

Ultraviolet Radiation Producing Device Guidelines

Scope: This guidance document applies to all laboratories and clinical areas at UT Health Science Center at San Antonio and is written in accordance with the National Institute for Occupational Safety and Health (NIOSH) recommendations and available safety guidelines for using UV radiation.

Background: Ultraviolet (UV) Radiation is divided into three different regions in the spectrum: UV-A 315-400 nm, UV-B 280-315 nm, and UV-C 100-280 nm. UV radiation can be associated with adverse health effects such as erythema, photokeratitis, skin cancer, melanoma, and cataracts. The severity of the effect is generally associated with the wavelength and duration of exposure. The primary use of UV radiation is to be able to inactivate surface pathogens to acceptable levels or as a physical disinfectant that leaves no residue. Ultraviolet light producing devices utilize a bulb which requires electrical current to produce the UV radiation.

The Health Science Center has UV radiation in the following forms: Transilluminators, Hand-Held UV units, Germicidal Lamps in Biosafety Cabinets, Germicidal Lamps in Clinical Units, and Germicidal Lamps in Laboratories. The following are some guidelines on how to minimize accidental exposures to UV radiation.

Occupational Health Limits: NIOSH recommends that the time of exposure to an intensity of 100 microwatts per square centimeter at wavelength 254 nanometers not exceed 1 minute. When this is averaged over an eight-hour work day, this value is 0.2 microwatts per square centimeter.

Personal Protective Equipment: **It is very important that you have the correct dermal and eye protection when working with UV radiation.** Environmental Health & Safety can provide assistance in measuring UV emissions and evaluating the PPE necessary for protection. Adequate eye and skin protection must be worn when working in an UV-irradiated area. Special safety glasses with side shields or goggles with solid side pieces should be worn. Skin protection can be accomplished through face shields, caps, gloves, lab coats, etc. Be cognizant of reflective surfaces which can reflect UV radiation to unprotected parts of your skin.

Devices Incorporating UV Radiation and Protective Measures:

1. Transilluminator

Uses: Frequently used for visualizing nucleic acids after gel electrophoresis and ethidium bromide staining.

PPE: Appropriate PPE includes gloves, lab coat without a gap between the cuff and glove, and a UV resistant face shield.

Maintenance: Maintenance on the UV producing device should be performed according to any manufacturer's recommendations.

2. Hand-held UV Units

Uses: Frequently used for visualizing nucleic acids after gel electrophoresis and ethidium bromide staining. Central Energy Plant uses them for water analysis.

PPE: Appropriate PPE includes gloves, lab coat without a gap between the cuff and glove, and a UV resistant face shield.

Maintenance: Maintenance should be performed according to any manufacturer's recommendations.

3. *Germicidal Lamps in Biosafety Cabinets*

Uses: Used for disinfecting the interior surfaces of biosafety cabinets prior to and after use. The UV light should be used in addition to routine chemical disinfection and must not be relied on as the sole source of disinfection.

PPE: Turn off UV lights prior to working at biological safety cabinets.

Interlocks: Some of the newer biosafety cabinets have an interlock to turn off the UV light when the sash is not closed.

Maintenance: Bulbs should be wiped off on a monthly basis with a soft cloth and dampened with ethanol after the bulb cools down. Bulb replacement occurs when the bulb burns out.

4. *Germicidal Lamps in Clinical Units*

Uses: Can be installed at ceiling levels in some clinical units for air disinfection purposes and to control exposures to Mycobacterium tuberculosis.

PPE: Turn off UV lights prior to working in the area.

Maintenance: Bulbs should be wiped off on a monthly basis with a soft cloth and dampened with ethanol after the bulb cools down. Bulb replacement occurs when the bulb burns out.

5. *Germicidal Lamps in Laboratories*

Uses: These are typically installed at ceiling level and can be used for air and surface disinfection.

Interlocks: Access to the room must be strictly controlled while the lamps are operating to prevent any possible exposures. Turn off UV lights prior to entering tissue culture rooms.

PPE: Personnel cannot enter the area when the lamp is working.

Maintenance: Bulbs should be wiped off on a monthly basis with a soft cloth and dampened with ethanol after the bulb cools down. Bulb replacement occurs when the bulb burns out.

6. *Air Handlers*



Uses: These are typically installed in air handlers for surface disinfection of various components of the air handlers such as coils and drain pans.

Interlocks: Remote kill switches or panel safety switches can be installed to turn off the UV source prior to entry into the air handlers.

PPE: Personnel cannot enter the area when the lamp is working.

Maintenance: Bulbs should be replaced in accordance with manufacturer's recommendations.

7. Water Purification Systems



Uses: UV radiation can effectively kill 99.9% of harmful organisms including e. coli.

Interlocks: The UV lamp is enclosed in a chamber, which includes a safety cap. Turn unit off and unplug prior to opening the UV chamber for servicing. In addition, a UV sensor is positioned outside of the chamber for detection of leaks.

PPE: Personnel cannot enter the area when the lamp is working.

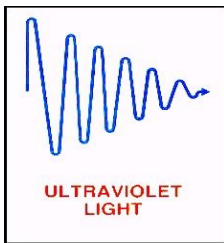
Maintenance: Bulbs should be replaced every 12 months per manufacturer's recommendations.

Labeling for UV Radiation:

All Health Science Center laboratories incorporating the use of UV radiation will have a placard posting at the entrance to the hazard area. This placard should include the following sticker:



The biosafety cabinets have the following hazard label located above the sash of the biosafety cabinet.



CAUTION UV HAZARD TURN OFF UV LIGHT BEFORE USING UNIT

When a germicidal lamp is used in a clinical unit, a warning label must be placed on the fixture stating Caution: High Intensity Ultraviolet Energy. Protect Skin and Eyes.

Emergency Procedure:

The signs and symptoms of an accidental exposure would be erythema of the skin similar to a sun-burn and possible inflammation of the eye caused by lesions on the cornea. Possible long-term signs and symptoms would be increased aging of the skin, cataracts, and an increased risk of melanoma or other skin cancers. Please take the following steps if you feel that you have an accidental exposure to UV radiation:

1. Notify your supervisor immediately, no matter how minor the injury may seem. Report all unsafe working conditions to your supervisor or the Environmental Health and Safety Department.
2. In the event of a UV exposure, immediately discontinue the use of the UV producing equipment. Seek emergency medical care for skin and eye exposures immediately.
3. You have freedom of choice as to which hospital, clinic, or pharmacy you may use; however the provider must accept Workers' Compensation Insurance. Inform the medical provider that your injury is work related. Your department will provide you with a ***Notification of an On-The-Job Injury*** form to give to your medical provider and the ***Employers First Report of Injury*** form to give to the Workers' Compensation Program Administrator.

For additional information or to request labels, contact:

Environmental Health & Safety, 1.343T DTL

(210) 567-2955

<http://research.uthscsa.edu/safety>