

LLE/COI INST6200E
6 February 2004

SUBJECT: LASER OPERATOR QUALIFICATION CARD

- REFERENCES:**
- a. LLE/COI Instruction 3000 (LFORM)
 - b. American National Standard *for the Safe Use of Lasers* (ANSI Z136.1-1993)
 - c. University of Rochester *Laser Safety Program for Research Laboratories*
 - d. New York State Industrial Code Rule 50, *Lasers*
 - e. University of Rochester *Statement of Safety Policy*
 - f. LLE/COI Instruction 6550

ENCLOSURES: (1) Laser Operator Qualification Card

1. **Purpose:** To ensure the safe use of lasers and to provide for a safe laser environment for all personnel. This program formalizes procedures for qualifying individuals as laser operators and establishes an internal program to supplement the already-existing and well-established laser safety protocols used throughout LLE and COI.
2. **Definitions:**
 - a. Qualified Laser Operator. A user of lasers who has completed Enclosure (1), the qualification card, and is qualified by a Certified Laser Operator/Supervisor, or who has completed OMEGA qualification in accordance with Reference (a).
 - b. Certified Laser Operator/Supervisor. A laser operator selected by the LLE Safety Officer to perform final sign-off on the Laser Operator Qualification Card.
 - c. Incidental Personnel. Those personnel whose work makes it possible but unlikely that they will be exposed to laser energy sufficient to damage their eyes or skin; e.g., custodial, clerical, and supervisory personnel not working directly with laser devices.
 - d. Laser Personnel. Those who work routinely in laser environments. These individuals are ordinarily fully protected by engineering controls, administrative procedures, and/or personal protective equipment.
 - e. Medical Surveillance. The program that consists of entrance/preassignment and exit eye examinations of workers potentially exposed to laser radiation (laser personnel). Incidental personnel are not included in this surveillance. This program also includes eye examinations when exposure to laser radiation is suspected. This examination will be provided without charge to the employee and will be conducted during work hours. Entrance eye examinations are used as a baseline against which damage (primarily ocular) can be measured in the event of an accidental injury as required by reference (a). Those personnel who require an entrance eye examination are identified

during their administrative check-in. This requirement and the eye appointment date are confirmed in writing by the supervisor on the Administrative Check-In sheet.

- f. Active Laser. A laser currently in use and, if Class 3B or 4, requires operator qualification.
- g. Inactive Laser. A laser identified by the Principal Investigator as not currently in use or not functional. This laser is not connected to a power source and if Class 3B or 4, does not require qualification. If reactivated, procedure should be followed as with a new laser.

3. **Background:** Historically, only capable individuals, hired as employees or accepted as students, have been allowed access to University research facilities. Only after rigorous performance evaluation and safety instruction have they been allowed access to high-power lasers (Class 3b & 4).

The LLE program defined in other procedures consists of the following: (a) requires and documents laser-safety training (introductory and specific orientation), (b) ensures eye examinations (entrance and exit), (c) provides appropriate eye wear, (d) designates a Laser Safety Officer, (e) furnishes laser-safety signs and labels, (f) maintains an inventory of lasers, (g) conducts safety inspections, and (h) installs access controls and safety interlocks.

This instruction formalizes qualification procedures as required by references (b), (c), and (d).

4. **Discussion:** Laser-safety standards at LLE are dictated by references (b), (c), and (d). Reference (c) establishes the purpose of the program to ensure the safe use of lasers in University research laboratories and, in turn, recognizes references (b) and (d).

Potential hazardous risks from lasers include eye, skin, chemical, electrical, and fire exposure. Classical approaches to laser safety include administrative controls, engineering controls, and personal protective equipment. Control measures are used to reduce ocular and skin exposure from hazardous laser levels as well as other hazards associated with laser devices.

- a. Administrative controls include designation of a Laser Safety Officer, written work practices [Standard Operating Procedures (SOP)], education and training, maintenance requirements, alignment procedures, medical surveillance, personal protective devices, and warning signs and labels.
- b. Engineering controls include protective interlocks, beam enclosures, shutters/attenuators, key switches, viewing optics/windows, service panels, warning systems, controlled areas, and remote firing and monitoring.
- c. Personal protective equipment includes eyewear (labeled with optical density and wavelength) and clothing (including gloves and face masks for protection from ultraviolet radiation).

Having knowledgeable individuals specifically qualified in laser safety and laser operations of specific systems also ensures the operational readiness of lasers.

5. Procedures: All personnel identified within LLE and COI as operators of laser(s) must be qualified according to Enclosure (1) or to the requirements of Reference (a). Those individuals are to be qualified within three (3) months after notification. Prior to completing qualification, all nonqualified personnel must be accompanied and supervised by a qualified laser operator. Requirements for completing Enclosure (1) qualifications are as follows:

- a. Laser operators may sign off knowledge and practical factor requirements for lasers/systems upon which they are qualified. Final qualification/certification must be completed by the OMEGA Laser Facility Manager, OMEGA Laser-Driver Section Head, OMEGA Optomechanical Section Leader, the LLE Optical and Imaging Sciences Group Leader, or others who are designated in writing by the Laser Safety Officer.
- b. Knowledge requirements will be certified by satisfactorily completing an oral examination.
- c. Practical factors must be actually accomplished under the observation of a qualified laser operator.
- d. One qualification card will be used for each laser type/system.
- e. Completed qualification cards are to be forwarded to the Engineering Division Secretary, who will file the cards, maintain the database, and provide copies to the Laser Safety Officer.
- f. The Laser Safety Officer will monitor the quality and adequacy of the program.
- g. A copy of the completed qualification card will be maintained within the appropriate laboratory and be available at periodic safety inspections.

6. Responsibilities and Organization:

- a. LLE Safety Officer
 - (1) Provide overall direction of the laser safety program.
 - (2) Appoint the Laser Safety Officer [Reference (f)].
 - (3) Report problems of noncompliance to EH&S.
- b. LLE Laser Safety Officer
 - (1) Provide safety training and procedural guidance.
 - (2) Shut down operations deemed to be unsafe.
 - (3) Interface with the University's Laser Safety Officer.
 - (4) Update laser inventory at monthly laboratory-wide safety inspections and whenever notified.
 - (5) Maintain the laser-safety library with publications and regulations.
 - (6) Follow progress of laser operator qualification.
 - (7) Attend periodic professional laser-safety seminars.

- (8) Prepare and maintain a list of Certified Laser Operators/Supervisors.
 - (9) Issue safety violations for the operation of lasers by non-qualified personnel.
 - (10) Shut down lasers/systems after the issuance of three safety violations
- c. Administrative Division Administrative Assistant
- (1) Identify through their supervisors individuals at administrative check-in who require eye examinations and will be working as Laser Operators, and maintain a database of their medical surveillance.
- d. Engineering Division Secretary
- (1) Maintain a database of all laser users, certification status, laser-safety orientation attendance, and maintain a file of completed qualification cards.
- e. Principal Investigators/Supervisors
- (1) Provide immediate supervision of personnel using lasers in the laboratory.
 - (2) Provide, implement, and enforce the safety requirements in this program.
 - (3) Identify all personnel to be qualified as laser operators and who require eye examinations to the Administrative Division Administrative Assistant.
 - (4) Conduct personnel training required to complete qualification as laser operator.
 - (5) Ensure that nonqualified personnel are instructed not to use any lasers unless they are under the direct control and supervision of a qualified laser operator.
 - (6) Provide appropriate information regarding any and all lasers under their supervision, including “fabricated” (in-house) and inactive lasers, to the Laser Safety Officer on the Laser Safety Survey form.
 - (7) Perform safety inspections, specifically the Laser Safety Survey for each installation.
 - (8) Make available Standard Laser Operating Procedures for each laser at each laser installation. These should be factory manuals for commercial lasers or individually prepared and approved procedures for “fabricated” (in-house) lasers.
 - (9) Ensure that appropriate eye protection is provided.
 - (10) Ensure that all warning signs and interlocks are provided.
 - (11) Ensure that all beam paths are enclosed so as to preclude exposure to incidental personnel.
 - (12) Enforce compliance with all laser-safety procedures and requirements, including attendance at the annual laser-safety refresher.

f. Individuals assigned to Qualify Laser Operators

- (1) Ensure that all individuals they qualify meet and continue to meet performance requirements.
- (2) Provide the Laser Safety Officer with any changes to the laser inventory (such as laser location changes and their status, active or inactive).
- (3) Enforce compliance with all laser-safety procedures and requirements.

g. Qualified Laser Operators

- (1) Ensure that lasers are operated in accordance with approved SOP's.
- (2) Confirm that all individuals continue to meet performance requirements.
- (3) Provide the Laser Safety Officer with any changes to the laser inventory (such as laser location changes and their status, active or inactive).
- (4) Verify that the technical information provided on the laser-safety sign is accurate.
- (5) Comply with all laser-safety procedures and requirements.
- (6) Attend annual laser-safety refresher training.

8. Approval:

Robert L. McCrory

Laser Operator Qualification Card

**Enclosure (1)
LLEINST 6200E
6 February 2004**

Name _____

Prerequisites: Attend LLE Laser Safety training and complete eye examination

Qualification:

Laser Type/System¹: _____ Room(s) _____

Knowledge Requirements: Demonstrate knowledge of the following by satisfactorily completing an oral examination by a qualified individual:

<u>REQUIREMENT</u>	<u>QUALIFIED SIGNATURE/DATE</u>
1. Describe laser(s), including lasing medium, wavelength, energy, power, and principle of operation	_____/_____
2. Describe laser safety procedures, including interlocks and eye protection requirements, and location of written procedures	_____/_____
3. Describe startup operations, emergency, and shutdown procedures	_____/_____

Practical Factors: Satisfactorily complete the following practical factors under the supervision of a qualified operator:

<u>REQUIREMENT</u>	<u>QUALIFIED SIGNATURE/DATE</u>
1. Startup laser(s) according to written procedures	_____/_____
2. Operate laser(s) according to written procedures	_____/_____
3. Identify all beam paths and respective hazards	_____/_____
4. Shutdown laser(s) according to written procedures	_____/_____

EXAMINATION AND CERTIFICATION

_____/_____
(Certified laser operator)

¹A separate qualification card must be completed for each laser type/system.