Oklahoma State University Policy and Procedures

INSTITUTIONAL LASER SAFETY POLICY	4-0303 RESEARCH April 2016

PURPOSE

1.01 The purpose of this policy is to formalize the obligation of Oklahoma State University-Stillwater and Oklahoma State University-Tulsa (hereinafter referred to as OSU or the University) to ensure the safe use, operation, and application of Class 3B and Class 4 lasers (as defined below) in all OSU-Stillwater and OSU-Tulsa campus locations and activities. The University accepts responsibility for ensuring that all activities involving the use of Class 3B and Class 4 lasers, and the facilities used to conduct such work, are in compliance with all applicable regulations, laws, and University policies, as well as invoked standards and guidelines (e.g., ANSI Standard).

1.02 The University acknowledges its responsibility to ensure, as much as possible, the safety of employees, students, the local populace, and the environment from activities that are capable of producing deleterious effects. Therefore, OSU will work to ensure that its activities are consistent with applicable regulations, laws, standards, and guidelines.

1.03 The University works to ensure its compliance with applicable regulations, laws, and invoked standards and guidelines through a comprehensive management program administered by the University's Laser Safety Officer (LSO), within the Office of University Research Compliance, in conjunction with the Laser Safety Committee (LSC).

1.04 The laser safety program operates in accordance with the American National Standards Institute (ANSI) laser safety guidelines, specifically the latest versions of ANSI Z136.1, *Safe Use of Lasers*; ANSI Z136.3, *Safe Use of Lasers in Health Care*; ANSI Z136.5, *Safe Use of Lasers in Educational Institutions*; and ANSI Z136.8, *Safe Use of Lasers in Research, Development, or Testing*.

POLICY STATEMENT

2.01 This policy establishes responsibility for the use of Class 3B and Class 4 lasers on the OSU-Stillwater and OSU-Tulsa campuses. Moreover, this policy establishes standards and procedures to help ensure that activities involving Class 3B and Class 4 lasers are conducted safely so as to protect employees, students, the public, and the environment.

2.02 Individuals intent on conducting activities involving Class 3B and Class 4 lasers through a University-sponsored, University-funded, or University-sanctioned activity must comply with all applicable government regulations, laws, and invoked standards and guidelines, as well as OSU policies.

2.03 The University hereby invokes the guidelines of the American National Standard Institute for the *Safe Use of Lasers*, ANSI Z136.1 (hereafter referred to as "the ANSI standard"). Guidelines within this document are to be implemented as requirements for the operation, maintenance, and service of all Class 3B and Class 4 lasers on the OSU-Stillwater and OSU-Tulsa campuses or at other geographic locations where OSU-Stillwater and OSU-Tulsa lasers may be used. ANSI Z136.1 is one component of a collection of standards within the Z136 series. While this policy explicitly invokes only ANSI Z136.1 in its entirety, components of ANSI Z136.3, *Safe Use of Lasers in Health Care,* ANSI Z136.5, *Safe Use of Lasers in Educational Institutions*, and ANSI Z136.8, *Safe Use of Lasers in Research, Development, or Testing*, are applicable to specific activities involving University lasers. Given the unique nature of the research environment, it may become necessary to authorize exceptions to the ANSI Z136 standards either on an institutional or case by case basis. The Laser Safety Committee (LSC) is hereby granted authority to approve institutional exceptions to any Z136 standard, and the Laser Safety Officer (LSO) is granted authority to approve, on a case by case basis, exceptions to this standard until the next regularly scheduled LSC meeting.

DEFINITIONS

Note: A full set of definitions is contained within the ANSI standard. However, a few of the more important definitions are repeated here.

3.01 *Lasers* are devices that produce radiant energy predominantly by stimulated emission. Laser radiation may be highly coherent temporally, or spatially, or both. An acronym for Light Amplification by the Stimulated Emission of Radiation, lasers produce an intense monochromatic, directional, coherent beam of light by stimulating electronic or molecular transitions to lower energy levels.

3.02 *Class 3B lasers* are moderate-power lasers that are incapable of generating radiant energy greater than 125 mJ pulsed in less than 0.25 seconds, CW: 5-500mW. These lasers can cause biological damage to the eyes under direct and specular reflection viewing conditions.

3.03 *Class 4 lasers* are high powered lasers that can cause biological damage to the eyes and the skin when directly exposed to the primary beam, specular reflections, and diffuse reflections. The laser beam may have the potential to generate a fire or air contaminants. These lasers present the most significant laser hazards.

3.04 *Laser-Controlled Areas* are those areas where the occupancy and activity within the space is subject to requirements of the laser safety program due to the Class 3B and/or Class 4 laser activity.

3.05 *Laser Personnel* are those individuals who work with or operate Class 3B and/or Class 4 lasers, or whose duties require them to work in or otherwise be present in a laser-controlled area.

3.06 *Laser Pointers* are a laser product that is usually hand held that emits a low-divergence visible beam and is intended for designating specific objects or images during

discussions, lectures or presentations as well as for the aiming of firearms or other visual targeting practice. These products are normally Class 1, 2, or 3R but some may be Class 3B or Class 4 lasers.

3.07 A *Laser Principal Investigator (PI)* is a faculty member or staff member who has 1) submitted all required documentation to the LSO, 2) completed all required training, 3) received LSO approval to operate Class 3B and/or Class 4 lasers unsupervised, and 4) accepted responsibility for ensuring that the individuals who use their Class 3B and/or Class 4 laser equipment comply with this policy, applicable ANSI standard(s), and lab-specific standard operating procedures (SOPs).

3.08 The *Laser Safety Committee* is an institutional committee that oversees the management of the laser safety program to ensure compliance with applicable regulations, requirements, policies, safe practices, and invoked standards and guidelines. This committee is headed by a chairperson and consists of at least five members, one of which represents OSU executive management. A majority of the committee members shall have substantial experience with laser use and safety. One member shall have experience with medical lasers. The committee chairperson and vice chairperson shall be members of the OSU faculty.

3.09 The *Laser Safety Officer* (LSO) is the individual appointed by the University to oversee the laser safety program. The LSO is responsible for the day-to-day management of the program and mitigation of laser safety hazards. The LSO, by definition, is a member of the LSC, as he/she heads the University's laser safety program. The LSO has authority and responsibility to monitor and enforce the control of laser hazards and effect the knowledgeable application of laser safety. The LSO has the authority to prohibit laser activities that he or she considers to be unsafe or not in compliance with the ANSI standards, applicable regulations, laws, and University policies, as well as invoked standards and guidelines.

3.10 *Incidental or Ancillary Personnel* are those individuals whose duties make it possible that they will be exposed to laser radiation.

3.11 *Maximum Permissible Exposure* (MPE) is the theoretical level of laser radiation to which a person may be exposed without hazardous effects or adverse biological changes in the eye or skin.

SCOPE AND APPLICABILITY

4.01 This policy governs the University's laser safety program and is applicable to any individual who operates or works in proximity to Class 3B and/or Class 4 lasers at OSU-Stillwater and OSU-Tulsa.

4.02 This policy supersedes all previous OSU policy statements pertaining to laser safety.

POLICY AND PROCEDURES

5.01 The cornerstones of University policy on the safe use of lasers for any purpose are:

A. **Individual user qualification, training, administration, management, and compliance with program standards and regulatory requirements**. As a matter of University policy, OSU faculty, staff, and students, as well as visitors and members of the general public, are denied use of Class 3B and Class 4 lasers until they are formally granted authority to use such lasers by the University after demonstrating a specific and appropriate level of qualification and training sufficient to ensure compliance with program standards and regulatory requirements. Additionally, all personnel, even after having been formally granted access to Class 3B and/or Class 4 lasers are required to adhere to the following general guidelines:

1. Act in manner that ensures full compliance with all requirements during the entire period of authorized access.

2. Control access to University Class 3B and Class 4 lasers under their sub-custody in such a manner as to prevent access and use by unauthorized personnel.

Principal investigators (PIs), or authorized users, and other personnel in charge of potentially hazardous work involving University lasers are responsible for the activities conducted within their respective laboratories, facilities, or other geographic areas where University laser use is authorized (i.e. laser-controlled area). They are responsible for carrying out laser activities in accordance with standard operating procedures that have been approved by the LSO and in a laser-controlled area that has been approved for the proposed work. PIs must promptly report incidents to the LSO, or his/her designee. PIs are ultimately responsible for the instruction and training provided to all others engaged in activities involving OSU lasers which they hold, and for ensuring personnel operating those lasers understand the potential hazards specific to the lasers and laser systems.

B. **Laser Safety Officer (LSO) qualification, training, administration, management, control, and compliance with program standards and regulatory requirements**. The LSO, within the Office of University Research Compliance, is charged with the day-to-day management of the OSU laser safety program. He/she is knowledgeable of all aspects of laser safety. He/she works to ensure that the program, including actions taken by individual users, is in compliance with program standards and protocols in order to meet regulatory requirements, policies, and invoked standards and guidelines. The LSO is ultimately charged with authorizing the use of Class 3B and Class 4 lasers at the University, with input from the LSC as appropriate. The LSO also works to ensure that authorized personnel handle and operate OSU lasers safely. He/she has the authority to prohibit the use of lasers by OSU personnel who do not meet the necessary requirements. He/she has the authority to shut down operations where justified to assure and maintain a safe work environment, most particularly for activities that he/she deems to be a threat to the safety and well-being of University personnel including students, as well as visitors, the City of Stillwater, the general public, or the environment. The LSO is not required to seek management approval for support in enforcing such actions.

Emergency actions by the LSO are subject to review by the Laser Safety Committee (LSC). Moreover, the LSO has the authority to place individuals who violate laser safety procedures and/or applicable regulations on probation or immediately suspend or revoke their privileges to use University lasers. Additional specific responsibilities of the LSO are contained within the University's LSO job description.

It is recognized that medical lasers bring a unique set of challenges to a laser safety program (e.g., when a user is employing a medical laser, he/she may intend to produce tissue damage in a human or animal rather than take action to prevent it). Due to the unique design and use of medical lasers, it is acceptable to also have a separately assigned Medical Laser Safety Officer (MLSO). This officer, if assigned, will be a member of the LSC and will assist the LSO as necessary in carrying out the laser safety program for medical lasers. If assigned, the MLSO will have the same authority as the LSO in prohibiting practices and use of medical lasers which he/she judges to be unsafe.

C. **LSC oversight**. OSU's Vice President for Research (VPR) appoints members of the LSC to work with the LSO and executive management to implement the laser safety program and establish policies and procedures for managing the program. The VPR will designate the LSC chairperson and vice chairperson, who must be members of the OSU faculty. The LSC meets at least semi-annually, but additional meetings may be scheduled to ensure compliance with regulations, policies, established procedures, and the ANSI standard. It is responsible for the oversight and approval of policies and procedures governing the procurement, use, storage, and disposal of Class 3B and Class 4 lasers at the University, as well as the training of individuals who work with, or in close proximity to Class 3B or Class 4 lasers. A subcommittee consisting of the LSC chairperson and the LSO is empowered by the full LSC to act on emerging matters when needed. Other committee business proceedings are documented in committee meeting minutes. The Office of University Research Compliance provides administrative support to the LSC and maintains LSC records as required.

D. **Principal investigator responsibilities.** Principal investigators (PIs) are ultimately responsible for the safe operation of lasers used under their direction or in activities for which they are responsible. PIs are required to adhere to the approved standard operating procedures that accompany each Class 3B and/or Class 4 laser within their control. Investigators are required to register all Class 3B and Class 4 lasers with the LSO. This notification is to include a standard operating procedure, to be approved by the LSO for all active lasers, for each laser. Each PI must supply all necessary safety equipment in order to ensure the safe operation of each laser under his/her control. Each PI must be knowledgeable of potential hazards associated with the use of all lasers under his/her control and adhere to the approved standard operating procedures and control measures that address these hazards. PIs must establish protocols that ensure that Class 3B and Class 4 lasers under their control are not operated or modified without the approval of the LSO. PIs are responsible for confirming that individuals working with lasers under their control have completed all required laser safety training as prescribed by the LSC. PIs are responsible for providing laser-specific training to laser personnel as needed but not less than once every three years, and documenting this training in an

auditable format. PIs, or their designees, must report any known or suspected laser accidents to the LSO immediately upon learning of the situation.

5.02 All accidents (e.g., injuries, emergencies, etc.) involving OSU lasers must be reported to the LSO, and shall be referred to the LSC for review and if appropriate, inquiry.

5.03 Deans, administrative heads of colleges, department heads, and heads of other campus units are responsible for employee safety within their respective units. No activity involving OSU lasers is to be permitted unless there is a commitment of effort and resources appropriate to ensure that the work can be conducted safely and only by authorized laser users.

5.04 The LSO, or his/her designee, is charged with compliance enforcement of University policies and the ANSI standard. In fulfilling his/her responsibilities, the LSO requires complete and open access to laboratories, facilities, lasers, laser equipment, and administrative records. Therefore, anyone who controls access to these laboratories, facilities, and records must provide the LSO and the LSC with entry to laboratories, facilities, lasers, laser equipment, and access to administrative records within their control, and to knowledgeable personnel who can assist in compliance inspections, inquiries, investigations, and visits upon request. Access may be delayed for brief periods when safety issues are involved but access may not be denied nor delayed as a matter of "convenience." Some inspections may be conducted as unannounced audits in order to ensure that safety protocols are being followed and that compliance standards are being met.

5.05 Class 3B and Class 4 lasers must not be sold, surplused, or otherwise disposed of in working condition. The LSO must be notified when Class 3B and Class 4 lasers are to be sold, surplused, or otherwise disposed of so that he/she can disable the laser before it is removed from the campus. The disabling requirement does not apply to lasers that are to be traded-in or upgraded via a legitimate manufacturer. PIs must inform the LSO prior to moving a Class 3B or Class 4 laser to a new location, regardless of the reason for the move.

5.06 This policy is written to apply to Class 3B and Class 4 lasers. However, it is important to comment on the use of laser pointers (as defined above). Laser pointers that are not Class 3B or Class 4 are not subject to LSO and LSC oversight when used solely as pointing devices at the University. Nonetheless, these devices are not toys and they should only be used by personnel who are aware of their potential for injury if misused. In particular, laser pointers should never, under any circumstance, be intentionally directed in a fashion that could result in a direct or specularly reflected beam entering another person's eye. The University reserves the right to administratively discipline, and if appropriate pursue civil or criminal action against, any member of the OSU faculty, staff, or student body or other person using a laser pointer to knowingly and intentionally shine the laser pointer beam at another person, regardless of power, for any reason other than approved research or an activity that has undergone LSC review and received LSO and LSC approval.

5.07 This policy shall be reviewed and modified as needed by members of the LSC. At a minimum, review of this policy shall take place at least once every four (4) years.

SUMMARY

This policy is intended to provide a broad description of the University's program for the safe use of Class 3B and Class 4 lasers. Other policies and procedures which are applicable to specific actions and functions of the University's laser safety program are contained in other documents, procedures, policies, manuals, training regimens, protocols, webpages, and in the regulations, policies, standards, and guidelines themselves.

REFERENCES

American National Standard for the Safe Use of Lasers, ANSI Z136.1 - 2007.

American National Standard for the Safe Use of Lasers in Educational Facilities, ANSI Z136.5 - 2009.

American National Standard for the Safe Use of Lasers in Health Care, ANSI Z136.3 - 2011.

American National Standard for the Safe Use of Lasers in Research, Development, or Testing, ANSI Z136.8 – 2012.

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Sliney, D., & Wolbarsht, M.L. (1980). Safety with lasers and other optical sources: A comprehensive handbook. New York: Plenum Publishing.

Sliney, D.H. (Ed.) 2000. *LIA guide for the selection of laser eye protection* (5th Edition). Orlando, FL: Laser Institute of America.

21 CFR 1040: Title 21—Chapter I—Food and Drug Administration Department of Health and Human Services Subchapter J—Radiological Health; Part 1040 – Performance Standards for Light-Emitting Products.

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