**STANDARD OPERATING PROCEDURES (SOPs) For Laser Labs**

As with any experimental procedure or other hazard, an SOP should be developed when introducing a new laser or laser system to the lab, or when significantly modifying an existing procedure or configuration. This section will detail the information that should be included in your lab’s laser SOP(s) (see below for a sample SOP).

**1. Introduction**

The introduction should include the following information:

* Manufacturer, serial number, and model number
* Type (CW or Pulsed)
* Classification (Class 3B or Class 4)
* Lasing medium (gas, semiconductor, dye)
* Location of laser (building, room number)
* Technical specifications including wavelength, power/energy, pulse length, repetition rate, beam diameter and divergence

Briefly describe the purpose of the experiment.

**2. Hazards**

Identify the specific hazards associated with the laser operation, including the following:

* Electrical
* Fire
* Hazardous chemicals
* Laser generated air contaminants
* Trip hazards
* High pressure
* Cryogens
* Others

**3. Hazard Controls**

Once the above hazards are identified, detail how they will be mitigated. List the controls required to accomplish this, including:

* Door interlocks
* Training
* Protective eyewear
* Signage
* Barriers and/or curtains

**4. Operating Procedures**

Describe the complete operation of the laser system, including when specific safety controls are implemented. The procedure(s) should be written specifically for the laser user(s), not necessarily for the benefit of others in the lab. An exception to this would be emergency procedures and response.

**5. Alignment Procedures**

Alignment procedures should be documented as described in Appendix B of the Laser Safety Program. This should be a separate document to the general laser SOP.

**6.** **Training**

Describe the training requirements for all laser users as well as lab members not directly interacting with the laser system. Laser users are required to complete both the UHS on-line training module and lab-specific training. Other lab members require lab-specific training and should (but are not required to) complete the on-line training.

**7. Emergency Procedures**

Describe what actions will be taken in the event of an injury, fire, suspected laser exposure, or other emergencies. Include names and contact details for:

* Principal Investigator and Lab Supervisor
* University Laser Safety Officer
* University Police and Fire
* Department Safety Officer

Sample SOP Template

**Standard Operating Procedure for name of lab or experiment**

This procedure is to be reviewed and signed annually by all members using the laser listed in this SOP. It is recommended that non-laser users review sections of this SOP, particularly Emergency Procedures.

**Building and Room #:**

**Date:**

**Reviewed by PI:**

**Approved by LSO:**

**Personnel:**

|  |  |  |
| --- | --- | --- |
| Principal Investigator |  |  |
| Lab Safety Officer/Supervisor |  |  |
| Laser User |  |  |
| Laser User |  |  |
| Laser User |  |  |
| University Laser Safety Officer | Brian Andersson | lso@umn.edu |

**I. Introduction**

**Laser Information**

|  |  |
| --- | --- |
| Manufacturer: | Serial #: |
| Model #: | Type (CW or Pulsed): |
| Classification: | Lasing Medium: |
| Location: | Wavelength(s): |
| Power/Energy: | Pulse Length: |
| Repetition Rate: | Beam Diameter (1/e2): |

(Briefly describe the purpose of laser experiment here)

**II. Hazards and Controls**

Indicate controls used to mitigate beam hazards.

|  |  |
| --- | --- |
|  | Door Interlocks |
|  | Barriers and/or Curtains |
|  | Signage |
|  | PPE |
|  | Beam Stops |
|  | Viewing Devices |
|  | Operating Key |
|  | Other |

In addition to hazards associated with direct beam exposure (intra-beam or reflections), non-beam hazards must be identified and addressed. Indicate in the table below the specific non-beam hazards associated with your laser system and the controls used to mitigate these hazards.

|  |  |  |
| --- | --- | --- |
| **Y/N** | **Hazard** | **Control Measure(s)** |
|  | Electrical |  |
|  | Fire |  |
|  | Hazardous Chemicals |  |
|  | LGAC |  |
|  | Trip Hazards |  |
|  | High Pressure |  |
|  | Cryogens |  |
|  | Other |  |

**III. Personal Protective Equipment**

**Laser Eyewear**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Laser In Use** | | | **Required Eyewear** | | |
| Class | Type | Wavelength(s) | Manufacturer | Optical Density | Comments |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

**Additional PPE Required While in Nominal Hazard Zone**

|  |  |  |
| --- | --- | --- |
| **Equipment** | **Location** | **Comment** |
|  |  |  |
|  |  |  |
|  |  |  |

**IV. Operating Procedures**

In this section, please detail how the laser or laser system will be operated, including, but not limited to:

* Pre-activation sequence (warning lights/signs, notifying non-laser users, barriers, etc.)
* Activation sequence
* Sequence of operations for experiment
* Methods of beam visualization (if applicable)
* Beam deactivation and post-experiment procedures (signage, etc.)
* Emergency shut-down procedures

(Insert operating steps here)

**V. Training**

In the table below, list all personnel in the lab, whether they are a laser user, and the level of laser safety training received.

|  |  |  |
| --- | --- | --- |
| **Name** | **Laser User? (Y/N)** | **Training (online, lab-specific) and Date** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**VI. Emergency Procedures**

Describe what action will be taken in the event of a suspected laser exposure, injury, fire, or other emergencies. Include names and contact details for:

* Principal Investigator and Lab Supervisor
* University Laser Safety Officer
* University Police and Fire
* Department Safety Officer

After lab personnel have reviewed the SOP, please sign and date below.

|  |  |  |
| --- | --- | --- |
| **Name** | **Signature** | **Date** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |