

Standard Operating Procedures

LSO workshop 2010

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Setting the Stage

- Standard Operating Procedures (SOP)
- Is the first item in the Administrative Control section 4.4

Section 4.4.1

- The LSO should require & approve written standard operating, maintenance and services procedures (SOPs) for Class 3B lasers.
- The LSO shall require & approve written SOPs for Class 4 laser or laser systems
- These written SOPs shall be maintained with the laser equipment for reference by the operator, and maintenance or service personnel

Section 4.4.5

- Alignment procedures:
- Written SOPs outlining alignment procedures
 - Should for Class 3B
 - Shall for Class 4

Normative Appendix A

- SOPs shows up again as an LSO duty, item 14.
- So one walks away with the feeling SOPs are needed

Question of interpretation

Option A:

- One could read section 4.4.1 and see the SOP as a user guide
 - These written SOPs shall be maintained with the laser equipment for reference by the operator, and maintenance or service personnel

Common interpretation

Option B:

- In research facilities SOP is interpreted as a document that outlines work hazards and controls
- This is how it is used at LBNL
- A web search of SOPs finds this same approach at Universities

Value of option B

- The LSO duties or at least hazard awareness extends beyond laser radiation
- Therefore the SOP provides a mechanism for the user and LSO to address beam and non-beam hazards
 - Electrical, Chemical, Seismic, Pressure, etc

Format Variations

- A review of SOPs found on the web and other sources shows a great deal of variation of SOP layouts, but most pose a few broad questions for the user to complete.
- Alignment procedures
- Laser specifications
- Eyewear selection
- Laser Inventory
- List goes on

Questioning Prompt approach

- I am suggesting that to get the most out of the user who completes the SOP, the SOP template needs to contain a number of specific prompts for the user to complete

Where do the prompts come from?

- Questions or concerns a LSO might ask as part of a laser audit.
- This approach makes the user document how they will address these concerns as well as give them some genuine consideration

Why?

- In general users do not consider all the safety control concerns as well as the mechanisms to control them that might be needed
- I would rather have a user say Not Applicable that over look a risk

Examples: Workstation location

- Question
- Effect



Unattended Work

- Conditions
 - Enclosed
 - Open beams
- Interlocked room
- Non-interlocked room
- Alternate access
- Posting
- Emergency contact
- In the event of unattended operation of non-enclosed lasers and non interlocked room the following controls shall be in place:
- A sign shall be posted outside the laboratory which states that an unattended laser operation is underway (the sign can be obtained from the LSO).
- Emergency shutdown procedures and emergency contacts shall be posted at the door.
- The LSO can review and allow exemptions (e.g. for access restricted areas)

Explain OJT

- Provide user with guidance for what entails OJT and a means to document it
- The PI or designee shall train/orientate staff on the hazards of the specific experimental work to be done. This will include location and mitigation of potential hazardous beams /reflections, hazards associated with the work and the use of all required personal protective equipment (PPE). This OJT will be documented, including a signature by the trainer and trainee.

Eyewear storage

- Inside laser area
- Outside laser area
- Quantity



Interlock checks & frequency



- Sets out interlock frequency checks
- Require a written procedure
- Require documentation

Vendor service

- What steps are taken during vendor service?
- Are special controls required are they in SOP?
- Receive a laser safety orientation from the LSO or designee (for each individual service person)
- Receive a site orientation from the user, including additional room hazards
- Follow safety guidance from the SOP and the laser chapter of EHS Manual
- Wear the proper laser protective eyewear for the level of laser output
- Post all room entrances with a “Notice - Laser Service” warning sign
- Be responsible to make anyone who enters the room is aware of the enhanced laser hazard status of the room
- It is the responsibility of the service person to re-install all safety system at the completion of the work (i.e. protective housings, interlocks)
- Their firm must have on file with LBNL a non-construction safety checklist
- In case of an injury or suspected injury notify his or her LBNL contact ASAP
- Electrical work and LOTO permit and Division permit maybe an additional requirement prior to allowing maintenance to proceed

Routine PM

- It is common and acceptable practice for laser users to perform PM on their laser systems (i.e. cleaning optics, optimizing output). A laser lab may have multiple energy sources that must be secured prior to maintenance or servicing activities. Steps described in the LBNL Lockout/Tagout Program shall be followed whenever this equipment is locked/tagged out. When access to electrical sources over 50 V is required (guarded or unguarded) the user must evaluate the need to applicability of LBNL Lock out tag out and electrical safety rules. This could include obtaining an electrical work permit. An activity where this applies is Flash lamp change out, work on diode drivers and power supplies.
- Outline LOTO Procedures

Room illumination

- Question
- Effect
- Room illumination can have a dramatic effect on eyewear selection and general safety within a laser use area, indicate level of illumination:
 - Normal room light [] Low light illumination [] Complete darkness []

Target interaction

- Once the laser beam reaches its goal a consequence is realized. It might be raising an energy level or cutting a material. Laser radiation interaction with a variety of target or sample materials can generate beam target interaction hazards. The purpose of this section is to cause the user to think about what these interactions might be including reflections from a reaction chamber. Beam interactions could include: ultra violet exposure, ionizing radiation, reflective material and fumes.
- ***<Describe any safety precautions that will to be taken to mitigate beam interaction:>***

Beam Alignment

- The majority of laser accidents in research activities occur while aligning the laser. All possible steps will be taken to prevent any such accidents. Alignment for the particular systems in this AHD shall be covered in required OJT of fully authorized users.
- The laser beam is never to be viewed directly.
- As a precaution, reflective jewelry, ID badges, etc will be taken off by those handling the laser.
- Only laser operators authorized by the PI may perform laser alignment activities.
- Whoever manipulates or moves optics shall be responsible to check for stray reflections. When found, those reflections shall be contained to the optical or experimental table(s), even if they are below an eye hazard level.
- Alignment should be conducted optic-to-optic and constant checking for stray reflections.
- Alignment procedures are performed at the lowest possible laser output.
- **<Describe any specific laser alignment procedures :>**

Alignment Eyewear: Yes or No

- Alignment eyewear is for laser adjustment work where hazardous laser radiation occurs in the visible portion of the spectrum (400-700 nm). This eyewear reduces but does not completely block the visible spectrum. It does allow the user to see the beam and therefore perform laser alignment (adjustment) activities. The alignment filters should attenuate the radiation level to a class 2-3A level. **The use of alignment eyewear can only be authorized by the LSO. That authorization is only valid for a year and for a set of specific circumstances, demonstrated to and evaluated by the LSO.**
- *< The specific alignment eyewear and the alignment controls. Examples: reduce output, use of ND filters, use of Iris, use of beam enclosures, remote viewing, will be found on the alignment authorization form, in the upload tab..>*

Summation

- Add a few situation specific questions to an SOP template provide a more complete hazard evaluation by the user and LSO

Questions

- Contact information
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