



Ultraviolet (UV) Radiation

Principal Investigator (PI) Approval is Required Prior to Performing this Procedure

Description

This standard operating procedure outlines the use of UV radiation. Review this document and supply the information required in order to make it specific to your laboratory. In accordance with this document, laboratories should use appropriate controls and personal protective equipment when working with UV radiation.

Useful UV Links:

- <http://www.cdc.gov/niosh/topics/uvradiation/>
- <http://www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/Tanning/ucm116425.htm>
- <http://www.who.int/uv/en/>
- <http://hps.org/hpspublications/articles/uv.html>
- http://www.ccohs.ca/oshanswers/phys_agents/ultravioletradiation.html
- www.icnirp.de/documents/UVWorkers.pdf

Potential Hazards

An unfortunate property of UV radiation is that there are no immediate warning symptoms to indicate overexposure. Symptoms of overexposure including varying degrees of erythema (sunburn) or photokeratitis (aka “welder’s flash” or “snow blindness”) that typically appear hours after exposure has occurred.

Skin Injury — UV radiation can initiate a photochemical reaction called erythema within exposed skin. This “sunburn” can be quite severe and can occur as a result of only a few seconds exposure. Effects are exaggerated for skin photosensitized by agents such as coal tar products, certain foods, e.g., celery root, certain medications and photoallergens. Chronic skin exposure to UV radiation has been linked to premature skin aging, wrinkles and skin cancer.

Eye Injury — UV radiation exposure can injure the cornea, the outer protective coating of the eye. Photokeratitis is a painful inflammation of the eye caused by UV radiation-induced lesions on the cornea. Symptoms include a sensation of sand in the eye that may last up to two days. Chronic exposures to acute high-energy UV radiation can lead to the formation of cataracts.

UV radiation is just outside the visible range, or under 400 nanometers (nm). There are three ranges of UV:

Region	Also Known As	Range in nm	Hazard Potential	Damage Mechanism (High Exposures)
UV-A	near UV (Black Light)	320-400	lowest	cataracts
UV-B	mid UV (Erythema)	290-320	mid to high	skin or eye burns
UV-C	far UV (Germicidal)	190-290	highest	skin or eye burns

Occupational Exposure Limits (OELs):

1. For the UV-A or near ultraviolet spectral region (315 to 400 nm), exposure to the eye should not exceed 1 milliwatt per square centimeter (1.0 mW/cm^2) for periods greater than 1,000 seconds (approximately 17 minutes).
2. For exposure times less than 1,000 seconds, the dose (total energy) should not exceed 1.0 joules per square centimeter (J/cm^2). Additional exposure limits apply to the amount of UV light exposure to the skin and the eyes.
3. The amount of UV exposure a person can receive on their skin or eyes during an 8-hour period varies with the wavelength of the UV radiation. For specifics, contact EHS at (810) 766-6763, or contact [ACGIH](#) to order your 2014 edition of TLVs and BEIs.
4. For the actinic ultraviolet spectral region (200-315 nm; about half of the UV-C and most of the UV-B range), the exposure of unprotected skin or eye should not exceed the values given in Table 1 of the ACGIH booklet, within an 8-hour period. For detailed TLVs refer to the current TLV booklet published by [ACGIH](#).

Engineering Controls

Potential engineering controls (preferred to other controls or PPE) include:

- Light-tight cabinets,
- Enclosures (including dedicated rooms) enclosed with opaque materials or UV radiation absorbing glass and plastic shielding and fail-safe interlocks are the key engineering control measures used to prevent human exposure to UV radiation,
- Utilize shields, curtains, and barriers.
- If no engineering controls are needed please cite this fact. If engineering controls are not practical, note what administrative or work practice controls are recommended, as well as applicable PPE.

Work Practice Controls

Never allow the skin or eyes to be exposed to UV radiation sources. The UV radiation generated by laboratory equipment can exceed recommended exposure limits and cause injury with exposures as brief as three seconds in duration. Utilize suitable separation distances to protect individuals against the UV radiation emitted by open sources. Many overexposures to UV radiation have occurred as a result of individuals not knowing the hazards associated with UV-emitting equipment. To help prevent eye and skin injuries, any equipment that emits UV radiation must be conspicuously labeled with a caution label. The label should contain language similar to:

WARNING
THIS DEVICE PRODUCES POTENTIALLY HARMFUL UV LIGHT
PROTECT EYES AND SKIN FROM EXPOSURE TO UV LIGHT



Labels and signs may be available from UM's M-Marketsite website or may be available from the manufacturer of the UV light product.

Personal Protective Equipment (PPE)

In order to select the appropriate PPE for the workplace, a Hazard Assessment is conducted. The Hazard Assessment determines the hazards and potential hazards associated with a task, machinery, or process. The appropriate PPE for the situation may be subsequently determined. Contact EHS at (810) 766-6763 to obtain a copy of the Hazard Assessment Form. The form may be completed by Environment, Health and Safety, workplace supervisor, laboratory supervisor or principal investigator.

Protective Clothing: Wear standard laboratory apparel including a fully buttoned lab coat, long pants and closed toe shoes. While working with UV radiation sources, lab workers must be particularly vigilant to prevent gaps in protective clothing that commonly occur around the neck and wrist areas.

Eye/Face Protection: If there is any potential for the eyes and face to be exposed to UV radiation, a polycarbonate face shield stamped with the ANSI Z87.1 "UV certification" must be worn to protect the eyes and face. Ordinary prescription eyeglasses may not block UV radiation. UV-certified goggles and safety glasses will protect the eyes, but it is common for lab workers to suffer facial burns in the areas not covered by the goggles or glasses.

Gloves: To protect hands and wrists, wear disposable thick nitrile, double latex gloves or something similar to protect exposed skin on the hands. Ensure wrists and forearms are covered between the tops of gloves and the bottom of the lab coat sleeves.

Transportation and Storage

Not applicable.

Waste Disposal

Not applicable.

Exposures/Unintended Contact



If the employee is in need of emergency medical attention, call 911 immediately.



- For UV radiation over exposure of the eye, place a sterile dressing over the eye and get medical attention.
- For UV radiation over exposure of the skin, apply cold water or ice to the skin burns and get medical attention.

Contact EHS for advice on symptoms of chemical exposure, or assistance in performing an exposure assessment.

Report all work related accidents, injuries, illnesses or exposures to UM-Flint DPS. Additionally, employees and supervisors must be sure to report the injury to EHS and complete and submit the [Illness and Injury Report Form](#) to WorkConnections within 24 hours. Follow the directions on the WorkConnections website [Forms Instructions](#) to obtain proper medical treatment and follow-up.

If you were involved in or observed an incident or near miss, please complete the [EHS Laboratory Incident and Near-Miss Report Form](#). This will be valuable in improving laboratory safety on UM-Flint campus.

TREATMENT FACILITIES:

<u>MAJOR INJURIES</u>	<u>MINOR INJURIES –During Business Hours</u>	<u>MINOR INJURIES –After Business Hours</u>
Genesys Hospital One Genesys Parkway Grand Blanc, MI 48439 (810) 606-5710 Hurley Medical Center One Hurley Plaza Flint, MI 48503 (810) 262-9000 McLaren Hospital Flint 401 South Ballenger Hwy Flint, MI 48532 (810) 342-2000	Genesys Occupational Health Network 1460 Center Rd. Burton, MI 48509 (810) 715-4620 Mon. to Fri. 7:30 am to 10 pm Sat. & Sun. Noon to 8 pm McLaren Flint-Burton OCC Center 1459 S. Center Rd. Burton, MI 48509 (810) 496-0900 Mon. - Fri. 8 am to 8 pm Sat & Sun 10 am to 2 pm	Downtown Flint 420 S. Saginaw St. Flint, MI 48502 (810) 762-1550 Genesys East 1096 S. Belsay Rd, Suite F Burton, MI 48509 (810) 743-3351 Genesys North 4154 W. Vienna Rd Clio, MI 48420 (810) 686-7397 Genesys South 8447 N. Holly Rd Grand Blanc, MI 48439 (810) 603-0856 Mon. - Fri. 6 to 10pm / Sat. & Sun. 1-10pm

Click [here](#) for more information on the UM – Flint Emergency Preparedness and Response Plan.

Report all emergencies, suspicious activity, injuries, spills, and fires to the UM-Flint Department of Public Safety (DPS) at 911 from any university telephone or (810) 762-3333 from cell phone or non-university telephone. Register with the [University of Michigan-Flint Emergency Alert System](#) via Wolverine Access. Also, preprogram the UM-Flint DPS telephone number (810) 762-3333 into your cell phone for quick, easy use.

Training of Personnel

All personnel are required to complete Laboratory Safety Training. Documentation of the training is required. This training can be accomplished by completing the **Comprehensive Laboratory Safety** session (**BLS009** or equivalent) via [MyLINC](#), or UM-Flint EHS on-line training or other equivalent approved by EHS. Furthermore, all personnel shall read and fully adhere to this SOP when working with UV radiation.

Certification

I have read and understand the above SOP. I agree to contact my Supervisor or Lab Manager if I plan to modify this procedure.

Name	Signature	UM ID #	Date

Principal Investigator _____

Revision Date _____