Exposure Assessment

BRIEF

Policy Summary

Berkeley Lab's Exposure Assessment policy requires that Laboratory personnel exposure to chemical and physical workplace hazards be maintained within acceptable exposure limits. The Exposure Assessment policy further requires that exposures be minimized by the use of hazard elimination, engineering controls, personal protective equipment, and administrative controls.

Occupational exposures addressed by this policy include, but are not limited to, chemicals and physical agents (e.g., noise, hot and cold extremes, non-ionizing radiation). Note: Assessments for confined spaces, lasers, ergonomics, biological agents, and radiological exposures are handled by their respective programs.

Who Should Read This Policy

Berkeley Lab managers, supervisors, employees, and affiliates who might be exposed to chemical or physical hazards at Berkeley Lab or during Laboratory-sponsored work.

To Read the Full Policy, Go To:

The POLICY tab on this wiki page

To Read the EH&S Program Details, Go To:


Contact Information

For assistance with exposure assessments, contact the Industrial Hygienist assigned to your division (see the Who to Call page on the EH&S Web site).

For questions about the overall Exposure Assessment Program, contact:
Subject Matter Expert for Exposure Assessment
EHSS Division

POLICY

To Read the EH&S Program Details, Go To:


A. Purpose

This policy describes Berkeley Lab's approach to evaluating chemical and physical workplace health hazards at the Laboratory and for...
Laboratory-related work at other facilities.

Occupational exposures addressed by this program include, but are not limited to, chemicals and physical agents (e.g., noise, hot and cold extremes, non-ionizing radiation). Note: Assessments for confined spaces, lasers, ergonomics, biological agents, and radiological exposures are handled within their respective programs.

B. Persons Affected

Berkeley Lab managers, supervisors, employees, and affiliates who might be exposed to chemical or physical hazards at Berkeley Lab or during Laboratory-sponsored work

C. Exceptions

None

D. Policy Statement

1. Overexposure to chemical or physical agents may lead to various types of occupational diseases. A partial list of common occupational health conditions is provided below:
   a. Heat exhaustion or heat stroke from high temperatures
   b. Asbestosis or lung cancer from asbestos
   c. Headaches or systemic injury associated with organic solvents
   d. Hearing loss as a result of noise exposure
2. There are many additional hazards from possible overexposures. Chemicals may pose hazards in addition to those related to direct exposure, such as flammability.
3. Prior to handling chemicals, persons must complete training that covers (a) hazards of chemicals and (b) methods for controlling the hazards. Training may include courses such as EHS0345 Chemical Hygiene for Facilities, EHS0348 Chemical Hygiene and Safety, EHS0356 Nano-Safety for Crafts and Technical Work, EHS0310 Respirator Training, and EHS0330 Lead Worker Training.
4. Users of hazardous chemicals and agents must follow training guidance and written procedures covering:
   a. Exposure controls
   b. Use of controls for chemical handling, including PPE
5. Assessments may be initiated by multiple methods:
   a. Identified on a Job Hazards Analysis (JHA)
   b. Requested on the Laboratory's Chemical Management System
   c. Requested by Work Leads where work involves any new agents or materials that pose any concern about possible exposures
   d. Inquired about or requested by a supervisor or employee
   e. Flagged by the EH&S Division or other Laboratory divisions/departments during a walk-through
   f. Prompted by another EH&S Division review or approval process
6. Exposure assessments may be qualitative or quantitative:
   a. Baseline Exposure Assessments are often performed to determine whether a more in-depth quantitative assessment is necessary.
   b. Quantitative assessments include air monitoring, noise dosimetry, and magnetic surveys. They are performed when it is not possible to determine whether a safe level of exposure may be maintained.
7. Controls should be protective at least to the level of Permissible Exposure Limits (PELs) and Threshold Limit Values (TLVs).
8. Line management (supervisors) ensure that Environment, Safety & Health (ES&H) requirements are followed to control exposures.
9. The Exposure Assessment Program should be evaluated for effectiveness. This is routinely done through the Laboratory's ES&H Technical Assurance Program.

E. Roles and Responsibilities

See PUB-3000, Chapter 4, Section 4.18 for roles and responsibilities related to the execution of this policy's implementation.

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Hygiene Subject Matter Expert</td>
<td>Is responsible for development, approval, revision, and administration of this policy and its implementing documents</td>
</tr>
<tr>
<td>Line Managers</td>
<td>Ensure that persons within their areas of responsibility comply with this policy and its implementing documents, and notify the Industrial Hygiene Group of process changes that may affect employee exposures</td>
</tr>
<tr>
<td>Potentially Exposed Workers</td>
<td>Request an Exposure Assessment when a concern is present regarding potential exposure, and follow all guidance provided in training and Work Processes to evaluate and control exposures</td>
</tr>
<tr>
<td>Supervisors and Work Leads</td>
<td>Request an exposure assessment when a concern is present regarding potential exposure, and ensure that persons within their areas of responsibility comply with this policy and its implementing documents, and have completed the required training prior to beginning work</td>
</tr>
</tbody>
</table>
## F. Definitions/Acronyms

See PUB-3000, Chapter 4, Section 4.18 and the Implementing Documents of this policy for technical terms related to the details of this policy and its implementation.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>Activity</td>
<td>For purposes of workplace evaluations and setting priorities, a job (or portion of a job) involving a discrete agent or set of agents to which workers may be exposed. The word &quot;task&quot; is sometimes also used in a similar manner.</td>
</tr>
<tr>
<td>Baseline Exposure Assessment</td>
<td>A Baseline Exposure Assessment is a process to screen activities to help determine associated risks and hazards. These assessments are generally qualitative, although some quantitative data (collection or review) may be involved.</td>
</tr>
<tr>
<td>Chemical Agents</td>
<td>Includes all chemicals used at the Laboratory (or in Laboratory-sponsored work). This includes pure chemicals, mixtures (such as paint or cleaning agents), and materials such as asbestos, silica, and engineered nanomaterials.</td>
</tr>
<tr>
<td>Engineered Nanomaterials</td>
<td>Discrete materials having structures with at least one dimension between 1 and 100 nanometers, and intentionally created, as opposed to those that are naturally or incidentally formed. Engineered nanomaterials do not include larger materials that may have nanoscale features (e.g., etched silicon wafers), biomolecules (e.g., proteins, nucleic acids, and carbohydrates), or materials with Occupational Exposure Limits (OELs) that address nano-size particles for that substance.</td>
</tr>
<tr>
<td>Exposure</td>
<td>Inhalation, ingestion, absorption, injection, or contact with a chemical, biological, or physical agent.</td>
</tr>
<tr>
<td>Exposure Assessment</td>
<td>The process of defining exposure profiles and judging the acceptability of workplace exposures to environmental agents. These assessments may be quantitative, semiquantitative, or qualitative. These assessments are generally conducted by an EH&amp;S professional, which may include industrial hygienists or safety engineers. These assessments may be conducted for representative employees and are not required to be conducted for each individual. In all cases, employees have full access to exposure-monitoring information, including situations where an individual's exposure is not monitored.</td>
</tr>
<tr>
<td>Occupational Exposure Limit (OEL)</td>
<td>The maximum concentration of an air contaminant to which working people can be exposed for a specified time interval, usually the maximum average exposure allowed throughout an entire 8-hour shift. OELs are typically PELs or TLVs, which are also defined in this section. In the absence of formally recognized or regulatory-defined OELs, a chemical manufacturer may establish an exposure limit that is appropriate to use. Alternatively, the occupational health staff will have to determine or develop an appropriate protective level. This process often involves industrial hygiene, occupational medicine, and toxicology staff members. The National Institute for Occupational Safety and Health also publishes Recommended Exposure Limits (RELs), which may be evaluated for use.</td>
</tr>
<tr>
<td>Permissible Exposure Limit (PEL)</td>
<td>The OSHA permissible exposure limits are exposure levels considered safe for employee exposure in the workplace. Permissible exposure limits for airborne concentrations of hazardous materials are listed in 29 CFR 1910, Subpart Z and 29 CFR 1926, Subpart Z; and for physical agents (i.e., noise and non-ionizing radiation), in 29 CFR 1910, Subpart G.</td>
</tr>
<tr>
<td>Physical Agents</td>
<td>Agents such as noise, hot and cold extremes, and non-ionizing radiation (e.g., radio frequency, electromagnetic, microwave, and magnetic fields). Laser exposure is addressed by the Laser Safety Program (refer to PUB-300, Chapter 16).</td>
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<td>Professional judgment</td>
<td>The application and appropriate use of knowledge gained from formal education, experience, observation, experimentation, inference, peer review, and analogy. It allows an experienced industrial hygienist with incomplete or a minimum amount of data to estimate worker exposure in nearly any scenario (adapted from DOE Guide G 440.1 and AIHA A Strategy for Assessing and Managing Occupational Exposures, Third Edition), although such judgments and their basis should be documented.</td>
</tr>
<tr>
<td>Qualitative exposure assessment</td>
<td>The estimation of exposure determinants based on integration of available information and professional judgment (adapted from DOE Guide G 440.1-3, Occupational Exposure Assessment).</td>
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</table>
Quantitative exposure assessment


Threshold Limit Values (TLVs):

Airborne concentrations of materials to which nearly all workers may be repeatedly exposed without adverse effect. These values are developed and published by the American Conference of Governmental Industrial Hygienists (ACGIH). There are different values established for eight-hour time-weighted averages, ceilings, and Short-Term Exposure Limits (STELs). Other TLVs are available for non-chemical exposures, such as noise and non-ionizing radiation.

G. Recordkeeping Requirements

- Job Hazards Analysis
- Activity Hazard Document
- Baseline and Quantitative Exposure Assessments

H. Implementing Documents

<table>
<thead>
<tr>
<th>Document Number</th>
<th>EH&amp;S Reference</th>
<th>Title</th>
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<tr>
<td>07.07.013.001</td>
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<td>Berkeley Lab Exposure Assessment Program</td>
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J. Revision History

<table>
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<tr>
<th>Date</th>
<th>Revision</th>
<th>By whom</th>
<th>Revision Description</th>
<th>Section(s) affected</th>
<th>Change Type</th>
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<tr>
<td>9/24/2013</td>
<td>0.1</td>
<td>T. Roberts</td>
<td>Reviewed, 8/26/13</td>
<td>SRD, ImpDocs, Next Review Date</td>
<td>Minor</td>
</tr>
<tr>
<td>1/2/2010</td>
<td>0</td>
<td>T. Roberts</td>
<td>Rewrite for wiki</td>
<td>All</td>
<td>Minor</td>
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Document Information

Title: Exposure Assessment

Document number: 07.07.013.000
Revision number: 0.1
Publication date: 9/24/2013
Effective date: 6/30/2010
Next review date: 9/24/2016
Policy Area: Industrial Hygiene and Safety
RPM Section (home): ESH
RPM Section (cross-reference): None
Functional Division: EH&S
Source Requirements Documents

- 10 CFR 851.21(a)(5), *Worker Health and Safety Program; Hazard Identification and Assessment; Evaluate Operations, Procedures, and Facilities to Identify Workplace Hazards*
- 29 CFR 1910.1020, *Access to Employee Exposure and Medical Records*
- 29 CFR 1910 Subpart Z, *Toxic and Hazardous Substances*
- 10 CFR 850, *Chronic Beryllium Disease Prevention Program*

Other Driving Requirements

- Federal Public Law 91-596, *Occupational Safety and Health Act of 1970*
- PUB-3851, *Worker Safety and Health Program*

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Other References

- DOE Standard 6005, *Industrial Hygiene Practices* (guidance only)