Pacific Northwest National Laboratory

Laser Use Permit

General Permit Information

Permit Name:	RTL520-148-LUP-2751	**Revision:**	1	**Created:**	21-OCT-1999
Author:	Michael Tinker			**Effective Date:**	22-DEC-1999
Title:	Optically Stimulated Luminescence (OSL) Laboratory			**Use Category:**	Information
Purpose:	To provide guidelines and requirements for safely operating the OSL laser system.				
Building:	RTL520	**Room:**	148	**Org Cd:**	D9T9R

Permit Approval/Signatures

Author:	Michael Tinker	21-OCT-1999
	(Electronic Approval)	(Date)
Laser Safety Officer:	Monty Rosbach	17-DEC-1999
	(Electronic Approval)	(Date)
ES&H Representative:	Patrick Wright	21-DEC-1999
	(Electronic Approval)	(Date)
Line Manager:	Judson Kenoyer	22-DEC-1999
	(Electronic Approval)	(Date)
Technical Reviewer 1	_____	_____
	(Steve Miller)	(Date)
Technical Reviewer 2	_____	_____
		(Date)
Technical Reviewer 3	_____	_____
		(Date)
Technical Reviewer 4	_____	_____
		(Date)

Applicable Laser Operations

☑ General Operation[1]	☑ Alignment[2]	☑ Service Repair[3]	☑ Specific Operation[4]	☑ Fiber Optics[5]

Description of Applicable Laser Operations:

1. This permit covers the general operations of the described laser system.
2. This permit includes the alignment process for the described laser system.
3. This permit includes the service and repair process for the described laser system.
4. This permit covers a unique or specific operational process for the laser system.
5. This permit covers and/or includes the use of fiber optics with the laser system.

Laser Characteristics

#	Laser Type	Wavelength(s)	Class	Maximum Power or Energy/Pulse	Pulse Length	Repetition Rate
1	Argon Ion	457-514nm	4	3W (cw)	NA	NA
2	ND:YAG	532nm	4	3.5W		10Hz
3	HeCd	442nm	3b	25mW (cw)	NA	NA
4	HeCd	326nm	3b	20mW (cw)	NA	NA
5	Diode (3@)	630-1064nm	3a	20mW (cw)	NA	NA
6	HeNe	632nm	3b	6.6mW (cw)	NA	NA
7	HeNe	543nm	3b	25mW (cw)	NA	NA

Description of Laser Use:

There are many types of luminescence phosphors, all of which have different trapping centers. These centers are stimulated by certain bandwidths of light. Lasers are used to stimulate these centers and the light given off as a luminescence is collected by various means (photon counting systems or CCD arrays). Only one laser is used at a time per experiment.

Hazards Analysis

☑ Laser Light	☑ Electrical	☑ Cryogens	☐ Toxic Chemicals
☑ Fire	☐ Noise	☐ Compressed Gas	☑ Flashtubes

Description of Hazards:

1. This laser system produces laser light across the spectrum. The direct beam and specular reflections of the laser can be a hazard to the unprotected eye. Precautions must be taken and controls instituted to control exposures to the laser light to below the MPE.
2. The Ion Argon, ND:YAG and the HeCd lasers pose a significant risk of electrical shock.
3. Cryogens may be used in conjunction with this laser system. See the IOPS practice entitled "Cryogen Use"
5. The Argon Ion & the ND:YAG laser beams are of sufficient energy to initiate combustible materials.
8. Flashtubes are used in conjunction with the ND:YAG laser system. See SBMS subject area "Non Ionizing Radiation Hazards in the Workplace, Controlling."

Engineering Controls

☑ Protective Housing	☑ Protective Interlocks	☑ Beam Stop or Attenuator
☑ Enclosed	☑ Activation Warning Systems	☑ Key Controls
☑ Control Area	☑ Emission Delay	☑ Safety Interlocks

Description of Engineering Controls used to mitigate the hazards associated with this process:

1. Protective housing, with available interlocks, is used to protect operators from diffuse internal laser light and electrical hazards.
2. A shutter on the laser system is tied to the protective housing of the laser enclosure. The interlocked enclosure will close the shutter of the laser when opened.
3. A beam stop or attenuator is used for limiting the class 3b & 4 laser beams within the defined control area.
4. During normal operations, the beam path is enclosed within the containment or whenever a beam leaves an optical table control area.
5. A light mounted on the interior wall of the laboratory space indicates when the laser system is activated.
6. Key controls are available for the class 3&4 lasers to limit access to authorized laser users and operators.
7. A control area is established for this laser system that controls access to the area in which the laser light exceeds the maximum permissible exposure limit (MPE). This control area is in the nominal hazard zone (NHZ).
8. An emission delay switch is used to allow a delay in light release after the argon ion laser is energized.
9. The access door interlock system has two graded hazard-level features: "hazard" and "high hazard." The "hazard" mode has both a steady red light, and the "high hazard" has blinking red lights. The "hazard mode" is used when the beam path is limited to the air space above the optical table(s) and beam tubes are used to transport laser beams between optical tables. The "high hazard" mode is used when the beam path may be open to the entire laboratory space.

Administrative Controls

☑ Labels[1]	☑ Signs[2]	☑ Output Emissions Limit[3]
☑ Barrier and Curtains[4]	☑ Operating Limits[5]	☑ Critical Beam Path[6]

Description of Administrative Controls used to mitigate the hazards associated with this process:

1. All lasers within the scope of this permit are labeled as to the type, class, and power.
2. An ANSI laser DANGER/CAUTION sign is clearly posted at the laboratory entrance.
3. Output emissions are controlled to limit the exposure potential to less than the MPE.
4. During normal operations, the access interlock system will operate in the "hazard" mode. During operations where laser radiation may leave the controlled area of the optical table, the interlock operates in the "high hazard" mode.
5. Repair and maintenance operations of this system may pose electrical hazards. Refer to SBMS - Electrical Safety for guidance.
6. A critical beam path has been established for this laser system that designates where the main beam is located.

Standard Requirements

1. Verify that all appropriate engineering controls are functioning.
2. Verify that all applicable administrative controls are understood and being used.
3. Ensure that all optical paths from the laser or laser system are controlled to within the nominal hazard control zone.
4. Operate the laser using the guidance of this permit and supplement with the laser operating manual, when appropriate.

Personal Protective Equipment

☑ Eye Protection[1]	☐ Skin Protection[2]

Description of Personal Protective Equipment required to control exposure:

1. Laser eyewear specifications are:
Wavelength Intrabeam OD Diffuse OD
326 1.1 0
442 2.59 0
457 3.39 0
532 3.55 0
543 1.14 0
632 .83 0
630 0 0

General Operations: Laser safety eyewear is recommended for the normal operation of this laser system by all personnel within the nominal hazard zone.

Alignment: Laser safety eyewear is used during alignment and repair of this laser system when a potential exists for exposure to the laser radiation above the maximum permissible exposure limit.

The optical density of the laser safety eyewear is dependent power capacity and wavelength of the laser(s).

2. Skin protection requirements are:NA

Description of Emergency Response

Should an emergency of any kind occur during and in conjunction with operation, maintenance, or alignment of the laser, the system should be deactivated immediately. Deactivation of the laser system is relatively simple:
1. Press RED crash button integrated with the interlock system; OR,
2. Depress the OFF button on the power supply; OR
3. Turn the MAIN POWER KEY SWITCH (labeled LOCK) on the power supply console counterclockwise, then remove the key.
In case of electric shock, calmly and quickly complete one of the above steps to disable the power supply of the laser; remove the victim from contact with any laser components, using a NON-CONDUCTIVE object such as a wooden stick or plastic rod; and immediately administer any first aid measures that may be necessary (CPR, treat for shock, etc.).
In the event of an emergency or off-normal event, call (9) 375-2400. State the problem to the 375-2400 operator, request any needed emergency assistance, and request notice of the appropriate personnel. If you need further instructions be sure the 375-2400 operator has the telephone number where you can be reached. This applies 24 hours a day, 365 days of the year. All injured individuals must report to first aid and notify their supervisor of the injury.

Laser User Qualifications

Both basic laser safety training and on-the-job laser safety training are required and provided for resident laser users and temporary visitors/guest laser users, (as defined in SBMS - Controlling Laser Hazards in the Workplace), who work in a Class 3b and Class 4 laser control area. Basic laser safety training must be retaken every two years. Basic laser safety training is not required of escorted laser observers. Medical examinations are required and provided for resident laser users working with or in an area of Class 3b or Class 4 lasers (See SBMS - Occupational Medical Examinations). Medical examination is not required for temporary guests, escorted laser observers, and maintenance/repair personnel not working directly with the laser.

Basic Laser Training	Job Specific Training	Medical Surveillance	Printed Name	Signature/Date
☐	☐	☐	_____	_____
☐	☐	☐	_____	_____
☐	☐	☐	_____	_____
☐	☐	☐	_____	_____
☐	☐	☐	_____	_____
☐	☐	☐	_____	_____

Job-Specific Training: Before working this laser system, the lab worker must read the Laser Use Permit. Staff must understand the hazards presented by their specific work tasks, how to protect themselves from those hazards, and know the emergency response to an accident involving this laser system.