Laser Safety

Brief

Title: Laser Safety
Publication date: 4/1/2014
Effective date: 4/1/2014

BRIEF

Policy Summary

The Berkeley Lab Laser Safety Program is designed to provide protection to personnel from exposure to Class 3B and 4 laser radiation. It is accomplished by:

- Properly classifying lasers
- Evaluating the laser hazard and implementing appropriate engineered and administrative controls
- Recommending laser eyewear
- Providing laser user training

Who Should Read This Policy

Berkeley Lab employees, affiliates, visitors, and subcontractors who:

- Will purchase or bring a laser device for use at Berkeley Lab
- Intend to use Class 3B or Class 4 lasers or laser systems
- Perform service or open-beam alignment on Class 1 products containing a Class 3B or Class 4 laser

To Read the Full Policy, Go To:

The POLICY tab on this wiki page

Contact Information

Laser Safety Officer
Radiation Protection Group
EHS Division

Policy

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POLICY

A. Purpose

The Lawrence Berkeley National Laboratory (Berkeley Lab) Laser Safety Program is designed to provide protection to personnel from exposure to Class 3B and 4 laser radiation. It is accomplished by:

- Properly classifying lasers
- Evaluating the laser hazard and implementing appropriate engineered and administrative controls
- Recommending laser eyewear
- Providing laser user training

B. Persons Affected
Berkeley Lab employees, affiliates, visitors, and subcontractors who:

- Will purchase or bring a laser device for use at Berkeley Lab
- Intend to use Class 3B or Class 4 lasers or laser systems
- Perform service or open-beam alignment on Class 1 products containing a Class 3B or Class 4 laser

C. Exceptions

None

D. Policy Statement

2. If a laser will be purchased, the Berkeley Lab Laser Safety Officer (LSO) must review the purchase, installation, and use (Work Process C, Procurement Requirements).
3. Class 1, 2, 3A, 3R, 1M, or 2M lasers may be used as intended when conditions in Work Process F, Class 1-3A Lasers, are satisfied.
4. Users of Class 3B and 4 lasers must pass medical surveillance requirements (Work Process D, Medical Exam Requirements).
5. Users of Class 3B and 4 lasers must pass training requirements (Work Process E, Training Requirements).
6. An Activity Hazard Document (AHD) must be completed for new installation and use of Class 3B and 4 lasers, and approved by the LSO (Work Process G, Class 4B-4 Lasers).
7. Control measures must be implemented for Class 3B and 4 (Work Process G):
   - Access controls
   - Beam controls
   - Signs and postings
   - Laser eyewear
   - User authorization
8. Any near-miss, exposure, or injury incidents should be reported and investigated (Work Process H.3, Suspected Laser Injury).

E. Roles and Responsibilities

Managers, supervisors, and employees have the responsibility to adhere to the provisions of this policy.

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| Supervisor/Work Lead | • Ensures the laser inventory is accurate in both the laser inventory system and on the AHD  
                        • Ensures that all laser users have taken the Job Hazard Analysis (JHA) training at least annually and whenever the scope of work changes  
                        • Ensures that all laser users understand general requirements for laser use  
                        • Ensures all lasers purchased for his or her lab or area are reviewed and approved by the LSO  
                        • Ensures that all personnel using Class 3B and 4 lasers report to Health Services for laser eye examinations  
                        • Ensures that all personnel using Class 3B and 4 lasers are trained and authorized before beginning work on the laser(s), including on-the-job training (OJT)  
                        • Ensures all visitors receive a site/experimental hazard orientation as part of any laser-use-area tour when lasers are in use  
                        • Prepares an AHD for a laser operation, and ensures that the provisions of the AHD are properly implemented and diligently followed by the laser users  
                        • Ensures that any laser safety devices (interlocks, etc.) are functioning properly (Note: Documented verification of interlocks is required every six months.)  
                        • Leads laser incident investigations |
                        • Work in a safe manner following Laboratory policy and procedural requirements  
                        • Promptly report any malfunctions, problems, accidents, or injuries that may have an impact on safety  
                        • Immediately report any suspected laser eye exposures to the laser supervisor, Health Services, and the LSO |
| Class 3b and 4 Laser Users | • Attend appropriate training (such as EHS 302) before operating any laser/laser system unsupervised  
                                 • Receive appropriate OJT prior to unsupervised laser use  
                                 • Receive medical surveillance, where applicable (EHS0288)  
                                 • Read, understand, sign, and follow all applicable procedures in the AHD, and insist that other personnel in the laser lab do the same |
### Laser Safety Officer (LSO)

- Maintains the Berkeley Lab Laser Safety Program
- Evaluates laser hazards (including non-beam hazards), approves mitigation plans, and provides technical advice for safe laser operations
- Reviews and signs off on all AHDs that reference laser hazards
- Ensures that a laser-safety audit of each Class 3B or Class 4 laser AHD is performed at least annually
- Performs and documents observational visits to laser use areas
- Approves specific safety plans for laser diode and fiber use when used within an AHD
- Ensures laser-safety training is provided for Class 3B and Class 4 laser users through lecture, Web-based, or other techniques
- Works with Health Services to develop and maintain the Medical Surveillance Program
- Ensures the appropriateness of OJT
- Investigates all instances of suspected laser eye exposure and participates in investigations of beam- as well as non-beam-related accidents in Laboratory laser facilities
- Maintains Laser Inventory System
- Assists in developing Temporary Control Areas/Temporary Work Authorizations

### F. Definitions/Acronyms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Class 1 Laser</td>
<td>Poses no threat of biological damage</td>
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<tr>
<td>Class 1M</td>
<td>May pose a threat if viewed with optical devices</td>
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<tr>
<td>Class 2</td>
<td>Visible (0.4 to 0.7 m) output, eye protection is normally afforded by aversion response</td>
</tr>
<tr>
<td>Class 2M</td>
<td>Visible (0.4 to 0.7 m) output, may pose a threat if viewed with optical devices</td>
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<tr>
<td>Class 3</td>
<td>Medium-powered lasers – may be hazardous under direct or specular viewing, not normally a diffuse reflection or fire hazard</td>
</tr>
<tr>
<td>Class 3R</td>
<td>Has potential hazards, under some direct or specular viewing conditions</td>
</tr>
<tr>
<td>Class 3B</td>
<td>Can cause biological damage to the eyes</td>
</tr>
<tr>
<td>Class 4</td>
<td>High-powered lasers — direct exposure to primary beam, specular reflections, and diffuse reflections can cause biological damage to the eyes or skin. Laser beam may have potential to generate a fire hazard. Laser beam may generate air contaminants.</td>
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</table>

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Term</th>
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<tr>
<td>AHD</td>
<td>Activity Hazard Document</td>
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<td>LSO</td>
<td>Laser Safety Officer</td>
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<td>OJT</td>
<td>On-the-job training</td>
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### G. Recordkeeping Requirements

- Activity Hazard Document (AHD)
- Eye exam
- Training records
- Laser inventory
- Laser control evaluation
- Laser eyewear inventory

### H. Implementing Documents

<table>
<thead>
<tr>
<th>Document number</th>
<th>PUB-3000 Reference</th>
<th>Title</th>
<th>Type</th>
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<tr>
<td>07.07.018.001</td>
<td>Chapter 16</td>
<td>Chapter 16, Laser Safety</td>
<td>Program</td>
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<td>07.07.018.003</td>
<td>Ch. 16, Work Process B</td>
<td>General Laser Requirements</td>
<td>Process</td>
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<td>Ch. 16, Work Process C</td>
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<td>Ch. 16, Work Process D</td>
<td>Medical Exam Requirements</td>
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<td>07.07.018.006</td>
<td>Ch. 16, Work Process E</td>
<td>Training Requirements</td>
<td>Process</td>
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</tbody>
</table>
I. Other References

- ANSI Z136.3, 2005 (or later revision), *American National Standard for the Safe Use of Lasers in Health Care Facilities*
- ANSI Z136.4, 2010 (or current revision), *Recommended Practice for Laser Safety Measurements for Hazard Evaluation*
- ANSI Z136.5, 2009 (or current revision), *American National Standard for the Safe Use of Lasers in Educational Institutions*
- ANSI Z136.6, 2005 (or current revision), *American National Standard for the Safe Use of Lasers Outdoors*

J. Contact Information

**Laser Safety Officer**
Radiation Protection Group
EHS Division

K. Revision History

<table>
<thead>
<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>1/2/2012</td>
<td>1</td>
<td>K. Barat</td>
<td>Rowrite for wiki</td>
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<tr>
<td>4/1/2014</td>
<td>1.1</td>
<td>G. Toncheva</td>
<td>Editorial changes</td>
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Document Information

**DOCUMENT INFORMATION**

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<td>Next review date:</td>
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<td>Policy Area:</td>
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<td>RPM Section (home):</td>
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<td>RPM Section (cross-reference):</td>
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<td>EHS</td>
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<td>Prior reference information (optional):</td>
<td>PUB-3000 Chapter 16</td>
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Source Requirements Documents

- 10 CFR 851.23(a)(11), *Safety and Health Standards*

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<td>07.07.018.007</td>
<td>Ch. 16, Work Process F</td>
<td>Class 1-3A Lasers Process</td>
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<td>07.07.018.008</td>
<td>Ch. 16, Work Process G</td>
<td>Class 3B- 4 Lasers Process</td>
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<tr>
<td>07.07.018.009</td>
<td>Ch. 16, Work Process H</td>
<td>Special Topics: 1. Laser Use Requirements for Berkeley Lab Off-Site Staff 2. Berkeley Lab Employees Working on the UC Berkeley Campus 3. Suspected Laser Injury</td>
<td>Process</td>
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<tr>
<td>07.07.018.010</td>
<td>Ch. 16, Work Process I</td>
<td>Berkeley Lab Response to a Laser Injury Process</td>
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