify the scope of work and training needs. All affiliates require an active JHA no later than 10 business days after affiliate status is granted. PBD requires new workers to complete the JHA prior to beginning work, where "work" is defined as hands-on activity including lab experimentation, and other desktop activity that is an active and essential part of the job. Minimally, each PBD worker *in LBNL-controlled space* is required to join the PBD Red Book JHA work group, consisting of a personal safety checklist, and at least one additional location specific work group. Whenever an employee's scope of work changes, the JHA is reviewed to ensure that the hazards, program assignments, and safety roles entered are still valid. A robust Job Description is required, which includes work objectives and locations, materials used, processes employed, equipment used, and expected output. To capture any unrecorded

changes in job description, the JHA must be reviewed annually. For situations where someone doesn't work onsite, within LBNL jurisdiction, but wishes to maintain a relationship with LBNL, the JHA "opt-out" option is used. PBD implements the JHA processes in accordance with the Lab's requirements described in PUB-3000, Chapter 32.

PBD is committed to shipping waste out of the SAAs within a nine-month period after the waste start date, as required by LBNL. In addition, to avoid approaching the maximum time limit of nine months, pickups for all waste will be requisitioned within 6 months of the waste accumulation start date. The SAA Manager will be responsible for enforcing proper waste accumulation in the SAA, in accordance with all LBNL requirements. The Waste Generator will be responsible for requisitioning the pickup of individual waste containers (by Waste Management) with enough lead time to allow for unseen delays. Individual exceptions to this policy will need to be approved by the DSC. The SPT will track compliance with this policy on a quarterly basis.

Individual weight lifting requirements are in accordance with the LBNL guidance in *PUB-3000 Chapter 17 Ergonomics*. In addition to this guidance, PBD suggests as a best practice, that all personnel should refrain from lifting or moving items heavier than 25 pounds. When items heavier than 25 pounds need to be moved, individuals should solicit lifting assistance from another person or the use of a mechanical lifting device. The PBD Facilities Manager will coordinate special training for "Lift Team" members who can perform lifts and equipment moves for heavier items.

Working Alone. The Physical Biosciences Division follows the Berkeley Lab working alone policy as outlined in *PUB-3000, Chapter 5.3 Working Alone*. Working alone restrictions are addressed and implemented through the appropriate formal authorizations (e.g., Activity Hazard Documents). (Appendix 2)

3.3 Work Performance

Periodic Walk-throughs. To ensure that the work is performed in a manner responsive to all ES&H issues, the responsibility for safety walk-throughs is shared among the Division Director, Principal Investigators, and general employees. Additionally, PBD strives to incorporate ISM and safety into all of the division's daily work activities.

- The Division Director will conduct an annual inspection of all Division space.
- Principal Investigators are responsible for conducting frequent walk-throughs, which must be documented at least semi-annually using the checklist available in the Safety section of the PBD website as a guide. Participation in the Division Director's walkthrough can be used as one of the semi-annual inspections. This task may be delegated to a reporting manager or a work lead. Specific training for walk-throughs (EHS0027) is required. Additional topic-specific walk-throughs may be organized on an ad-hoc basis by the DSC.

- Each Work Group will participate annually in the BOB (Bio-scientists Observing Bio-scientists) Program. In this program, each Work Group participates by dividing themselves into teams of Observers and Workers complete the PBD Lab Walkthrough Checklist available on the PBD website. Observers schedule time with Workers to watch them perform their tasks and evaluate and provide feedback on safety issues. 100% participation is encouraged; however PBD requires a minimum of 40% participation of the Work Group (of this 40%, half will be observers and half will be workers). BOB is an accident-prevention process which aims to reduce accidents and injuries by applying the principles of behavior observation and positive feedback, thereby creating a work culture committed to an accident-free workplace.
- PBD's commitment to incorporating safety into all daily work is further implemented by the Division's Management Team, DSC, and Operations Team members who regularly perform observations of division personnel and space as a part of their routine support services to Division customers. As an ex ample, during a routine facility support request, the operations team member will perform casual observations of space, personnel, equipment, etc., to assist that group in proactively identifying and immediately correcting any additional safety concerns that might not have been part of the original support request. These regular actions allow the Division's safety commitment to maintain its momentum.

  This additional focus on safety in every task is provided by Division team members at all types of lab visits including (but not limited to), baseline exposure assessments, research process and Formal Authorization reviews, annual self-assessment plan reviews, routine EHSS program walkthroughs for SSAs, biosafety assessments, medical and hazardous waste inspections, outside agency inspections (e.g. City of Berkeley), and any other time that Division team members have the opportunity to assist the Division research staff in identifying and correcting safety concerns.

Safety Standdowns. Each organizational unit, including LBNL-funded labs on the UC Campus, may conduct a safety standdown, in collaboration with the SPT. Attendance will be mandatory, and will serve as an opportunity for the group to conduct a joint safety walk-around, critique their protocols with a view toward safety, and assure general housekeeping.

Stop Work Authority. Whenever an employee, contractor or participating affiliate encounters conditions or practices that appear to constitute an imminent danger (i.e., cause death, serious injury or environmental harm), they have the authority to:

1. Alert the affected employee(s) and request the work to be stopped.
2. Call the Berkeley Lab incident reporting telephone number (x6999) and report the situation.
3. Inform the immediate supervisor, PI, Work Lead, DSC, and/or Division Director (if available/known).

The specific policy and procedure for stopping work is found in §1.5 of LBNL/Pub-3000.

Personal Protective Equipment (PPE). Protective gear for work in the Division is selected by either the task being performed, or by the area in which the work is done; as detailed in PUB-3000, Chapter 19. Closed-toe footwear and long pants are required in all lab areas. Safety

glasses with side shields are required in all PBD labs at all times (unless using a microscope). Additional PPE requirements, beyond the minimum PUB-3000 requirements, are documented in the following location specific safety plan(s): *Environment, Health and Safety Plan for LBNL Joint BioEnergy Institute.* Exceptions to the LBNL PPE policy in PUB-3000 Chapter 19 require prior identification, review and approval by the Area Safety Lead and the DSC, along with applicable approval from the LBNL EHSS Director. Selected areas have been demarcated as safety glasses free areas where eyewear is not required. These areas have been reviewed by the DSC and Area Safety Lead, and approved by the LBNL EHSS Director (or his designee). Each worker is responsible for knowing the hazards present and the appropriate controls required, and supervisors are responsible for ensuring that workers have adequate training for the specific task at hand, which may extend beyond simple attendance at LBNL-sponsored classes.

Chemical Hygiene. The Division uses LBNL's Chemical Management System (CMS) database to track the receipt, location, and disposal of all hazardous chemicals. Each research group is responsible for appropriately managing their chemical inventory and the CMS database. Peroxide forming chemicals are tested annually for free radical levels.

Personal Injuries. All injuries are to be reported to LBNL Medical Services (x6266), to the Supervisor and to the DSC. Repeated experience shows this to accomplish two objectives—it allows injuries to be treated correctly by trained staff, and allows the Division to take corrective action to fix any hazardous conditions. The Division groups may utilize first aid supplies that are approved by LBNL Health Services, but this does not remove the obligation to seek treatment from Medical Services. Emergency response information is provided in the LBNL Emergency Response Guide (red flip chart) available in all PBD technical and non-technical spaces. Correct options for emergency response are to *a)* dial x7911, (x9911 at JBEI, ABPDU or KBase) or *b)* transport the worker to the appropriate clinic (Bldg 26 LBNL Health Services, UC Berkeley Tang Center, or Alta Bates Emergency Room, depending on location and time of day). Division policy does not prevent workers from keeping personal first aid kits. Workers are encouraged to be prepared for general emergencies by stocking supplies that include water, food, prescription medication, extra eyeglasses, cash, outer clothing, personal care items, flashlight, radio, and blanket.

Special Situations. Control of hazards, including radioactivity, biological materials, and chemicals, are the responsibility of the PI. Special precautions are also required during lab moves and closeouts. In these instances, the PI notifies the Division Operations Team during the planning phase. The operations team will be assisted in the evaluation of the associated hazards by the DSC and EHSS liaison.

Qualification and Training. PIs have the responsibility to ascertain that all employees and affiliates (including retirees) under their supervision have the qualifications and training to undertake their work safely. These qualifications include training, skills, education, knowledge, and certifications required by law or by LBNL and PBD policy. In general, training must be completed *before* beginning work; this is facilitated by the availability of online training classes that can be completed before the individual arrives at LBNL and before processing through Human Resources. In particular circumstances, the untrained worker can perform work under direct line-of-sight supervision (at all times) by a trained Work Lead; but the authorization for

any such work must be specifically documented in writing (or through an electronic signature) according to Pub-3000. Radiological work authorizations provide for such supervision, but Biological Use registrations/authorizations and Laser Activity Hazard Documents do not.

Division Management Involvement in Training Compliance. For safety training classes available in Web-based format: workers are required to complete on-line training before starting work, or promptly after receiving new course requirements through the annual renewal of the JHA. New employees and affiliates are required to complete all online training prior to beginning work, and must notify the DSC of this completion for confirmation and issuance of building card key access. EHS0059 (Ergonomic Self-Assessment), when required, must be taken within 30 days. Delinquent JHA and training cases will be referred to the Division Director for disciplinary action including but not limited to cancellation of card-key & badge access until the respective JHA or training course has been completed.

For Safety training classes not available via the Web: The PBD Operations Team assists supervisors to assure that required training classes are completed within 90 calendar days. Training requirements are reviewed by the safety planning team on a monthly basis. As an example, the PBD Operations Team reminds individuals, their Work Lead, and/or Supervisor, by email of any new or expired courses identified during the review. Individuals are expected to reply promptly as to how and when they will be trained.

3.4 Feedback and Improvement

Safety Communication. Applicable information from the Laboratory's Lessons Learned Program and PBD incidents will be disseminated to PBD personnel for accident prevention and hazard awareness.

Personnel Review. PRD evaluations of all Division personnel include ES&H performance.

Annual Divisional Self-Assessment.

The Annual Divisional Self –Assessment Plan is prepared each year by the DSC. The individually identified focus areas in the Plan are determined by the DSC, Division Business Manager and Scientific Safety Advisor and are approved by the Division Director. Review of the focus areas is performed by the DSC and applicable members of the PBD Operations Team, EHSS Subject Matter Experts, and Division members as appropriate.

3.5 Work in UCB-controlled spaces

The Division is committed to assuring that LBNL-funded work in UCB-controlled space receives ES&H protection equivalent to that established for LBNL-controlled space. Three actions will be taken. *1)* To identify locations and individuals performing LBNL-funded work in UCB-controlled spaces, PBD maintains the Division roster. This list can be sorted so that jurisdiction will be clear. This list will be available to all involved parties, including UCB EH&S and individual UC Departments upon request. *2)* Based on the list, PBD will coordinate with UCB EH&S to ensure equivalent protection. *3)* PBD Division PIs will notify LBNL & UCB officials as necessary when a research proposal is funded for work on the UC campus, giving LBNL & UCB EH&S and Department Safety Coordinators the opportunity to implement the appropriate work authorizations and hazard controls in a timely fashion.

3.6 Reporting Employee Concerns

A variety of formal communication methods have been established at Berkeley which enable division employees to report environmental health and safety concerns or safety suggestions. Employees may file a concern directly with their division director, department head, immediate supervisor, principal investigator or division safety coordinator, as well as seek assistance from the EHSS Liaison, EHSS Suggestion Box, EHSS Division, the Laboratory Ombudsman, or the Department of Energy. Persons reporting hazards or improper activities are fully protected by the law and Lab policy against retaliation. The available reporting mechanisms are detailed on the LBNL Research and Institutional Integrity Office website (www.lbl.gov/Workplace/RIIO/ec/).

4. Resource Allocation

4.1 Line Managers

PIs incorporate appropriate resource allocation for ES&H concerns in all research proposals, including resources for safety equipment, permits, training, maintenance, waste disposal, and facilities modifications unless covered by institutional funding sources.

4.2 PBD Division

To facilitate implementation and execution of the Divisional ES&H Program, the following Division resources are made available: PBD Division Safety Coordinator (1.0 FTE), PBD ES&H Administrator (0.25 FTE), the PBD Facilities Manager/Assistant Safety Coordinator (1.0 FTE), the Assistant Safety Coordinator/ Facilities Manager (0.5 FTE), and 0.5 FTE spread over two Administrative Assistants.

4.3 EHSS Division

PBD will require support from EHSS Division professionals on an as needed basis. EHSS estimates that direct support of our activities require the following levels of effort:

	FTE
Radiation Protection	
Radiological Control Technician support (routine)	0.25
Health Physicist support	0.125
Occupational Safety	0.05
Waste Management	0.95
Fire Protection	0.075
Environmental Protection	0.03
Industrial Hygiene (including biosafety and AHD support)	1.00
Total	2.48

5. Performance Measures

The implementation of PBD ES&H policies is best measured by the daily commitment to safety in our every day practices, which allows the Division to identify and correct potential or

identified issues, allowing our research community to continue its mission in pursuit of world class science. PBD judges its ES&H performance by achieving the following goals: execution of BOB program annually by the entire staff, annual update of the JHA, all CATS findings corrected within established period of time, all SAAs in compliance, proper training of staff and affiliates, all AHDs and RWAs reviewed annually, all chemicals appropriately labeled and inventoried, and an OSHA accident rate as close as possible to zero.

This plan will be reviewed annually and updated as necessary to facilitate compliance with regulatory and contract requirements.

Appendices

A.1 BOB (Bio-scientists Observing Bio-scientists) - PBD Self-Assessment

A.2 PBD Working Alone Policy

A.3 Revision History

Appendix 2a. PBD SELF-ASSESSMENT

PROCEDURE:

1. Each Work Group participates in BOB program by dividing themselves into teams of Observers and Workers. Observers schedule time with workers to watch them perform their tasks and evaluate and provide feedback on safety issues. 100% participation is encouraged, however PBD requires a minimum of 40% participation (of Work Group), 50% Observers / 50% Workers.
    a. Complete PBD Lab Walkthrough Checklist

2. All employees must:
    a. Complete Ergo Refresher Course: EHS0058
    b. Update JHA and include the following 6 elements in the job description:

    - **Work Objectives** – what is the overall context of what this work is trying to do? This statement defines the context for the further analysis.

    - **Work Locations** – where is the work performed? You can also break down the different materials and processes by location if that makes sense.

    - **Materials Used** – this description should be sufficiently detailed that the hazards associated with each material can be assessed. Where some members of a family of materials have unique hazards, then they should be specified (e.g., specify which types of acids are used, what are the typical compositions of welding rods employed, which hand or power tools are used, etc.)

    - **Processes Employed** – the processes and techniques should be listed with sufficient detail that hazards and potential exposures of the work effort can be determined. For example, "Work with chemicals" is not specific enough, nor is "climb ladders" – neither provides enough detail to determine the hazards/exposures. Better would be "perform solvent-solvent extractions and acid-base titrations" and "climbs stepladders to reach and retrieve items up to 10 feet above the floor". It may make sense to integrate the "Materials Used" and "Processes Employed" descriptions into one statement (e.g. "perform inert-gas arc welding on aluminum, mild carbon and stainless steels").

    - **Equipment Used** – be specific enough that hazards can be determined. Generally this means providing a list of each piece of equipment. Detail can be summarized (e.g., "vertical mill" is probably sufficient, manufacturer and model probably doesn't add much to the description).

    - **Expected Output** – what product is the result of your work effort? In the research environment where the expected output is knowledge this may be harder to describe, but when the processes and equipment produce a physical entity this will help put the work in context.

BOB
(Bio-scientists Observing Bio-scientists)

PBD Self-Assessment

What is BOB? PBD is introducing BOB (Bio-scientists Observing Bio-scientists) to help us evaluate ourselves for self-assessment, and to create a more robust safety program. BOB is an accident-prevention process which aims to reduce accidents and injuries by applying the principles of behavior observation and positive feedback, thereby creating a work culture committed to an accident-free workplace.

Who: Bio-scientists (Biophysicists, Bioengineers, Biologists, Biochemists, Business office, etc.) observing Bio-scientists

Where: *All PBD space*

When: Must be completed annually

PBD Working Alone Policy

Effective 4-23-12.

Policy

The Physical Biosciences Division follows the Berkeley Lab working alone policy as outlined in *PUB-3000, Chapter 5.3 Working Alone*. Working alone restrictions are addressed and implemented through the appropriate formal authorizations (e.g., Activity Hazard Documents).

Review and implementation

This information is available in the safety section of the PBD website, as well as in the PBD ISM Plan. Creation and annual renewals trigger the review of the work. Within the AHD, the working alone information is documented in the Activity Description, under the heading "Working Alone." The information identifies the specific task(s) that cannot be performed alone, with any necessary additional instruction. PBD's various AHDs have been reviewed with the appropriate SME to determine which applicable authorizations should have additional language specific to working alone in the laboratory.

Affected Formal Authorizations

The following activities are covered by the PBD working alone policy:

1. AHD 3358 – Heinz Frei
2. AHD 3470 – Jay Keasling
3. AHD 3623 – Kai Deng
4. AHD 3670 – Harry Beller
5. AHD 3724 – Steve Singer

Exempt Formal Authorizations

The following formal authorizations are exempt from the working alone policy. Concurrence provided by the following EH&S SMEs: Ken Barat, John Heim.

1. AHD 3343 – Heinz Frei
2. AHD 3344 – Heinz Frei
3. AHD 3349 – Vittal Yachandra
4. AHD 3426 – Seema Singh
5. AHD 3476 – Rajiv Bharadwaj
6. AHD 3526 – Brad Holmes
7. AHD 3553 – Kai Deng
8. AHD 3710 – Rakesh Banka
9. GS1020 – Simon George

Examples from AHDs in which limitations pertaining to working alone are specifically addressed

- Filling the electromagnet with cryogenic material
- Specific handling of highly hazardous chemicals

Examples of AHDs that to not require the working alone policy

- Laser work
- General chemical work (not highly hazardous materials)

Revision History

January 18, 2013

1. Web-links have been updated.
2. Divisional research, staffing composition and annual budget information has been updated.
3. JBEI and ABPDU EH&S Plan links are available on the PBD website.
4. The ABPUD and KBase facilities have been added.
5. Safety Planning Team and EH&S titles have been edited as appropriate.
6. The PBD SAA policy has been updated to better meet user needs.
7. Weight lifting guidance has been updated to reflect that Lab's policy.
8. The PBD Working Alone Policy has been added.
9. PBD has increased its resource allocation to 3.25 FTE for the safety program
10. Appendix 1 has been removed. This information is available in the JHA database.
11. Appendix 2.a has been removed and is now provided on the PBD website.
12. Appendix 2.b has been removed and is now provided on the PBD website.
13. Appendix 3 was reapproved and removed and is now provided on the PBD website.
14. Appendix 4 has been removed and is now provided on the PBD website.
15. Appendix 5 has been removed and is now provided on the PBD website.
16. Appendix 6 has been removed and replaced with reference to PUB-3000, Ch.32.
17. Appendix 7 has been updated and removed and is now provided on the PBD website.
18. Appendix 8 has been added.
19. Appendix 9 has been deleted and replaced with reference to PUB-3000, Ch.19.
20. Appendix 10 has been deleted and replaced with a link to the HR website with the current information.
21. Appendix 11 has been deleted.

October 16, 2009

1. Tables of Supervisors and Workleads were consolidated into one list and training results were removed (§1).
2. Subcontractor work authorization was implemented fully in February 2009 (§2.1).
3. Hazard Identification milestone moved to 2010 (§3.1).
4. Safety glasses with side shields are now required in all PBD labs (§3.3).
5. BOB (Bio-scientists Observing Bio-scientists) Program developed and implemented (§2.1).
6. Self Assessment sheets replaced by BOB program: "PBD Lab Walkthrough Checklists" (§3.3).
7. Created and distributed "Opt-Out Process Information and Procedures" (§3.2).
8. As a result of the HSS audit, we mandated individual JHA's and a robust "Description of Work" (§3.2).

October 9, 2008

1. The JBEI EH&S Plan is included by reference (§1).
2. Subcontractor work authorization will be implemented in Jan. 2009 (§2.1).
3. Representation on the safety committee extends to groups receiving LBNL funds, even if they do not occupy LBNL space (§2.2).
4. The HEAR database is now replaced by the Hazard Management System (§3.1).
5. The Job Hazard Analysis replaces both the Job Hazard Questionnaire & *PBD Red Book (*§3.2).

6. "Lift Team" training is required for lifting loads heavier than 25 pounds (§3.2).
7. Walkthrough inspections of biological research labs are introduced (§3.3).
8. A safety standdown program is introduced (§3.3).
9. An area-based policy for safety glasses is established (§3.3).
10. Division can supply first-aid supplies, but injuries still need to be reported to x6266 (§3.3).
11. Training must be completed before work starts, unless specified otherwise in a documented work authorization (§3.3).
12. Online training courses must be taken promptly. There is no grace period (§3.3).
13. Employee concerns resources are listed (§3.6).

<u>September 21, 2007</u>

1. Sections have been reordered to highlight adherence to ISM principles.
2. PBD's safety role for labs in UCB space is explained. PBD has an interest in assuring that the UCB ES&H program provides equivalent protection. The Division will collaborate with UCB by providing a list of Division members and funded work, and request documentary evidence of ES&H protection.
3. The Work Lead concept is introduced. Work leads in each laboratory are identified, and new training requirements are listed.
4. The position of Ergonomic Advocate is introduced.
5. Annual update of the JHQ is required. The PBD Red Book (Personal Safety and Emergency Response Checklists) is explained to be part of the formal process of authorizing work.
6. A new policy for sweeping hazardous waste out of satellite accumulation areas in a timely manner is introduced.
7. PIs are now required to perform frequent walkarounds and to document them semi-annually. A new LBNL training class on effective walkarounds is introduced.
8. It is specified that personal protective equipment will be used on a task-based basis, rather than an area-based basis.
9. Use of LBNL's chemical management database is spelled out.
10. Reporting requirements for personal injuries are specified & correct first aid response is outlined. It is explained that work areas do not stock first aid supplies so as to discourage untrained individuals from rendering treatment. However, there is no prohibition against individual workers keeping their own first aid supplies.
11. Management procedures are specified to enforce training compliance within three months after the need for a training class is identified.
12. PBD has increased its resource allocation to 1.4 FTE for the safety program.