

# APS Laser Training Procedure and Record

## Scope

Following a mandate of the DOE Office of Sciences and as part of the policy for safe laser work the APS Laser Safety Committee has developed the policy that all laser control area supervisors (LCAS) are required to provide on-the-job training for laser alignments (Class 3b and 4) within their laser control area (LCA). This form facilitates the process and overall serves multiple purposes:

- It serves as a guideline for on hand skills for any authorized laser users
- It provides an outline for the development of the actual training procedure for different laser systems.
- It ensures and records that the laser user has been exposed to all relevant topics and demonstrated to the LCAS that he/she understands the operations and procedures.
- Maintenance of training records

## When to use this form

This form will be used initially when a new laser user applies for access to an LCA without an escort. The training record shall be updated as the training level of the laser user increases or decreases (reconfiguration of a laser setup generally requires retraining).

Upon completion of the training or segments thereof the laser user and LCAS shall sign and date the appropriate elements.

## How to use this form

The form provided below has two sections. The first section is based on the *American National Standard for Safe Use of Lasers* (ANSI Z136.1 – 2000), Appendix C on general laser alignment safety management. The second part is only a suggested template that LCAS shall contract or expand to cover all procedures and components within each LCA.

A copy of all on-the-job training forms applicable to the LCA shall be part of the standard operating procedure (SOP) for each LCA. The LCAS is responsible for maintaining training procedures and records that reflect current operations.

## ANL Laser On-the-Job Training Procedure

<b>LCA Location</b> (Bldg., Rm.)	
<b>ANL Laser registration#s</b>	
<b>LCA Supervisor</b> (Print)	
<b>Laser User</b> (Print)	

### Section 1: General laser safety for all authorized laser users

	<b>Supervisor</b> (Signature)	<b>User</b> (Signature)	<b>Date</b>
Lasers classification			
Laser wavelength (s)			
Completed ANL laser safety training <i>ESH120 ANL Laser Safety Training</i> <i>An eye exam arranged by the ANL medical center</i>			
Read and understand ANL ESH Manual section 6.2 on laser safety			
Read and understand CHM Laser safety manual			
Read and understand LCA SOP			
Understands entry restrictions and interlock system - access for visitors and collaborators			
Demonstrated knowledge of cut-off systems, light indicators			
Proper eyewear chosen			
Awareness of specific hazards and safety issues <i>Example: RF sources, exposed electrical contacts (high voltage), toxicity of materials (laser dyes)...</i>			
Knows limits of operation without supervisor approval/oversight			
General or normal maintenance and operation - startup and shutdown procedures - cooling systems, gas systems - laboratory cleanliness - laser (key) access - emergency shutdown			

## Section 2: Laser Alignment Safety and Authorization

Alignment of Laser System			
	Supervisor (Signature)	User (Signature)	Date
Read and understand the SOP and the alignment procedure			
Understand restricted access to LCA during alignment <i>Example: access allowed to necessary personnel only, appropriate area warning signs posted...</i>			
Proper eyewear chosen and use during the operation <i>Example: wavelength, optical density...</i>			
Appropriate opening/removal, and replacing of proper safety shields for alignment			
Using class II laser for alignment if possible			
Use lowest possible power from a high power laser for alignment			
Optical components and detectors in place <i>Example: integrity of lenses and mirrors checked, unobstructed beam path where necessary...</i>			
Use of appropriate beam stops <i>Example: use of protective barriers where laser beams could stray outside defined areas; terminate beams that might miss optics during alignment...</i>			
Proper use of beam viewing equipment for IR and UV radiation			
Adjustment of appropriate components and verification of results			

## EXAMPLE OF TERAWATT LASER SYSTEM OJT

### CHM Laser On-the-Job Training Procedure

LCA Location (Bldg 211, Rm. D076)	
ANL Laser registration numbers	10328, 10402, 10403, 10404, 10419, 10458
LCA Supervisor (Print)	R. Crowell
Laser User (Print)	D. Gosztola

### Section 1: General laser safety for all authorized laser users

	Supervisor (Signature)	User (Signature)	Date
Lasers classification <b>Class 4</b>			
Laser wavelength (s) <b>1064 nm, 800 nm, 532 nm</b>			
Completed ANL laser safety training <i>ESH120 ANL Laser Safety Training</i> <i>An eye exam arranged by the ANL medical center</i>			
Read and understand ANL ESH Manual section 6.2 on laser safety			
Read and understand CHM Laser safety manual			
Read and understand LCA SOP			
Understands entry restrictions and interlock system - access for visitors and collaborators			
Demonstrated knowledge of cut-off systems, light indicators			
Proper eyewear chosen			
Awareness of specific hazards and safety issues <i>Example: RF sources, exposed electrical contacts (high voltage), toxicity of materials (laser dyes)...</i>	NA		
Knows limits of operation without supervisor approval/oversight			
General or normal maintenance and operation - startup and shutdown procedures - cooling systems, gas systems - laboratory cleanliness - laser (key) access - emergency shutdown			

## Section 2: Laser Alignment Safety and Authorization

Alignment of Laser System			
AREA 1, Ti:Sapphire Oscillator	Supervisor (Signature)	User (Signature)	Date
Read and understand the SOP and the alignment procedure			
Understand restricted access to LCA during alignment <i>Example: access allowed to necessary personnel only, appropriate area warning signs posted...</i>			
Proper eyewear chosen and use during the operation <i>Example: wavelength, optical density...</i>			
Appropriate opening/removal, and replacing of proper safety shields for alignment			
Using class II laser for alignment if possible	NA		
Use lowest possible power from a high power laser for alignment	NA		
Optical components and detectors in place <i>Example: integrity of lenses and mirrors checked, unobstructed beam path where necessary...</i>			
Use of appropriate beam stops <i>Example: use of protective barriers where laser beams could stray outside defined areas; terminate beams that might miss optics during alignment...</i>			
Proper use of beam viewing equipment for IR and UV radiation			
Adjustment of appropriate components and verification of results			

AREA 2, Grating Stretcher	Supervisor (Signature)	User (Signature)	Date
Read and understand the SOP and the alignment procedure			
Understand restricted access to LCA during alignment <i>Example: access allowed to necessary personnel only, appropriate area warning signs posted...</i>			
Proper eyewear chosen and use during the operation <i>Example: wavelength, optical density...</i>			
Appropriate opening/removal, and replacing of proper safety shields for alignment			
Using class II laser for alignment if possible	NA		
Use lowest possible power from a high power laser for alignment			
Optical components and detectors in place <i>Example: integrity of lenses and mirrors checked, unobstructed beam path where necessary...</i>			

Use of appropriate beam stops <i>Example: use of protective barriers where laser beams could stray outside defined areas; terminate beams that might miss optics during alignment...</i>			
Proper use of beam viewing equipment for IR and UV radiation			
Adjustment of appropriate components and verification of results			

<b>AREA 3, First Amplifier</b>	<b>Supervisor (Signature)</b>	<b>User (Signature)</b>	<b>Date</b>
Read and understand the SOP and the alignment procedure			
Understand restricted access to LCA during alignment <i>Example: access allowed to necessary personnel only, appropriate area warning signs posted...</i>			
Proper eyewear chosen and use during the operation <i>Example: wavelength, optical density...</i>			
Appropriate opening/removal, and replacing of proper safety shields for alignment			
Using class II laser for alignment if possible	NA		
Use lowest possible power from a high power laser for alignment			
Optical components and detectors in place <i>Example: integrity of lenses and mirrors checked, unobstructed beam path where necessary...</i>			
Use of appropriate beam stops <i>Example: use of protective barriers where laser beams could stray outside defined areas; terminate beams that might miss optics during alignment...</i>			
Proper use of beam viewing equipment for IR and UV radiation			
Adjustment of appropriate components and verification of results			

<b>Alignment of Laser System</b>			
<b>AREA 4, Second Amplifier</b>	<b>Supervisor (Signature)</b>	<b>User (Signature)</b>	<b>Date</b>
Read and understand the SOP and the alignment procedure			
Understand restricted access to LCA during alignment <i>Example: access allowed to necessary personnel only, appropriate area warning signs posted...</i>			
Proper eyewear chosen and use during the operation <i>Example: wavelength, optical density...</i>			
Appropriate opening/removal, and replacing of proper safety shields for alignment			
Using class II laser for alignment if possible	NA		

Use lowest possible power from a high power laser for alignment			
Optical components and detectors in place <i>Example: integrity of lenses and mirrors checked, unobstructed beam path where necessary...</i>			
Use of appropriate beam stops <i>Example: use of protective barriers where laser beams could stray outside defined areas; terminate beams that might miss optics during alignment...</i>			
Proper use of beam viewing equipment for IR and UV radiation			
Adjustment of appropriate components and verification of results			

<b>AREA 5, Third Amplifier</b>	<b>Supervisor (Signature)</b>	<b>User (Signature)</b>	<b>Date</b>
Read and understand the SOP and the alignment procedure			
Understand restricted access to LCA during alignment <i>Example: access allowed to necessary personnel only, appropriate area warning signs posted...</i>			
Proper eyewear chosen and use during the operation <i>Example: wavelength, optical density...</i>			
Appropriate opening/removal, and replacing of proper safety shields for alignment			
Using class II laser for alignment if possible	NA		
Use lowest possible power from a high power laser for alignment			
Optical components and detectors in place <i>Example: integrity of lenses and mirrors checked, unobstructed beam path where necessary...</i>			
Use of appropriate beam stops <i>Example: use of protective barriers where laser beams could stray outside defined areas; terminate beams that might miss optics during alignment...</i>			
Proper use of beam viewing equipment for IR and UV radiation			
Adjustment of appropriate components and verification of results			
Safe handling of liquid nitrogen			

<b>Alignment of Laser System</b>			
<b>AREA 6, Grating Compressor</b>	<b>Supervisor (Signature)</b>	<b>User (Signature)</b>	<b>Date</b>
Read and understand the SOP and the alignment procedure			
Understand restricted access to LCA during alignment <i>Example: access allowed to necessary personnel only, appropriate area warning signs posted...</i>			

Proper eyewear chosen and use during the operation <i>Example: wavelength, optical density...</i>			
Appropriate opening/removal, and replacing of proper safety shields for alignment			
Using class II laser for alignment if possible	NA		
Use lowest possible power from a high power laser for alignment			
Optical components and detectors in place <i>Example: integrity of lenses and mirrors checked, unobstructed beam path where necessary...</i>			
Use of appropriate beam stops <i>Example: use of protective barriers where laser beams could stray outside defined areas; terminate beams that might miss optics during alignment...</i>			
Proper use of beam viewing equipment for IR and UV radiation			
Adjustment of appropriate components and verification of results			

<b>AREA 7, Diagnostic Table</b>	<b>Supervisor (Signature)</b>	<b>User (Signature)</b>	<b>Date</b>
Read and understand the SOP and the alignment procedure			
Understand restricted access to LCA during alignment <i>Example: access allowed to necessary personnel only, appropriate area warning signs posted...</i>			
Proper eyewear chosen and use during the operation <i>Example: wavelength, optical density...</i>			
Appropriate opening/removal, and replacing of proper safety shields for alignment			
Using class II laser for alignment if possible	NA		
Use lowest possible power from a high power laser for alignment			
Optical components and detectors in place <i>Example: integrity of lenses and mirrors checked, unobstructed beam path where necessary...</i>			
Use of appropriate beam stops <i>Example: use of protective barriers where laser beams could stray outside defined areas; terminate beams that might miss optics during alignment...</i>			
Proper use of beam viewing equipment for IR and UV radiation			
Adjustment of appropriate components and verification of results			