Argonne NATIONAL LABORATORY

Standard Operating Procedures for Laser Controlled Area

Name of Division: _____ Page # **1** of **7**
Location, bldg./room: _____ Ver. # _____
LCA Supervisor: (Name): _____ Date: _____

Prepared by:

LCA Supervisor:

_____

Name Printed Signature Date

Approved by:

Laser Safety Officer or Deputy Laser Safety Officer:

_____

Name Printed Signature Date

ESH Coordinator:

_____

Name Printed Signature Date

Approved by:

Division Director:

_____

Name Printed Signature Date

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INTRODUCTION

Indicate in a paragraph the physical location of this LCA; include the building, room, etc. Provide a brief description of the overall mode of operation of this LCA, indicating the total number of active lasers. If diagrams or floor plans are available for this LCA, the descriptions should be noted here, and included as Appendix A at the end of this document.

LCA SUPERVISOR

Indicate the LCA supervisor, including their badge number and how to contact him/her (i.e., phone extension and email address if available). Any Backup or Deputy LCA Supervisors should also be noted.

NORMAL LASER OPERATION

Indicate the General Setup of your LCA. This should provide a detailed description of what the essential system consists of; how it is set-up on the tables; how the output is directed; where the optical components are located; how the beam is terminated; where the emergency stop is located, if applicable; how and where the beam is enclosed, or unenclosed; and the height of the beam. Unenclosed beams have to be fully justified by the needs or nature of the experiment.

List each laser in use in your LCA: 1) Indicate the Industrial Hygiene Identification Number (IHID); 2) Indicate the ANL Property #; 3) Indicate the serial number; 4) Indicate the class of the laser; 5) Indicate the type of eyewear appropriate for that laser. For each laser, provide a brief paragraph describing the essential technical specifications, such as wavelength(s), power, repetition rate, beam shape and dimensions, divergence, Optical Density (OD) of eyewear needed for protection from a direct hit. An example follows:

***Example**:*
Lambda Physik COMPex 102 Excimer Laser

IHID	Property #	Serial #	Class	Eyewear
02346	P065553	9512E4280	4	OD 7

This laser is capable of pulsed operation up to 20 Hz and can emit a variety of UV wavelengths that depend on the excimer gas, as listed below:

Gas:	F_2	ArF	KrF	XeCl	ZeF
Wavelength (nm):	157	193	248	308	351
Pulse energy (mJ):	10	200	350	200	150

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The laser is currently optimized for fluorine operation, and thus its use with XeCl is not recommended at this time. The main purpose of this laser is to photodissociate the sample molecular beam, although it can be used to pump one of the dye lasers (IHID# 1234 and #44443 above).

EYEWEAR SECTION

This section contains the calculation or specification for the calculation of OD for eyewear appropriate to your operating conditions. If several types of eyewear are normally used in the LCA, indicate the different types and the laser for which they are needed. If there is a simple solution for eyewear (such as eyewear X is always worn when laser Y is on) list it here. However, if it is complex consider providing the information in a table or graph form, (as Appendix B to this document) indicating the types of eyewear appropriate to the lasers used in this LCA. The supervisor should consider posting such a graph or chart in the lab. Also, indicate spectator and collaborator eyewear here, if different than that of the operator.

Note that eyewear shall be physically inspected at least annually for damage or deterioration. Indicate your testing procedure including intervals and your procedures for logging of this practice.

ALIGNMENT HAZARD CONTROL

Indicate the General Setup for the alignment procedure of your LCA. Describe internal (manufacturer procedures can be deferred to the respective laser manuals) and external alignments of the beams separately. If possible, break down this information according to each laser.

Describe in adequate detail alignment procedures, listing the changes in set-up that may occur. Provide a detailed description of changes that are made to shielding, housing etc., to access the beam, how is alignment done, and what is monitored/viewed to optimize alignment etc. Indicate what type of eyewear is used if different than normal, and give a calculation supporting a lower OD Include spectator and collaborator policy during this procedure here.

Indicate all other non-routine work here.

Indicate which lasers require OJAT to perform alignment.

Example:
Laser 02346 - Lambda Physik COMPex 102 Excimer Laser This laser is factory aligned and generally does not require any addition internal adjustments. Routine minor adjustments are to be performed at the lowest power feasible and in complete accord with the manufacturer's maintenance manual.

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LASER HAZARD CONTROL

1. *Door Interlocks:* Describe in detail all interlock systems used to control entry to the LCA. Indicate your testing procedure, including intervals, and how you document this practice. Note that interlocks must be tested at least annually for proper operation.

2. *Window/Door Covers:* Describe all covers and materials used for control. Indicate your testing procedure including intervals and your procedures for logging of this practice.

3. *Warning Signs:* Describe all signs posted, especially at the entrance for control. Indicate your testing procedure including intervals and your procedures for logging of this practice.

4. *Unauthorized Operation (Class 4 and Class 3B):* Describe the methods used in the LCA to prevent unauthorized operation (e.g., lab is locked when nobody is in, and/or laser keys removed, etc.)

5. *Invisible Laser Beam "ON" Indicator:* Describe methods used in the LCA to indicate that invisible beams are on.

6. *Emergency Cut-off Switch (Class 4)*: Describe the Emergency-Stop switch operation and location in the LCA.

Provide some general discussion regarding the type of activities that are permitted when the laser is on under normal conditions. Discuss proper training, adequate care, and laboratory practices. Include the additional use of computers and monitors and the positioning and/or shielding of these items. Note in this area the additional hazard controls used for chemicals, high voltage, hot plates, glassware, cryogenic fluids, and other equipment.

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CONTROL OF ADDITIONAL LCA HAZARDS

Indicate other possible hazards associated with the lasers in your LCA.

Example:
Some of the lasers listed above pose additional hazards over and above those associate with the laser light output. These include:

Laser 02346 - Lambda Physik COMPex 102 Excimer Laser The high voltage circuitry associated with this laser is contained within the laser cabinet, and cannot be accessed except by removing the cover (as performed during maintenance and repair). An interlock switch on the cabinet prevents the high voltage circuits from charging when the cover is opened, except when this switch is deliberately defeated.

Compressed gases are used to generate the lasting medium for this laser. Compressed He, Ne , Ar, Kr, Xe, 5% Hcl - 1% H_2 in He, and other necessary gases or mixture are contained either in full-size or reduced-size standard high pressure tanks fitted with appropriate regulators. Typically, the tanks are located in the dedicated space along the east wall. At all time the tanks are rigidly secured using standard straps and/or chains. When appropriate form the safety viewpoint, the smaller size cylinders can be located in the adjacent hood. All corrosive gases are fed into the laser inlet using tubing made of compatible materials. In particular, tubing used for mixtures containing elevated concentrations of F2 has to be properly passivated prior to routine use.

ASSOCIATED CHEMICAL HAZARD CONTROL

List chemicals used in this LCA include a list SDS numbers, or attach SDS's to the end of the document (not required to attach SDS sheets). If you prefer, provide the chemical list section from your Project Review Document as an Appendix. Indicate in this section if there is a registered Satellite Waste Accumulation Area in the LCA and where it is located. Discuss any site-specific chemical hazards for this LCA in this section.

CONTROL OF EMERGENCIES & ABNORMAL SITUATIONS

Describe some of the general emergencies (fire, explosion, personal injury, etc.,) that are possible with the site-specific hazards in the laboratory. This section provides some guidance for other extraordinary situations that may require immediate action in order to avoid the possibility of personal injury or equipment damage.

In any emergency or unusual situation, the main rule of thumb is to act conservatively, and protect personnel and equipment as much as possible. Action can be taken only if it is safe to do so. If a situation is out of your control, get help by dialing 911.

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SCIENTIFIC COLLABORATORS, SPECTATORS, AND VISITORS

Detail your policies on entry of scientific collaborators, spectators, and visitors. Entry and training requirements may be more restrictive than defined in Laboratory-Wide Argonne Procedure LMS-PROC-285, Exhibit E, but may not be less restrictive.

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APPENDIX A

FLOOR PLAN DIAGRAM

If diagrams or floor plans are available for this LCA, the descriptions should be noted and included.

APPENDIX B

EYEWEAR SECTION

Shall contain the minimum OD values as specified by the LSO, as well as the specifications of all eyewear provided in this LCA; include a chart or graph indicating the types of eyewear appropriate to the lasers used in this LCA.

APPENDIX C

AUTHORIZED LASER USERS

List all Authorized Users (per Laboratory-Wide Argonne Procedure LMS-PROC-285, Exhibit E), including badge numbers. Users should sign the document to verify that they have read and understand the Standard Operating Procedure for the LCA.

NAME (printed)	**BADGE**	**SIGNATURE**

Users requiring **OJAT** should be noted and their On-the-Job Training Record: Laser Systems Alignment Safety Training (ANL-692) form attached to the SOP.

SCIENTIFIC COLLABORATORS

List all Scientific Collaborators (per Laboratory-Wide Argonne Procedure LMS-PROC-285, Exhibit E), including badge numbers. Collaborators should sign the document to verify that they have read and understand the Standard Operating Procedure for the LCA.

NAME (printed)	**BADGE**	**SIGNATURE**

Appendix C can be updated as frequently as needed.