



UNIFORMED SERVICES UNIVERSITY

SUBJECT: USU Laser Safety Program

Instruction 6440

(EHS)

SEP 06 2018

ABSTRACT

A. Purpose. This Instruction establishes procedures and policy for the safe use of lasers by all laser users at Uniformed Services University of the Health Sciences (USU).

B. References. *See Enclosure 1*

C. Applicability. The provision of this instruction applies to the all USU personnel, civilian and military, who work at or occupy research laboratory space in University campus buildings.

D. Policy. All USU personnel who actively use Class 3B or Class 4 lasers in labs and other non-clinical USU facilities must comply with the requirements contained in this document. USU policy on laser safety requires that all lasers and laser systems be operated in a manner that is consistent with recommendations of the American National Standards Institute (ANSI) Z136.1, and applicable Department of Defense (DoD) regulations.

This laser safety program summarizes the laser safety policies and procedures implemented by the University to ensure a safe environment for students, faculty, research personnel and the public. The program goal is to afford research users as much flexibility as is safe and consistent with USU policy and in alignment with the ANSI Z136.1, Z136.8 and Z138.5 standards.

E. Responsibilities.

1. The Assistant Vice President, Environmental Health and Occupational Safety (AVS) shall:
 - a. Appoint a Laser Safety Officer (LSO) and Alternate Laser Safety Officer (ALSO).
 - b. Ensure the adequate administrative support to the LSO and ALSO.
 - c. Make decisions based upon the recommendations or reports of the LSO and ALSO.
2. The LSO and ALSO shall:
 - a. Develop, maintain, and update the laser safety program, guide, and policy.
 - b. Ensure current training is available for all Principle Investigators (PIs) and laser users.

- c. Perform an annual inspection of all Class 3B and Class 4 lasers and laser controlled areas
 - d. Provide an annual Laser safety report to the University Health, Safety, and Wellness Committee.
 - e. Provide appropriate and timely follow-up on problems and recommendations developed by the LSC.
 - f. Review and approve, purchases, transfers and disposal of Class 3B and Class 4 lasers.
 - g. Maintain a current inventory of all Class 3B and Class 4 lasers in use or in storage at the university.
3. University Laser Safety Committee:
- a. Provide oversight and approval of the University academic laser safety program.
 - b. Convene a Laser Safety Committee (LSC) meeting at least twice per year.
4. PIs shall:
- a. Follow all guidance from the Laser Safety Plan.
 - b. Assist the LSO and ALSO with inspections of lasers and laser controlled areas.
 - c. Supervise the safe use of lasers in the laser environment to ensure that laser users follow established safety procedures.
5. Laser users shall:
- a. Follow all guidance from the Laser Safety Plan. Assist the PIs with maintaining a safe workplace.
 - b. Report unsafe work practices and conditions to the PIs.



Richard W. Thomas, MD, DDS, FACS
President

Enclosure:

1. Laser Safety Plan



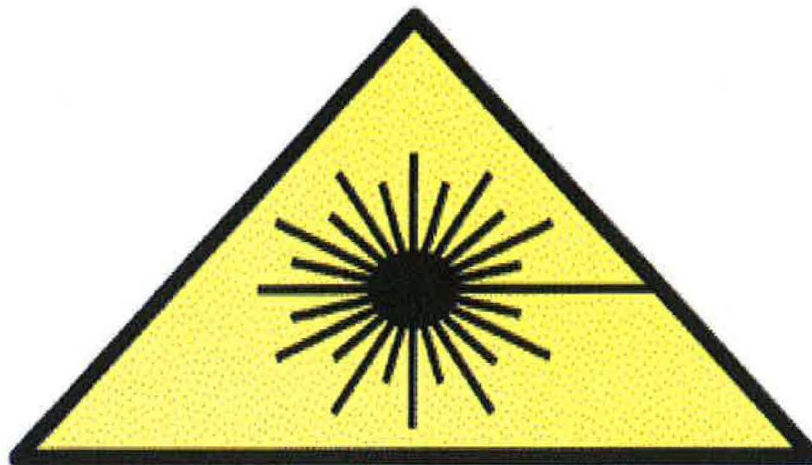
UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES

LASER SAFETY PLAN

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1 POLICY

The Uniformed Services University of the Health Sciences (USU) policy on laser safety requires that all lasers and laser systems shall be operated in a manner comparable to the [American National Standards Institute \(ANSI\) Z136.1-2014, American National Standard for the Safe Use of Lasers](#), as well as other applicable regulations. These requirements for laser safety are complex and include engineering controls, administrative controls, medical surveillance, and training.

The primary objective of the USU laser safety program is to ensure that no laser radiation in excess of the maximum permissible exposure (MPE) limit reaches the human eye or skin except for intended exposure in clinical or biological research. Additionally, the program is designed to ensure that adequate protection against collateral hazards is provided. These collateral hazards include, but are not limited to: 1) the risk of electrical shock; 2) fire hazard from a beam or from the use of dyes and solvents; 3) chemical exposures from chemicals and/or the vaporization of targets.

In order to implement the policy properly while giving the greatest possible latitude to the researcher, all operations involving Classes 3B or 4 lasers (see Section 3 for description of Classes) at USU shall be reviewed and approved by the Laser Safety Officer (LSO).

In addition, exposure to ultraviolet (UV) radiation, radio frequency (RF) and microwave radiation, and magnetic fields shall be kept as low as reasonably achievable. Exposure levels are never to be greater than is permissible under applicable standards.

2 LASER SAFETY PLAN CONTACTS

Environmental Health and Safety Contacts:

Main Office
Radiation Safety Officer

Room A2020
Room A2068

(301) 295-3324
(301) 295-3390

3 SUMMARY OF REQUIREMENTS

TRAINING REQUIREMENTS

Classes 3B & 4 laser users	Laser Safety Training required (initial & annual)
Classes 1 – 3R laser users	Laser Safety Training recommended
Non-laser user, but work in laser area	Laser Safety Training recommended
	Contact LSO

MEDICAL SURVEILLANCE

Classes 3B & 4 laser users	Eye examination required within one month of assignment to lab
	Suspected eye injury, eye examination required
	Exit examination, eye examination required
Non-laser user, but work in Classes 3B or 4 laser areas	Eye examination recommended
	Eye examination not required

Classes 1 – 3R laser users

HAZARD EVALUATION DOCUMENT (HED)

Classes 3B & 4 laser users	Required
Classes 1 – 3R laser users	Not required
Approval Scheme	Flows from laser user (LSO can advise on safety controls) through Principle Investigator and Department Chair to Laser Safety Committee for approval

CONTROL MEASURES

Class 4	See “Class 4 Controlled Areas”
Class 3B	See “Class 3B Controlled Areas”
Containment Suggestions	Contact LSO
Interlock	Installation, contact LSO

LASER POINTERS

Class 3B	Use is prohibited
Classes 3R and below	Use is allowed

LASER-RELATED SAFETY SUPPLIES

Warning Signs	Available through LSO
Lighted Warning Signs	Available through safety supply vendor
Laser Labels	Available through LSO
Laser Protective Eyewear Literature	Available from LSO
Laser Protective Eyewear	Purchased by laser user from vendor
Curtain Material Data	From LSO, vendor list & options

4 CLASSES OF LASERS

CLASS 1 LASERS

Class 1 lasers are considered to be incapable of producing damaging radiation levels during operation and are exempt from any control measures. As a matter of good practice, unnecessary exposure to Class 1 laser light should be avoided.

CLASS 1M LASERS

Class 1M lasers are considered to be incapable of producing hazardous exposure conditions during normal operation unless the beam is viewed with collecting optics (e.g., telescope) and is exempt from any control measures other than to prevent potentially hazardous optically aided viewing.

CLASS 2 LASERS

Class 2 lasers emit in the visible portion of the spectrum (400 nm to 700 nm), and eye protection is normally afforded by the aversion response.

CLASS 2M LASERS

Class 2M lasers emit in the visible portion of the spectrum (400 nm to 700 nm), and eye protection is normally afforded by the aversion response for unaided viewing. However, Class 2M lasers are potentially hazardous if viewed with collecting optics (e.g., telescope).

CLASS 3R LASERS (“R” for Reduced Requirements)

Class 3R is largely composed of lasers formally ANSI Class 3A. Class 3R lasers have reduced control requirements and are potentially hazardous under some direct and specular reflection viewing conditions if the eye is appropriately focused and stable, but the probability of an actual injury is small. These lasers will not pose either a fire hazard or diffuse reflection hazard.

CLASS 3B LASERS

Class 3B lasers may be hazardous under direct and specular reflection viewing conditions but are normally not a fire hazard, diffuse reflection hazard, nor a laser generated air contaminant (LGAC) production hazard. The power output of Class 3B lasers is 5 - 500 mW continuous wave or less than 10 J/cm² for a 0.25 second pulse. Specific control measures covered in this document shall be implemented.

CLASS 4 LASERS

Class 4 lasers are a hazard to the eye or skin from the direct beam and may pose a fire hazard or diffuse reflection hazard. Class 4 lasers may also produce LGAC and hazardous plasma radiation. Class 4 lasers include all lasers with power levels greater than 500 mW continuous wave or greater than 10 J/cm² for a 0.25 second pulse. All of the control measures explained in this document shall be implemented.

5 REQUIREMENTS FOR LOW-POWER LASERS (CLASS 1, 1M, 2, 2M, 3R)

Low-power lasers can be used in the manner intended by the manufacturer without restriction and without special training or qualification of operating personnel. Personnel should not be exposed to laser light unnecessarily.

6 REQUIREMENTS FOR HIGH-POWER LASERS (CLASS 3B AND 4)

All requirements of the USU laser safety program apply to Classes 3B and 4 lasers, unless documented equivalent procedures and control measures have been approved by the LSO. These requirements are described in the following sections of this document.

7 LASER PROCUREMENT

Laser users are required to notify the LSO of any intent to procure a Class 3B or 4 laser. The LSO and user will review the hazards of the proposed operation and make recommendations regarding the specific safety requirements that pertain to the proposed use.

To ensure that all lasers are included in the Laser Safety Program, General Fund Enterprise Business System (GFEBS) shall notify the LSO of purchase orders for lasers as the orders are placed. The Laser Safety Committee will be notified of all requests for laser purchase. The receiving individual shall hold arriving Class 3B and 4 lasers until their installation is approved by the LSO.

8 LASER CONTROLLED AREAS

Classes 3B and 4 lasers shall only be operated in laser controlled areas approved by the LSO. The purpose of laser controlled areas is to confine laser hazards to well-defined spaces that are under the control of the laser user. This is an attempt to prevent injury to those visiting and working in the controlled area. Operations shall meet, or have equivalent, operating standards described in this section.

8.1 CLASS 3B CONTROLLED AREAS

All personnel who require routine entry into a Class 3B laser controlled area shall be appropriately trained. They are required to follow all applicable administrative controls.

8.1.1 POSTING

The area shall be posted with appropriate warning signs that indicate the nature of the hazard. The wording on the signs will be specified by the LSO.

8.1.2 AUTHORIZATION

Only authorized personnel shall operate the laser. Personnel shall be authorized upon compliance with the requirements identified in the sections on Training and Medical Surveillance. At a minimum, authorized personnel shall have met all training and medical surveillance requirements stipulated for the Class laser they wish to operate. Management may stipulate additional authorization requirements. (See the Training and Medical Surveillance sections of this document.)

8.1.3 BEAM STOP

All laser beams shall be terminated within the controlled area. Beam stops provide protection from misaligned beams, and should be placed in all appropriate and practical locations.

8.1.4 EYE PROTECTION (LASER PROTECTIVE EYEWEAR)

If there is a possibility of viewing Class 3B or 4 beams, appropriate eye protection shall be provided for all personnel within the laser controlled area, if such viewing could exceed the MPE. The eye protection shall have an appropriate optical density (OD) and/or reflective properties based on the wavelengths, beam intensity, and expected exposure conditions. It is the responsibility of the laser user to obtain appropriate laser protective eyewear from a vendor. To select laser protective eyewear, contact the LSO.

8.1.5 ROOM ACCESS

During laser operation, access to the laser controlled area by visitors and/or untrained personnel shall be limited and controlled by the laser user.

8.1.6 LIGHT CONTAINMENT

Light levels in excess of the MPE shall not pass the boundaries of the controlled area. All windows, doorways, open portals, and other openings through which light might escape from a laser controlled area shall be covered or shielded in such a manner as to preclude the transmission of laser light.

8.2 CLASS 4 CONTROLLED AREAS

All personnel who require routine entry into a Class 4 laser controlled area during laser operation shall be appropriately trained. They shall be provided with appropriate protective equipment and are required to follow all applicable administrative controls. Class 4 laser controlled areas shall meet all of the requirements that apply to Class 3B controlled areas and also the following requirements:

8.2.1 CONTROLLED AREA INTERLOCKS

Class 4 laser controlled areas shall be equipped with interlocks or alternate controls to preclude the entry of unprotected personnel while Class 4 laser radiation is present in the controlled area. The interlock system should be designed to preclude entry while the laser is operating or to terminate laser operation when the door is opened without deliberate overriding of the interlock by an authorized individual. Administrative or procedural entryway safety controls should be used where interlocks are not feasible or are inappropriate.

8.2.2 RAPID EGRESS

There shall be provisions for rapid egress from a laser controlled area under all normal and emergency conditions. The controlled area interlock system shall not interfere with emergency egress.

8.2.3 LASER ACTIVATION SYSTEM

A visible or audible signal shall be provided at the entrance to the controlled area to indicate when the laser is energized and operating.

8.3 REMOTE FIRING

Wherever possible, Classes 3B and 4 lasers should be monitored and fired from remote locations.

8.4 TEMPORARY LASER CONTROLLED AREAS

Temporary laser controlled areas should be created for the servicing and alignment of embedded lasers, enclosed beams/lasers, and in special cases where permanent laser controlled areas cannot be provided. They are subject to the normal HED approval process.

9 TRAINING

All USU employees and visitors who use Class 3B or 4 lasers must complete initial and annual training. In addition, it is highly recommended that anyone who regularly works in a Class 3B or 4 laser controlled area should also complete training. The LSO must be notified of new employees or visitors. Laser users are also responsible for knowing the safety requirements that apply to their specific laser or laser system and for knowing the contents of the applicable HED.

10 MEDICAL SURVEILLANCE

All Class 3B and 4 laser users assigned to a lab for more than 1 month must complete an eye examination. The examination may be arranged through the Occupational Health Office, EHS. The examination includes:

- Ocular history
- Visual acuity
- Amsler grid test
- Color vision response

If the results of the above tests are normal, no further tests are required. If abnormalities are noted, identification of the underlying pathology shall be performed by a fundusoscopic examination, or other test as determined by the medical or optometric examiner.

Additional eye examinations will be performed as a follow-up to suspected eye exposure, or at the request of the LSO or user. An exit examination is also required before departing USU.

11 HAZARD EVALUATION DOCUMENT (HED)

All Class 3B and 4 laser operations must be covered by an approved HED. This HED shall cover laser operations (i.e., description of activities, hazard identification and mitigation, routine alignment procedures, schematics of laser set-up) and other relevant hazards in the laboratory. The HED shall be submitted, by the Principal Investigator through the Department Chair, to the LSO for approval prior to laser operation. An HED template may be found in the Appendix. The use of the template is highly recommended. The template provides a guide for the researcher to identify the characteristics of the laser operation and collateral hazards, and to write set-up and alignment procedures. For assistance in developing appropriate control measures and completing the HED, contact the LSO.

In the case of laser diode users, and enclosed systems [i.e., laser scanning confocal microscopy] an abbreviated HED can be applied. This abbreviated HED will follow the standard HED approval process. This approach can only be used following a physical evaluation by the LSO, who will then determine the required sections of the abbreviated HED.

All HEDs shall be reviewed annually. If no new hazards have been added to the experiment, the existing HED is considered valid. The LSO shall be notified and concurrence obtained. If new hazards have been added to the experiment, the revised HED shall be submitted to the LSO for review to assure that all applicable safeguards have been met.

HEDs will be performed and submitted within 30 days of procuring Class 3B or 4 lasers. During this time the experimental conditions and appropriate controls for the HED are being developed. With the assistance of the user, the LSO will develop a set of conditions for the laser user to follow in operating the laser during this time. These conditions shall be posted at the laser laboratory.

12 RESPONSIBLE PARTIES

The individuals and groups listed in the following sections are responsible for implementing the laser safety policy.

12.1 LASER USERS

- Complete laser training.
- Know and adhere to control requirements in this document and in the pertinent HED.
- Obtain the eye examination.
- Use laser protective eyewear.
- Notify LSO, through the Principal Investigator, of proposed changes in laser use.
- Hold all purchased lasers until released by the LSO.
- Immediately report any suspected eye or skin exposures above the MPE to the Director EHS, and the LSO.

12.2 PRINCIPAL INVESTIGATORS (PIs)

- Ensure that all personnel complete the laser safety training, and other training as required to operate lasers safely.
- Ensure that all personnel report for eye examinations as outlined in the medical surveillance section of this document, and after any suspected case of eye exposure.
- Prepare an HED for Classes 3B and 4 laser operations and ensure that the provisions of the HED are implemented. (See the Appendix for an example of an HED.)
- Authorize the establishment of laser controlled areas, the installation of required interlock or other approved systems, the purchase of appropriate laser protective eyewear for laser operations, and the purchase of copies of pertinent user safety standards and instructional software and printed materials.
- Notify LSO of proposed laser acquisitions.
- Notify LSO of proposed changes to the laser controlled area configuration.

12.3 LASER SAFETY OFFICER (LSO)

In the ANSI Z 136.1 Laser Standard, the conditions under which the laser is used, the level of safety training of individuals using the laser, and other environmental and personnel factors are important considerations in determining the full extent of safety control measures. Such situations require informed judgment by responsible persons. Major responsibility for such judgments has been assigned to a person with the requisite authority and responsibility, namely the LSO. The LSO's duties and responsibilities include, but are not limited to:

- Maintain the USU laser safety program.
- Review and provide technical advice and safety approval for all laser operations.

- Review HEDs listing laser hazards.
- Review alternate controls.
- Calculate eye hazards and advise laser users and supervisors on appropriate laser protective eyewear.
- Maintain an inventory of Classes 3B and 4 lasers at USU.
- Develop and/or teach laser safety training for all USU laser users.
- Investigate all instances of suspected eye or skin exposure.
- Determine classification and confirm that lasers used at USU facilities are in compliance with the standards.
- Perform periodic surveys, or inspections, of laser use areas.

12.4 ALTERNATE LASER SAFETY OFFICER (ALSO)

- Assist the LSO in completing the above duties.
- Perform the functions of the LSO in the LSO's absence.

12.5 LASER SAFETY COMMITTEE (LSC)

The purpose of the Laser Safety Committee is to establish and maintain adequate policies/procedures for the control of laser hazards at USU. The committee will:

- Recommend appropriate laser safety training programs and materials.
- Maintain an awareness of new, or revised, laser safety standards.
- Review requests for new laser purchases.
- Submit minutes to the Radiation Safety Committee (RSC) for technical oversight and review.

The committee is composed of representatives from each department or area using Class 3B or 4 lasers, the LSO, the ALSO, and a laser orientated BIC representative. The members must have some expertise in the use of lasers. The Chair is selected from the appointed members.

12.6 FACILITIES MANAGEMENT

Design and install interlock systems and access controls for controlled laser areas as specified and approved by the LSO.

12.7 ENVIRONMENTAL HEALTH AND OCCUPATIONAL SAFETY

- Arrange eye examinations for all laser users.
- Advise laser users and LSO of any ocular abnormalities that could be attributed to laser exposure or that could be relevant to laser use.

- Provide guidance in handling laser-associated hazards such as the handling of laser dyes and other toxic materials.
- Provide evaluation and guidance for ventilation requirements for laser targets and toxic materials.
- Provide guidance for electrical hazards, and Lockout/Tagout requirements, etc.

13 STANDARDS AND REFERENCES

- American National Standards Institute (ANSI) Z136.1-2014, American National Standard for the Safe Use of Lasers.
- American National Standards Institute (ANSI) Z136.2-2012, American National Standard for the Safe Use of Optical Fiber Communication Systems Utilizing Laser Diodes and LED Sources.
- OSHA Instruction PUB 8-1.7 August 5, 1991, Guidelines for Laser Safety and Hazard Assessment.
- 29 CFR 1910, Occupational Safety and Health Standards.
- 21 CFR 1040, Performance Standards for Light-Emitting Products.

14 APPENDICES

- Appendix A: HED Outline
- Appendix B: Sample SOP
- Appendix C: Sample Laser Audit Form

Appendix A: HAZARD EVALUATION DOCUMENT (HED) OUTLINE FOR CLASSES 3B & 4 LASER USERS

GENERAL INFORMATION			
TITLE	LOCATION Bldg.-Room	DEPARTMENT	LASER SAFETY CONTACT

DESCRIPTION OF ACTIVITY
<i>Provide description including unique equipment, its application or activity and principal parameters.</i>

DURATION (Check One Box)	
<input type="checkbox"/>	Ongoing
<input type="checkbox"/>	Limited Period; Enter # of Months _____

HAZARDS <i>(Include beam and non-beam items identified as hazards)</i>	
HAZARD	CONTROL MEASURE

Identification of laser(s): Laser specifications (Complete the following chart (as much as possible), list all lasers, including low power alignment lasers:)

	Laser 1	Laser 2	Laser 3
Serial #:			
USUHS / HMJF Tag #			
Manufacturer:			
Model:			
Description:			
Class			
Use:			
Department			
PI			
Bldg/Lab			
Emission Duration (Pulse or Continuous)			
Fixed or Mobile			
Laser Type (visible, invisible, infrared, other			
Last Compliance Audit Date			
Last Alignment Date			
Last Alignment Performed by			
Alignment Frequency			
Operational Power Output			
Operational Wavelength Range			
Maximum Operational Power or Energy			
Pulse Repetition Rate			
Wavelength Used			
Pulse Length			
Beam Path (Open, Closed, or Partially Enclosed)			

LASER USERS		
Employee	Date Laser Safety Training Completed	Date Eye Examination Completed

ATTACH A DIAGRAM OF LASER USE AREA (*A simple block diagram is sufficient. The diagram should also be posted on lab door.*)

DESCRIBE ACCESS CONTROLS, INCLUDING USE OF INTERLOCKS
--

WHERE HAVE LASER WARNING SIGNS BEEN POSTED? <i>(Warning signs can be obtained from USUHS-LSO)</i>

LASER PROTECTIVE EYEWEAR (Attach Specification Sheets)					
Number of Pairs on Hand	Location of Eyewear	Manufacturer & Model	Optical Density	Wavelength	Last Inspection Date

MAINTENANCE

Equipment will be maintained in accordance with manufacturers recommended procedures. System safety devices will be tested and documented. Accurate records will be kept of tests, calibrations, adjustments, and repairs done. The door interlock will be checked quarterly and a record kept.

EMERGENCY PROCEDURES

Authorized laser users will be familiar with the Building Emergency Plan, location of emergency equipment, and emergency procedures for fires, and evacuations. Emergency shut-off procedures for lasers consist of shutting off the electrical power to the laser system. The main electrical shut-off switches to the laser should be labeled.

ANNUAL REVIEW SCHEDULE

If new hazards have been introduced, a full review will be required one year from approval date. If no changes other than users have been made (an update of the users list will be sent to LSO) the existing HED will be considered valid. Concurrence of the LSO shall be obtained.

Appendix B: SAMPLE SOP FOR CLASSES 3B OR 4 LASER USE

Note: this SOP should be tailored for individual applications and requirements.

WARNING

Lasers can cause irreparable blindness if used improperly. Exposure of the eye to either the direct beam or a beam reflected from a flat mirror-like surface could cause an injury to the unprotected eye. Class 4 lasers may also pose a potential hazard when viewing a diffuse reflection of the beam and may also pose a skin hazard. The following control measures will prevent hazardous exposure during laser operations:

1. Equipment should only be operated by personnel who have received proper training for the operation of the laser. Refer to operators' manual for startup and operating procedures.
2. Operating personnel shall periodically read and shall always follow this safety SOP.
3. Remove all watches and reflective jewelry prior to operating the laser.
4. Remove the key from the key switch when the laser is not in use.
5. Never direct the laser at unprotected personnel.
6. Wear laser protective eyewear whenever the laser is operated with an unenclosed beam.
7. All personnel within the laser-controlled area shall wear laser protective eyewear during laser operation. The laser operator shall assure that laser protective eyewear is being worn prior to commencing laser operation.
8. Prior to laser operations, complete the following checklist:
 - (a) Periodically test door electrical interlock switches.
 - (b) Select appropriate laser protective eyewear for the laser(s) to be operated. Ensure that laser protective eyewear is marked with its protective characteristics.
 - (c) Test warning lights or alarms to the laser controlled area.
 - (d) Post a warning sign at the entrance(s) to the laser controlled area.
 - (e) Periodically check that all Warning and Certification labels are attached to the laser.
 - (f) Insure that any other required safety devices are available.

9. A lens used to focus the laser beam of Classes 3B and 4 lasers will increase the eye hazards from diffuse reflections and the skin hazards around the focal point.
10. Immediately report any suspected injury, or defective equipment, to your supervisor, the Director EHS and the Laser Safety Officer so that appropriate action may be taken.

Appendix C: SAMPLE LASER AUDIT FORM FOR CLASSES 3B & 4 LASERS

Auditor's Name: _____ Date of Audit: _____
Location of Laser System (building and room number): _____
Name of Primary Laser User: _____
Name(s) of Additional Laser User(s): _____
Contact During Audit: _____

LASER SYSTEM INFORMATION

Laser Manufacturer: _____
Laser Model: _____ Laser Serial Number: _____
USUHS or HMJF Tag#: _____
Laser Type: _____ Laser Class: _____
Wavelength: _____ nm Output (Max/used) : _____ W or J (circle one)
Beam Diameter at Aperture: _____ mm Beam Divergence: _____ mrad
Pulse Duration: _____ sec Pulse Frequency: _____ Hz
Laser is Q-Switched/Mode Locked: Y or N (circle one)
Laser is: active or inactive (circle one)

LASER POSTING, LABELING AND SECURITY MEASURES

Entrances properly posted: Y N Comments: _____
Room security adequate: Y N Comments: _____
Door interlock system: Y N NA Comments: _____
Laser status indicator outside room: Y N NA Comments: _____
Laser class label in place: Y N Comments: _____
Laser hazard label in place: Y N Comments: _____
Laser aperture label in place: Y N Comments: _____

LASER UNIT SAFETY CONTROLS

Protective housing in place: Y N Comments: _____
Interlock on housing: Y N NA Comments: _____
Interlock on housing is functioning: Y N Comments: _____
Beam shutter present: Y N Comments: _____
Beam shutter is functioning: Y N Comments: _____
Key operation: Y N Comments: _____
Laser emission indicator on laser: Y N Comments: _____
Laser emission indicator on console (or power supply): Y N Comments: _____
Beam power meter: Y N Comments: _____
Emergency shutoff available: Y N Comments: _____

ENGINEERING SAFETY CONTROLS

Laser secured to table: Y N Comments: _____
Laser optics secured to prevent stray beams: Y N Comments: _____
Laser at eye level: Y N Comments: _____
Laser beam at eye level: Y N Comments: _____
Laser beam is enclosed: Y N Comments: _____
Beam barriers in place: Y N Comments: _____
Beam stops in place: Y N Comments: _____
Remote viewing of beam: Y N Comments: _____
Beam condensed or enlarged: Y N Comments: _____
Beam focused: Y N Comments: _____
Beam intensity reduced through filtration: Y N Comments: _____
Fiber optics used: Y N Comments: _____
Windows in room covered: Y N Comments: _____
Reflective materials kept out of beam path: Y N Comments: _____
Beam management documented: Y N Comments: _____
Physical evidence of stray beams: Y N Comments: _____
Class IV diffuse reflection hazard: Y N Comments: _____

ADMINISTRATIVE SAFETY CONTROLS

Authorization up-to-date: Y N Comments: _____
Authorization posted: Y N Comments: _____
SOP up-to-date: Y N Comments: _____
SOP posted: Y N Comments: _____
Emergency contact list posted: Y N Comments: _____
Laser safety guidelines posted: Y N Comments: _____
Laser safety policy manual available: Y N Comments: _____

OTHER LASER SAFETY MEASURES

Eye exam requirement met: Y N Comments: _____
Proper laser protective eyewear available: Y N Comments: _____
Proper skin protection available: Y N Comments: _____
All users have met training requirement: Y N Comments: _____

NON-BEAM HAZARDS

Toxic laser media in use: Y N Comments: _____
Fume hood for dye mixing: Y N Comments: _____
Cryogens in use: Y N Comments: _____
Compressed gasses in use: Y N Comments: _____
Compressed gas cylinders secured: Y N Comments: _____
High voltage power hazard: Y N Comments: _____
Optical tables properly grounded: Y N Comments: _____
Collateral radiation hazard: Y N Comments: _____
Explosion hazard: Y N Comments: _____
Fire hazard: Y N Comments: _____
Laser Generated Airborne Contaminants production: Y N Comments: _____