LASER SAFETY POLICY

Effective Date: August 30, 2011

Originating Office: Office of the Vice-President, Services and Sustainability

Supersedes /Amends: VRS-51/n/a

Policy Number: VPSS-51

All users of lasers shall be expected to follow these guidelines, policy and procedures established by the University Radiation Safety Committee (URSC) and the Radiation Safety Officer (RSO).

SCOPE

Laboratories in general require precautions to control hazards associated with lasers. Laboratories with high powered (Class 3b and Class 4; see section 2) lasers require special safety procedures to ensure a safe environment. It is the University's policy to provide its employees, students and visitors with the safest work environments possible.

This Policy describes reasonable and necessary procedures for the safe use of lasers, which apply to any and all facilities, departments, students and employees who are associated with the use and/or handling of lasers.

The safety standards contained herein are based primarily on the American National Standards Institute Guide for the Safe Use of Lasers (ANSI Z136.1-2000, or the most recent guide if an update has been adopted). This guide represents the generally accepted standards for the safe use of lasers within the fields of industry, education, research, and medicine.

PURPOSE

Concordia University's Laser Safety Policy is based on the recommendations of ANSI Z136.1, any other pertinent standards, and in compliance with the Federal and Provincial regulations. The laser safety program's primary objective is to ensure that no laser radiation in excess of the maximum permissible exposure (MPE) reaches the human eye or skin. This program is also intended to ensure adequate protection against laser- related non-beam hazards.

POLICY

Responsibilities

1. URSC and Laser Safety Responsibilities:

    a. Review internal policies, procedures and practices to ensure they comply with applicable regulations and accepted safety standards.

    b. Resolve issues identified by the RSO, laser users, or other parties.

    c. Perform annual program reviews.

    d. Review applications and permits for lasers class 3b and Class 4.

2. RSO and Laser Safety responsibilities:

    a. Administer the Laser Safety Program.

    b. Maintain a current inventory of all lasers.

    c. Function as liaison between Principle Investigator (PI) and the URSC.

    d. Accompany outside inspectors/regulators on laser safety inspections.

    e. Perform laser hazard analyses and audits, and review SOP with PI.

    f. Make recommendations to improve laser safety.

    g. Recommend to the Chair of URSC to close a laser operation that present an imminent danger or excessive hazard.

    h. Ensure the availability of proper laser safety equipment.

    i. Make recommendations for selection of proper personnel protective equipment.

    j. Investigate laser accidents and near miss incidents.

k. Ensure that all users have received proper training and keep training records

3. Principal Investigator and Laser Supervisor Responsibilities:

a. Complete a Laser Registration Form for each Class laser and send the form(s) to the RSO.

b. Ensure that standard operating procedures (SOPs) are written for all Class 3b and 4 laser activities. These procedures, which must contain the name of, and contact information for, the principle investigator (PI) and the Laser Supervisor, will be approved by the RSO and posted near the laser.

c. Comply with the safety requirements outlined in this Laser Safety Policy.

d. Supervise the safe use of lasers in the laser environment and provide personnel protective equipment (PPE).

e. Classify and label appropriately all lasers under his/her control.

f. Establish and maintain a current list of those personnel approved to operate specific types of Class 3b or 4 lasers under their supervision and provide a copy of the list to the RSO.

g. Complete the applicable Laser Safety course at the interval specified in this policy.

h. Immediately notify RSO in the event of a suspected overexposure to the output beam from a Class 3b or 4 lasers.

i. Ensure all laser users are adequately trained and supervised.

j. All laser users must follow emergency procedures listed in their SOP in case of an emergency.

4. Laser Operator Responsibilities:

   a. Complete the applicable Laser Safety course, before operating a Class 3b or Class 4 laser and again at the interval specified in this Policy.
   b. Use lasers safely in accordance with established policy, SOPs and other procedural requirements.

   c. Promptly report to the PI any malfunctions, problems, accidents, or injuries, which may have an impact on safety.

   d. Report any injury/incident to the PI, the Laser supervisor and to the EH&S.

Laser Classification

5. All lasers and laser systems are categorized into one of several hazard classes (1, 2, 3a, 3b, and 4). Corresponding labels affixed to the laser or laser system positively identify the class. These laser classifications are detailed in ANSI Z136.1, ANSI Z136.3, and the Products Performance Standard, 21 CFR 1040.10 and 1040.11. The manufacturer provides the classification for most lasers. For custom-built and modified lasers classification must be according to regulations and standards. See criteria for laser classification in appendix and in the laser safety manual.

Laser Acquisition, Transfer, and Disposal

6. Notify the RSO of any decision to purchase, fabricate, or otherwise acquire a Class 3b or Class 4 laser. The RSO will review with the PI the hazards of the proposed operation and make recommendations regarding the specific safety requirements that pertain to the proposed use, including requirements for SOPs, laser control areas, training, and personnel protective equipment. Also notify the RSO of any class 3b or 4 laser or laser system relocated, transferred to another PI or institution, or sent offsite as surplus equipment.

   Follow all procedures in the Laser Safety Manual.

Procedures

Administration

7. The Environmental Health and Safety Office will manage the laser safety program through the Radiation Safety Officer. The RSO shall be an individual with the authority and responsibility to monitor and enforce the control of laser hazards. The RSO reports to the URSC on issues related to the laser safety program (LSP).

8. The URSC will include a laser-user scientist or engineer and any other members needed for effective evaluation of laser safety standards.

9. The RSO's functions will include evaluations, audits, and training.

Other Considerations

10. When any individual or unit initiates or significantly modifies an operation (research, demonstration or conventional) that involves the use of Class 3b or Class 4 laser systems, the unit must, at the same time, submit a "Laser Safety Plan" to the RSO.

11. Standard laser copiers, laser printers, optical scanners, or equivalent equipment will be assumed to be class 1 lasers will be exempt from filing a Laser Safety Plan unless the individual or unit knows of any reason that the equipment would not be considered a Class 1 laser.

12. Laser pointers and similar "low power" laser systems do not require a laser safety plan. However, users of "low power" laser systems should read the safety precautions in the manufacturer's literature.

13. The RSO, along with the URSC, has the authority to request supplemental information in addition to the Laser Safety Plan as needed to accomplish a thorough and complete evaluation of the laser hazards and the control measures required to ensure safety.

14. No unit within the University may install, significantly modify or operate a high-powered laser unless a Laser Safety Plan has been approved by the RSO and the URSC. Once granted, the approval of the Laser Safety Plan remains in force until withdrawn by request

of the applicant or by notification by the RSO. The RSO has the authority to suspend, restrict, or terminate the operation of a laser if, at any time, he/she determines that the laser hazard controls are inadequate. Once approval of the laser registration form is obtained, the purchasing individual/unit is responsible for complying with the proper installation of the laser and maintenance of the required safety features. The RSO is available for consultation and assistance with these requirements.

Evaluation Procedures

15. Evaluation of a Laser Safety Plan and a laser acquisition is based on four primary considerations:

- the laser classification;
- the facility/environment where the laser will be used;
- the personnel operating or otherwise within the vicinity of the laser
- laser safety training.

Audits and Inspection

16. Laser Safety Plans will be routinely evaluated and the facility inspected in accordance with this Policy. The frequency of the evaluation and inspections will vary depending on risks that are identified. As a minimum, all Laser Safety Plans will be evaluated annually. Evaluations will be performed by the RSO and presented to the URSC. Documentation of all inspection program reviews will be maintained by the RSO. A Laser Safety Annual Report will be presented to the CAHSC annually.

Training

Employee and Student Training

17. Training shall be provided to each employee and student routinely working directly or in proximity to lasers or laser systems. The level of training will vary with the degree of potential laser hazards, both from laser radiation and non-beam hazards. The training

program will follow the ANSI Z136.1 standard but not be limited to it. PIs are responsible for training all users under their supervision with respect to standard operating procedures SOPs.

18. The training program will be developed and yearly updated by the RSO and presented to the URSC for approval.

19. A refresher training should be considered depending on the frequency of working with lasers. Occasional work with lasers may be a stronger justification for a refresher training and/or more frequent training than working daily with lasers. Yearly refresher training sessions for the occasional users and every three years for the regular users will be required.

APPENDIX

Laser Classification

Class 1

- Do not emit harmful levels of radiation during normal operation.
- Also includes higher class lasers completely enclosed and interlocked to prevent beam access, allowing a Class 1 laser system designation; any time the higher class laser is accessible (e.g. during alignment or servicing), the higher laser class controls must be observed.
- Can be used without restriction in the manner intended by the manufacturer and without special operator training or qualification.

Class 2

- Emit accessible laser light in the visible wavelength region.
- Capable of creating eye damage through chronic exposure.
- In general, the human eye will blink within 0.25 second when exposed to Class 2 laser light; this blink reflex provides adequate protection.
- Can be used without restriction in the manner intended by the manufacturer and without special operator training or qualification.

Class 3a

- Normally not hazardous when viewed momentarily with the unaided eye, but may pose severe eye hazards when viewed through collecting optics (e.g., microscopes and binoculars).
- Power levels 1-5 milliwatt (mW).

- Same controls as Class 1 and Class 2 lasers for normal operations; if viewed through optical instruments (e.g., binoculars, telescopes, or microscopes), contact the laser manufacture for a hazard review.

Class 3b

- Will cause injury upon direct viewing of the beam and specular reflections.
- Power output 5-500 mW for continuous wave or less than 0.03 joule (J) for a pulsed system (i.e. pulse width less than 0.25 second).
- Must implement specific control measures covered in laser safety manual.

Class 4

- Includes all laser systems with power levels greater than 500 mW Continuous Wave (CW) or greater than 0.03 J for a Pulsed System.
- Pose eye hazards, skin hazards, and fire hazards. Viewing the beam or specular reflections or exposure to diffuse reflections can cause eye and skin injuries.
- All control measures explained in this document must be implemented.