Artificial Optical Radiation (AOR) Safety Policy

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1. Introduction

The operation of some artificial optical radiation (AOR) sources, including medium and high power lasers, may give rise to both beam and non-beam hazards that could pose risks to the eyes and skin of staff and students. The University of Sussex is subject to the provisions of health and safety legislation in relation to its operation of hazardous artificial optical radiation sources and has a responsibility to protect its employees and others from the hazards associated with them.

This document sets out the University's policy with respect to the management of artificial optical radiation safety. For implementation please see the Artificial Optical Safety Standard Operating Procedure.

2. Scope

This policy applies to all activities carried out on University premises or by University staff/students involving the use of artificial optical radiation excluding the list of safe light sources outlined in Note 2 of the HSE guidance on the control of Artificial optical radiation (AOR 2010). This will include:

- All work involving the operation of lasers or laser products of classes other than Class 1 or Class 2 (see annex 1 for details of the laser classification scheme);
- All work involving the operation of non-laser optical sources falling into Risk Group 3 (see annex 2 for details of the non-laser classification scheme); and
- All work involving the operation of laser or non-laser optical sources not classified under the schemes described in annexes 1 or 2 where exposure could exceed one or more of the Exposure Limit Values defined in the Control of Artificial Optical Radiation at Work Regulations 2010.

For the avoidance of doubt, this policy does not apply to lasers or equipment of Class 1 or Class 2 unless:

- they have been incorrectly classified and should actually fall into a higher class; or

- they contain embedded lasers of higher class, the beams from which are accessible during servicing or other activities.

3. Optical Radiation Safety Policy Statement

The University of Sussex is committed to the protection of all its employees and students from the adverse effects of exposure to beam and non-beam hazards arising from the use of hazardous artificial optical radiation equipment on its premises.

The University of Sussex will extend these safeguards to its visitors, neighbours, subcontractors and suppliers so far as is reasonably practicable and will expect them to do the same for its employees.

In order to achieve these aims University management will:

- Comply with all relevant legislation and authoritative guidance;
- Develop and implement artificial optical radiation safety management programmes that deal effectively with the routine uses of hazardous artificial optical radiation sources and reasonably foreseeable abnormal events;
- Identify priorities for artificial optical radiation safety, define performance indicators, and monitor to assess success in meeting these;
- Implement best practice in relation to artificial optical radiation health and safety;
- Enlist specialist support to provide advice and ensure that keep policies and procedures are kept up to date;
- Ensure that hazardous artificial optical radiation equipment and associated safety equipment is properly maintained, inspected and serviced; and
- Co-operate with and monitor the performance of contractors who work on the University's premises.

The University requires the full and active participation of all employees to assist it in meeting these objectives. The University regards the statutory duties placed on it as the

minimum standard required and aims to achieve best practice in the management of artificial optical radiation (AOR).

4. Applicable Legislation

4.1. The Control of Artificial Optical Radiation at Work Regulations 2010

Work with artificial optical radiation is subject to the requirements of the Control of Artificial Optical Radiation at Work Regulations 2010 (CAOR 10), which implement the requirements of the European Directive on artificial optical radiation. These regulations impose specific duties on the employers where work may result in exposure to artificial optical radiation that could create a reasonably foreseeable risk of injury to the eyes or skin of the employees.

4.2. Other applicable health and safety legislation

The Control of Artificial Optical Radiation at Work Regulations 2010 applies only to exposures of employees. Nevertheless, general health and safety legislation applies to all exposures regardless of whether those exposures are at work or not. Hence the Health and Safety at work etc. Act 1974 and a number of regulations made under it are pertinent to artificial optical radiation activities. The Management of Health and Safety at Work Regulations 1999, the Provision and Use of Work Equipment Regulations 1998, and the Health and Safety (Safety Signs and Signals) Regulations 1996 all need to be adhered too. In particular, Regulation 3 of the Management of Health and Safety at Work Regulations 1999, it assesses health and safety risks to which its employees and others are exposed, and to identify measures to reduce those risks.

4.3. Personal protective equipment legislation

Personal Protective Equipment (PPE) in the workplace is subject to the requirements of the Personal Protective Equipment at Work Regulations 2002. These regulations require that PPE is used only as a last resort when more effective controls are not appropriate. They place specific duties on the employers to assess the suitability of PPE. New PPE cannot be suitable unless it complies with the requirements of the Personal Protective Equipment Regulations 2002.

5. Applicable Standards

5.1. Laser standards

The main laser standard applicable in the UK is BS EN 60825-1:2014, which is equivalent to European (EN60825-1) and International (IEC 60825-1) standards. EN 60825-1:2014 sets out the classification scheme for lasers and laser products and is intended to provide users with a guide to the hazard presented by the laser beam (see Annex 1). BS EN 60825 sets out the control measures that the manufacturer should incorporate into lasers of each class and specifies the labelling required to warn users about the hazard presented by the laser beam. BS EN 60825-14 provides guidance on appropriate administrative arrangements that employers using lasers should put in place.

5.2. Non-laser standards

The main standard for non-laser optical sources is BS EN 62471-1:2008. Like BS EN 60825-1:2014, this is equivalent to the corresponding European and international standards. BS EN 62471 sets out a classification scheme analogous to the laser scheme. In the case of non-laser sources there are four classes: Exempt; Risk Group 1; Risk Group 2; and Risk Group 3. Hazards increase with the risk group number.

5.3. PPE standards

The principle standard for laser protective eyewear is BS EN 207:2017. Any equipment that does not conform to a relevant standard or otherwise comply with the requirements of the Personal Protective Equipment Directive cannot be used as personal protective equipment within the University. BS EN 207:2017 defines the essential properties of laser protective eyewear that are required to ensure that its performance will be satisfactory and specifies appropriate test criteria.

Protective eyewear for use with non-laser sources will normally conform to the general protective eyewear standard, BS EN 166:2002. However, when used to provide protection from optical radiation, the eye wear will normally be fitted with filters conforming to one of the associated filter standards: BS EN169; BS EN170; BS EN171; BS EN172; or BS EN1379

6. Guidance

The Health & Safety executive has produced guidance to support the requirements of the control of artificial optical radiation at work regulations 2010, these are:

- Guidance for employers on the control of artificial optical radiation at work regulations (AOR) 2010.

A list of British Standards for exposure values can be found below in Annex 3

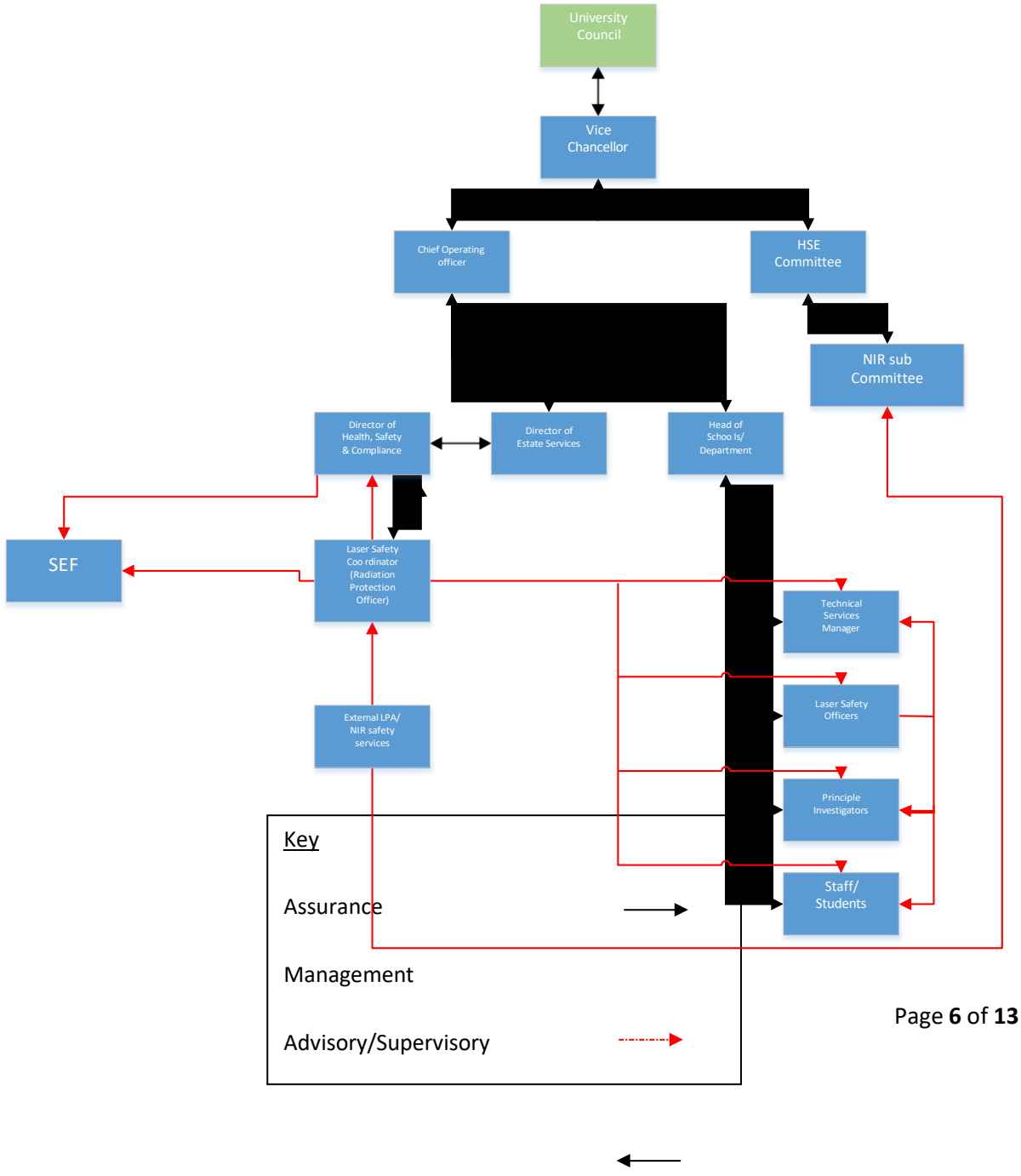
Guidance is also available for the use of lasers as produced by the European Union (for the requirements of the EU physical Agents Directive – Optical Radiation) and by the association of University Radiation Protection Officers (AURPO). These are:

- Non-binding guide to good practice for the implementing Directive 2006/25/EC – “Artificial Optical Radiation”
- Guidance on the safe use of Laser in Education and research guidance note no. 7 (2012)

7. Organisational Arrangements

Optical radiation safety is managed within the overall framework of safety management within the University. The organisational structure for managing optical radiation safety is illustrated in the diagram below.

University of Sussex AOR Management



7.1. University Council

The University Council is responsible for ensuring that overall management arrangements will meet the requirements of AOR 2010.

7.2. Vice-Chancellor

The Vice Chancellor is responsible for implementation of the University's Health and Safety Policy and as the most senior manager of the University and is therefore responsible for ensuring overall compliance with AOR 2010.

7.3. Director of Estate Services

The Director of Estate Services is responsible for the provision of the University Radiation Protection Service this includes the RPO role, who with regards to Artificial Optical Radiation is the Laser Safety Co-ordinator.

To ensure that health, safety matters pertaining to the control of artificial optical radiations are managed within the compliance framework of the University.

7.4. Non-Ionising Radiation Protection Advisor (LSA)

Encompassing all Non-Ionising Radiation including laser systems the LSA provides technical and legal support to the University. Attends the Non-Ionising Radiation protection sub-committee and performs audits/inspections of all relevant Schools on a rotating basis.

7.5. Head of Schools

The Head of Schools are responsible for:

- Ensuring that all work with artificial optical radiation in their area of responsibility is carried out in accordance with the University AOR Safety Policy and with this Code of Practice.
- Appointing a Departmental Laser Safety Officer where equipment in risk group 3 is present including laser systems of Class 3B & 4.
- Support local rules that are required all relevant equipment outlined above.

7.6. Non-Ionising radiation sub-committee

The University Non-Ionising radiation sub-committee must ensure consistency in compliance with optical radiation safety requirements and encourage the dissemination of good practice in this field and to advise on and monitor the use of ionising and non-ionising radiation within the University. In particular, to advise the Health, Safety and Environment Committee on compliance with statutory regulations and the health implications for users of ionising and non-ionising radiation. Optical radiation safety will be a standing item at meetings of the University Non-Ionising radiation sub-committee. The non-ionising radiation protection committee has final approval on all new projects acquisitions and the control thereof.

7.7. Radiation Protection Officer/ Laser Safety Co-ordinator

With reference to section 2 “Scope” University Laser Safety Co-ordinator is responsible for ensuring that arrangements are in place for:

- Ensuring that training of new staff / students is appropriate;
- Identification maintain a University wide register of relevant equipment;
- Inspection of all new laser facilities; and
- The routine auditing & inspection of laser facilities with School LSOs.
- Charing the Non-Ionising Radiation Sub-committee.
    - Keeping LSOs updated on relevant changes to legislation
    - Reviewing risk assessments and local rules written by principle investigators

7.8. Laser Safety Officers

With reference to section 2 “Scope” Laser Safety Officers (LSOs) should ensure that:

- Equipment within the areas of their appointment are identified;
- Labelled in accordance with BS EN 60825;
- Have standard operating procedure (SOP) and local rules in place, where necessary, for the safe operation of equipment (see example in Appendix 5). These will normally be required for all equipment in risk group 3 including Class 3B and Class 4 lasers when not totally enclosed;
- Personnel intending to work with equipment in Risk Group 3, are identified and receive training in the safe use of artificial optical radiation.
- Personnel who intend to modified Class 1M or Class 2M devices, are identified and receive training in the safe use of lasers.

- Risk assessments and local rules written by principle investigators are sufficient.
- Principle investigators or other owners of equipment receive suitable advice on the provision of suitable safety eyewear (where appropriate) and that training is given in the use and maintenance of this eyewear;
- Undergraduates working with relevant equipment should use the minimum power practicable and follow written SOPs and local rules;
- All relevant equipment in the department is used in accordance with this guidance; and
- Routine surveys are undertaken to ensure compliance with this policy.

7.9. Principal Investigator

With reference to section 2 “Scope” Principal Investigator is responsible for ensuring that:

- All work involving relevant equipment is covered by risk assessments and where appropriate, written schemes of work and protocols.
- Procedures are in place to guarantee that relevant equipment is made safe prior to disposal and dealt with appropriately if they contain hazardous materials;
- Workers using relevant equipment are effectively trained in the operating techniques required and that inexperienced staff are adequately supervised.

7.10. User of relevant equipment (Laser/AOR Users)

With reference to section 2 “Scope” Laser/AOR Users are responsible for:

- Observing the Policy / Guidance, SOPs and local rules applicable to the relevant equipment that will be used and to follow the guidance of supervisors and the Laser Safety Officer ;
- Not leaving a relevant experiment running unattended unless a risk assessment has established that it is safe to do so;
- Their own safety and that of others who may be affected by their acts or omissions; and
- Wearing the appropriate safety eyewear where required.

7.11. Technical Staff Members/Contractors.

Technical support staff and external contractors may need to operate equipment falling within the scope of this policy in connection with maintenance and servicing activities.

These personnel must be authorised by the School Laser Safety Co-ordinator (LSC) prior to carrying out any work and will be designated as 'Technical Users'. Criteria for authorisation are recorded in the University Laser Safety Management Programme File

8. Training and Competency

Individuals will only be appointed to positions of responsibility in relation to artificial optical radiation safety if they have sufficient knowledge, experience, and authority to be effective in the role to which they are being appointed. Staff appointed will receive suitable initial and refresher training to enable them to discharge their responsibilities. University management shall satisfy themselves as to the competence and performance of appointed staff and shall formally record evidence of this assessment. The names of those appointed will be promulgated via Laser Safety Management Files, Local Rules and other relevant documents.

Line managers have responsibility for ensuring that all staff, students or visitors required to work with or close to hazardous artificial optical radiation equipment have received adequate information, instruction and training to enable them to work safely. Annex 4 contains a training matrix of the training required of all relevant members of staff. All new, temporary or transferred personnel are expected to have a personal interview with the relevant School LSO prior to commencing work. This interview should assess the knowledge and competence of the individual and should be used as a basis to decide on the training needs of the individual concerned.

9. Communication

Standing instructions in relation to the management of artificial optical radiation safety are provided in this policy document and amplified in Laser Safety Management Files and Local Rules that are available for each of the areas where artificial optical radiation are in use. The Supervisor for each area is responsible for ensuring that copies of the relevant Local Rules and other documents are available and that staff comply with all requirements within them. University management will ensure that School LSOs and Supervisors have the necessary delegated authority and support to enforce the requirements of the Local Rules.

10. Policy Implementation

10.1. Laser safety management programme

The University has set in place an overarching laser safety management programme to organise the management of artificial optical radiation safety across all sites and departments. The overarching programme is based on this policy document and provides for University wide management arrangements. However, it is recognised that individual departments will often have unique applications and will consequently have very specific needs that have to be reflected in the local arrangements. It is therefore helpful for each department (or even each individual laboratory within a department) to have its own laser safety management programme that is consistent with the University's overall programme but tailored to local needs. It is noted that staff are more likely to 'buy in' to the programme if they can see the relevance to their work. The principal elements of both the overarching programme and individual local programmes are recorded in laser safety management programme files.

10.2. Risk Management

Each local laser safety management programme is strongly influenced by the outcome of the risk assessment undertaken on each artificial optical radiation application. This is used as a tool to decide priorities and set objectives for elimination of optical radiation hazards and risk reduction.

Where new or modified facilities are being considered, risk assessments should be carried out at the design, installation and commissioning stages of the life cycle in order to identify inadequately controlled risks and implement additional control measures where necessary. Where new equipment is being procured the procedures detailed below should ensure that safe operation is a key selection criterion. Where a need for additional controls has been identified an action plan will be drawn up to guide their implementation.

10.3. Procurement

The University will ensure that its procedures for procurement of equipment and contractors takes proper account of the need to ensure that artificial optical radiation safety requirements are met.

10.4. Contingency planning

Supervisors are required to put in place contingency arrangements to deal with all reasonably foreseeable accident scenarios identified through a risk assessment.

10.5. Measuring performance

Management will adopt a proactive approach to monitoring the implementation of the Laser Safety Management Programme. Measurement of performance against pre-determined standards is a key tool in demonstrating successful implementation. The following endpoints will be assessed as part of this process:

- Formal review of maintenance and servicing records
- Formal review of records of inspections and tests carried out on equipment, safety systems, and personal protective equipment.
- Formal review of laser safety training and staff interview records for staff involved with laser work
- Formal review of the records, of the checks carried out on administrative procedures
- Formal review of risk assessments for activities involving work with hazardous artificial optical radiation equipment
- Formal review of reports of suspected accidental exposure to hazardous artificial optical radiation (procedures detailed in Local Rules).

Artificial optical radiation safety documentation will be audited at approximately annual intervals by the University Laser Safety Co-ordinator. The successful implementation of the Laser Safety Management Programme will be reviewed by the Non-Ionising radiation sub-committee at regular intervals.

In the event of continued no compliance the mater should be escalated to the Head of School by the LSO/LSC. Any resulting disciplinary actions should be carried out in accordance with the individual Schools Policy. Serious items can also be escalated to the Universities Health Safety & Environment Committee.