

This document provides guidance regarding the arrangements that Colleges / Professional Services should put in place to protect staff and students operating science-based equipment that generates ultra violet (UV) light and to ensure compliance with the Control of Artificial Optical Radiation at Work Regulations.

General, daily exposure, for example, to sunlight are considered by other sources of information, available on the HSS Website.

## WHAT IS ULTRA VIOLET LIGHT?

Ultraviolet light is a type of electromagnetic radiation, transmitted in waves or particles at different wavelengths and frequencies. This broad range of wavelengths is known as the electromagnetic (EM) spectrum. Common designations are radio waves, microwaves, infrared (IR), visible light, ultraviolet (UV), X-rays and gamma rays.

## NATURAL SOURCES OF ULTRA VIOLET LIGHT

Most of the UV light people encounter comes from the sun. However, only about 10 percent of sunlight is UV, and only about one-third of this penetrates the atmosphere to reach the ground. Celestial sources of UV radiation also exist, for example, very large young stars shine most of their light in ultraviolet wavelengths, but the Earth's atmosphere blocks much of this UV radiation.

## ARTIFICIAL SOURCES OF ULTRA VIOLET LIGHT

A number of artificial sources have been devised which produce UV radiation. For example, tanning booths, black lights, curing lamps, germicidal lamps, mercury vapour lamps, halogen lights, high-intensity discharge lamps, fluorescent and incandescent sources and some types of lasers.

The University also operates a range of science-based equipment, which create artificial UV radiation, examples of which are available on page 3.

## RISKS FROM ULTRA VIOLET LIGHT

Too much exposure to UV radiation is damaging to living tissue. The majority of us have experienced sunburn whilst sunbathing to get the elusive tan. Other risks to health from ultra violet light include burns or reddening (erythema) of the skin or surface of the eye (photokeratitis) and burns to the eye's retina, lens and cornea.

## LEGISLATION: ARTIFICIAL SOURCES

The Control of Artificial Optical Radiation at Work Regulations came into effect on 27<sup>th</sup> April 2010. The Regulations require employers to protect the eyes and skin of workers exposed to hazardous sources of artificial optical radiation. Ultraviolet light falls under the remit of the Regulations.

## GENERAL COLLEGE / PROFESSIONAL SERVICE REponsibilities

Colleges and Professional Services operating science-based equipment, which could produce ultra violet light, have an obligation under the Control of Artificial Optical Radiation at Work Regulations to:

- Identify equipment that produces artificial ultra violet light.
- Assess the risk to operators and others from these.
- Put in place appropriate controls to reduce the risk of harm to the eyes and skin of operators and others who could be affected to as low as reasonably practicable.

## RECOMMENDED CONTROL MEASURES

The following details types of control measures to protect operators and others from the risks associated with artificial sources of ultra violet light.

- Use an alternative, safer light source that achieves the same result.
- Use filters, screens, curtains.
- Arrange remote viewing or dedicated rooms.
- Restrict access to rooms with equipment to trained, authorised operators eg keypads, SALTO.
- Use equipment fitted with safety interlocks, remote controls or time delays.
- Check relevant safety signage displayed.
- Train operators in best practice and provide appropriate information to them.
- Issue Personal Protective Equipment (PPE) eg clothing, UV resistant goggles or face shield.
- Display an Authorised Operators List ie those trained how to operate the equipment.



**Warning Optical Radiation Symbol**

## INSPECTIONS / CHECKS

Formally check all safety critical devices eg safety interlocks, access controls, time delays every 3 months to confirm their efficacy.

In addition, undertake regular inspections of the equipment and immediate working area to confirm controls remain in place. For example, relevant warning signs displayed, Safe Operating Procedures available, the Authorised Operator Lists up to date.

As part of the inspection process always check, PPE provided to protect operators is available and remains in good condition.

## RECORDS






Maintain records of all safety critical device checks ie safety interlocks and inspections.


Records of operator training should be kept, with a list of Authorised Users displayed and maintained by the machine.

In addition, dependent on the potential for UV exposure when using the equipment relevant information should be made available by the machine. For example, warning about no safety interlocks, Safe Operating Procedures, what PPE to wear.

## EXAMPLES OF SOME UNIVERSITY SCIENCE EQUIPMENT AND CONTROLS


**Note:** Highlighted items higher risk

ITEM	RISKS	REQUIRED CONTROLS
<p><b>Trans-illuminators</b></p> 	<p>Severe burns to skin and eyes from UV</p> <p>Exposure to hazardous substances</p>	<ul style="list-style-type: none"> <li>• <b>No safety interlock (higher-risk)</b></li> <li>• Only trained personnel to operate</li> <li>• Display safety warning notices</li> <li>• UV resistant safety glasses, full face shield and gloves must be worn at all times</li> <li>• Display warning signs stating operators must be trained and what PPE to wear</li> <li>• Item placed and shield lowered before the machine is operated</li> <li>• Ensure lab coat cuffs &amp; gloves overlap</li> <li>• Refer to COSHH Assessments as required</li> </ul>
<p><b>UVP High Performance Trans-illuminator</b></p> 	<p>Severe burns to skin and eyes from UV</p> <p>Exposure to hazardous substances</p>	<ul style="list-style-type: none"> <li>• <b>No safety interlock (higher-risk)</b></li> <li>• Operator training required</li> <li>• UV resistant safety glasses, full face shield and gloves must be worn at all times</li> <li>• Item to be placed in equipment and doors shut before UV light turned on</li> <li>• All viewing must take place through the viewing panel at the top of the machine</li> <li>• Refer to COSHH Assessments as required</li> </ul>
<p><b>UVP Illuminator</b></p> 	<p>Severe burns to skin and eyes from UV</p> <p>Exposure to hazardous substances</p>	<ul style="list-style-type: none"> <li>• Refer to COSHH Assessments as required eg ethidium bromide</li> <li>• Operation of UV light interlocked with door to protect against UV exposure</li> <li>• Nitrile gloves worn when handling gels containing ethidium bromide</li> </ul>
<p><b>CL1000 UV Crosslinker</b></p> 	<p>Severe burns to skin and eyes from UV</p> <p>Exposure to hazardous substances</p>	<ul style="list-style-type: none"> <li>• Operation of UV light interlocked with door to protect against UV exposure</li> <li>• Refer to COSHH Assessments as required</li> </ul>
<p><b>Cabinets with UV Facility</b></p> 	<p>Severe burns to skin and eyes from UV</p> <p>Exposure to hazardous substances</p>	<ul style="list-style-type: none"> <li>• Operation of UV light interlocked with sash to protect against UV exposure</li> <li>• UV light should only be used when closing panel ie sash in place</li> <li>• Refer to COSHH Assessments as required</li> </ul>

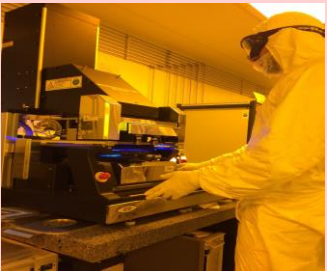
ITEM	RISKS	REQUIRED CONTROLS
<b>Gel Doc Imagers</b> 	Severe burns to skin and eyes from UV Exposure to hazardous substances	<ul style="list-style-type: none"> <li>• Operation of UV light interlocked with doors to protect against UV exposure</li> <li>• Refer to COSHH Assessments as required</li> </ul>

## EXAMPLES OF SOME UNIVERSITY ENGINEERING EQUIPMENT AND CONTROLS

**Note:** Highlighted items higher risk

ITEM	RISKS	REQUIRED CONTROLS
<b>Electric-arc Welding and Cutting</b> 	Severe burns to skin and eyes from UV Exposure to hazardous substances	<ul style="list-style-type: none"> <li>• <b>Higher-risk equipment / activity</b></li> <li>• Only trained personnel to operate</li> <li>• Ensure suitable ventilation / extraction</li> <li>• Ensure other persons are shielded from the arc, including passers-by and colleagues who may be assisting welding operations</li> <li>• UV resistant safety face-shield and gloves must be worn at all times. Do not allow skin to be exposed to the arc</li> <li>• Display warning signs and/or have local procedures stating operators must be trained, that PPE is required and welding fumes must be extracted away from face</li> <li>• Refer to COSHH and Risk Assessments as required</li> </ul>

**NOTE:** UV is generated by all arc processes. Excess exposure to UV causes skin inflammation, and possibly even skin cancer or permanent eye damage. However, the main risk amongst welders is for inflammation of the cornea and conjunctiva, commonly known as 'arc eye' or 'flash' – this includes all arc, MIG, TIG and plasma welding/cutting activity.

<b>EVG 630 Mask Aligner</b> 	Severe burns to skin and eyes from UV Exposure to hazardous substances	<ul style="list-style-type: none"> <li>• <b>Machine is interlocked</b></li> <li>• Operator training required</li> <li>• UV resistant safety glasses, Cleanroom apparel and gloves to be worn at all times</li> <li>• Ensure lab suit and gloves overlap</li> <li>• UV exposure only takes place under machine control</li> <li>• Direct viewing is not possible until exposure is finished</li> <li>• Refer to individual COSHH Assessments and Risk Assessment as required</li> </ul>
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