

## **CTIO/SOAR LASER SAFETY PROGRAM**

### **SCOPE**

This program applies to SAM laser system and the Gemini South Laser Mask Cutting Machine operated by CTIO/SOAR. This program is based on guidance of ANSI Z136.1-2007, *American National Standard for Safe Use of Lasers*. The proper implementation of this program will assure that laser exposures are always below the maximum permissible exposure (MPE) limits.

### **LASER SAFETY OFFICER**

The Director of CTIO and/or SOAR shall designate a Laser Safety Officer in writing for both the laser laboratory work related to the SAM project and the Gemini South Laser Mask Cutting Machine both located at the CTIO maintenance facility in La Serena Chile.

The individual designated as the Laser Safety Officer (LSO) shall have the responsibility and authority to assure compliance with this program. The LSO shall:

- Assure the proper classification of all lasers
- Approve and/or perform hazard evaluations for all class 3B and 4 lasers and laser work areas
- Approve and/or specify control measures for all class 3B and 4 lasers and assure implementation
- Approve by signature of all procedures, SOPs, signs, and labels
- Approve all protective equipment
- Assure that all laser personnel receive appropriate safety training and maintain documentation
- Monitor the program and assure compliance
- Maintain program records

The LSO shall have final authority in determining laser control measures and may approve alternate controls when these are appropriate based on the judgment of the LSO. Class 3B and class 4 lasers shall be operated only with the written approval of the LSO by signing the Standard Operating Procedures for the UV Laser and the maintenance procedures for the Gemini South Laser Mask Cutting Machine. The LSO shall have the authority to terminate laser operations at any time.

The LSO may appoint a Deputy Laser Safety Officer (DLSO) and may delegate duties to the DLSO in accordance with ANSI Z136.1.

## **LASER CLASSES**

Class 1 laser systems are incapable of producing damaging radiation levels during normal operation and are exempt from any control measures. Class 1 laser systems may contain higher class lasers and may produce laser hazards if operated with interlocks defeated. Only authorized personnel may operate class 1 laser systems with interlocks defeated. Operators of class 1 laser systems with embedded class 3B or class 4 lasers shall receive a laser safety briefing. The AURA masker cutter is considered a Class 1 laser when it is in its normal operation.

Class 1M laser systems are incapable of producing hazardous exposure conditions during normal operation unless the beam is viewed with optical instruments. Operators of class 1M laser systems shall receive a laser safety briefing.

Class 2 laser systems emit visible light only at a power level of 1 milliwatt or less. The normal aversion response to bright light is adequate protection. Staring into the beam of a class 2 laser is hazardous. Operators of class 2 laser systems shall receive a laser safety briefing.

Class 2M laser systems emit visible light only. The normal aversion response to bright light is adequate protection for unaided viewing. However, viewing the beam with optical aids is potentially hazardous. Operators of class 2M laser systems shall receive a laser safety briefing.

Class 3R laser systems are potentially hazardous under some viewing conditions, but the probability of an actual injury is small, and the control measures for safe use are straightforward. Most laser pointers fall in this class. Operators of class 3R laser systems shall receive a laser safety briefing. (Most lasers previously classified as class 3a fall in this category.)

Class 3B laser systems are eye hazards for intrabeam viewing and specular reflections, even for momentary exposures, but diffuse reflections are not usually hazardous. Class 3B laser systems shall be operated only in laser controlled areas by authorized operators. Operators of class 3B laser systems shall receive approved laser safety training.

Class 4 laser systems are eye hazards and skin hazards for intrabeam exposures, specular reflections, and diffuse reflections. They are also fire hazards and may produce laser generated air contaminants. Class 4 laser systems shall be operated only in laser controlled areas by authorized operators. Operators of class 4 laser systems shall receive approved laser safety training. A written Standard Operating Procedures (SOP) is required for class 4 laser operation. The SAM UV laser is a Class 4 laser while located at the CTIO facility.

## **TRAINING REQUIREMENTS**

All operators of class 1, 1M, 2, 2M, and 3R lasers and laser systems and all incidental personnel or spectators who may be allowed to enter laser controlled areas shall receive a laser safety briefing before operating the laser or entering the controlled area. An Authorized Laser Operator shall conduct the briefing and shall use the "SAM/UV Laser Safety Briefing for Visitors" as a minimum.

All operators (Authorized Laser Operators) of class 3B and 4 lasers shall receive approved laser safety training before operating the laser. These operators shall be authorized if they completed the Laser Safety Awareness Course by Laser-Safety Professionals or an equivalent trade recognized course.

## **MEDICAL SURVEILLANCE**

Baseline eye exams shall be considered for those who do maintenance on mask cutter laser base line eye exams are not required for the laser operators of the UV laser. An eye exam is required immediately following a suspected hazardous exposure. Laser personnel shall report any suspected hazardous exposure to the Laser Safety Officer immediately.

## **CONTROL MEASURES**

All class 3B and 4 lasers shall be operated in a laser controlled area. The requirements for individual laser controlled areas shall be determined and/or by the LSO. The minimum requirements for laser controlled areas are:

- Entryway controls to allow only authorized personnel or approved spectators to enter the laser control area. (Administrative controls are acceptable.)
- Laser safety eyewear available and used in accordance with the SOP for class 4 lasers.
- Beam control (barriers and beam blocks) to limit laser hazards within the controlled area.
- Written SOP for class 4 lasers. (Recommended but not required for class 3B lasers)
- Training of operators of all class 3B and 4 lasers.

## **RESPONSIBILITIES OF EMPLOYEES WORKING WITH LASERS**

Employees (Authorized Laser Operators) who work with class 3B or 4 lasers with the beam exposed shall:

- Energize or work with lasers only when authorized to do so.
- Comply with laser safety rules and work procedures.
- Notify their supervisor or the LSO or DLSO in case of potential accident or injury or suspected unsafe condition.

## **AUDITS**

An audit of all class 3B and 4 lasers and the Laser Safety Program shall be conducted by the LSO annually, when there is prolonged periods between experiments (6 months), or when there is a significant change in the position or location of the laser.

## **RECORDS**

The LSO shall maintain records which document the Laser Safety Program. These records shall include:

- Laser hazard analysis reports for all class 3B and 4 lasers
- Training records for all operators of class 3B and 4 lasers
- Standard Operating Procedures for all class 4 lasers
- Approvals of alternate laser control measures
- Laser Safety Audit reports

I am the Laser Safety Officer and I approve this CTIO/SOAR LASER SAFETY PROGRAM.

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Signature of the CTIO/SOAR Laser Safety Officer

Date