

Safe operation of UV light sources in laboratories

Ultra violet radiation [UVR] is electromagnetic radiation in the range of wavelength 100 – 400nm.

UV light sources used in laboratories include hand held UV lamps, UV transilluminators and gel documentation equipment. These sources usually emit UVR in the region of 280nm to 400nm.

1. Hazards to health.

The potential hazards to health arise from UVR with wavelengths greater than 180nm. UVR of shorter wavelength is strongly absorbed in air.

The main organs likely to be affected by exposure are the

- **Skin** - Excessive short-term exposure causes sunburn and can result in an increased risk of skin cancer
- **Eyes.** Exposure can cause acute damage to the cornea and conjunctiva causing pain, light sensitivity and tearing. These effects can be felt between 30 minutes and 24hrs after exposure. Prolonged exposure can cause permanent retinal damage.

It should be noted that the UVR hazard of a potential source cannot be judged solely by its brightness. Some lamps emit only a faint visible glow but a large amount of UVR

2. Risk Management & Control Measures

An appropriate combination of the following control measures should be implemented to ensure that the risk to health and safety from UV exposure will be low. These must be documented in a risk assessment for the process.

2.1. Engineering controls.

- **Enclosure.** The use of light tight cabinets and enclosures is the preferred means of ensuring exposure is prevented.
- **Screened areas** will be required where the exposure process takes place external to the source housing. Such an area will need to be subject to administrative controls [see below] and access will be restricted.
- **Interlocks** should be fitted where the removal of a blocking cover from a source could result in hazardous exposure. Transilluminators are now available which have a UV Blocking Cover with an interlocking safety switch and indicator light and these should be considered for new acquisitions.
- **Shielding.** Where this is not practicable to fully enclose the process UV absorbent shields and barriers must be provided.
- When using flat bed transilluminators ensure that the equipment is orientated so that the UV protective cover opens towards the operator.
- **Elimination of reflected UVR** by avoiding shiny surfaces and using non-reflective UVR material.

- **Adequate ventilation.** UV sources can generate ozone and if in prolonged use consideration will need to be given to the ventilation that will be required to remove or control this. The Safety Office can monitor ozone levels.
- If the **pressure** within the source is significantly different from atmospheric pressure [e.g. mercury vapour microscope lamps] consideration must be given to risk of explosion.

2.2. Administrative controls

- **Training.** Staff/students working with UVR sources must be provided with adequate information, instruction and training in its safe use.
- **Minimising exposure.** The exposure time should be kept to a minimum and where source is not enclosed/shielded the user should keep as far away from source as practicable.
- **Restricting access** to people directly concerned with the operation of the UV source.
- **Hazard warning signs.** The following signs should be used where relevant to indicate the presence of potential UVR hazards, the requirement to restrict access and the need for personal protective equipment.



- **Warning lights** should also be used to show when equipment is energised.
- **Regular testing** by users [at least six monthly] of the correct functioning of interlocks **and** recording results.

2.3. Personal protection

- The areas of skin usually at risk are hands, eyes & face,
- Hands must be protected by wearing gloves with low UV transmission. Nitrile/latex gloves are suitable.
- Arms will be protected by wearing long sleeve lab coat but care must be taken to ensure there is no gap between cuff and glove.
- A full-face visor made of suitable UVR absorbent material must be worn whenever the UV source is unprotected. Care must be taken not to use non-UV absorbent visors, which may be present in the lab for use with liquid nitrogen. Where 2 sorts of visor are present they should be clearly labelled as to their use. Eye protection must conform to BS EN 170:2002
- Where PPE is provided for use with UV sources it must be subject to a regular regime of weekly checks to ensure it is available adjacent to the source, clean

and not damaged. In laboratories where ethidium bromide is used this is particularly important in controlling exposure to this mutagen.

2.4. Disposal of UV tubes

The tubes from UV sources contain mercury and therefore require specialist disposal. Contact the Safety Office for information.