

# UNIVERSITY OF TOLEDO

SUBJECT: Radiation Safety

Procedure No: HM-08-010

---

## PROCEDURE STATEMENT

The safety of staff, patients, students and visitors with respect to the use of ionizing and non-ionizing radiation.

## PURPOSE OF PROCEDURE

To define the responsibilities of the Environmental Health and Radiation Safety department.

## PROCEDURE

### IONIZING RADIATION

1. The Radiation Safety Office (419-383-4301) is responsible for all safety issues involving the use of ionizing radiation at the University of Toledo.
2. Responsibilities of the Radiation Safety Office include, but are not limited to:
  - a. Monitoring conditions for compliance with regulations of the Ohio Department of Health and recommendations of The Joint Commission.
  - b. Maintaining radiation dose records for persons exposed to ionizing radiation as occupational workers.
  - c. Performing periodic environmental radiological surveys in areas where sources of ionizing radiation are used.
  - d. Developing policies for the safe handling and use of sources of ionizing radiation.
  - e. Responding to incidents involving sources of ionizing radiation, including malfunctioning equipment, spills of radioactive material, and radioactive contamination patients.
  - f. Preparing radiation safety training materials and providing training to personnel.
  - g. Managing the safe disposal of radioactive waste in compliance with regulatory mandates.

### NON-IONIZING RADIATION

The use of non-ionizing radiation sources or equipment will be permitted only in a manner that is safe for all faculty, staff, students and visitors. Non-ionizing radiation includes all sources of electromagnetic radiation with wavelengths greater than 0.16  $\mu\text{m}$ .

1. Procedures for Use of Non-ionizing Radiation Sources
  - a. Personal
    - Proper eye protection must be worn when working with sources such as ultraviolet, LASER and high intensity visible light which are capable of producing eye damage. For additional information on LASER systems, see Environmental Health and Radiation Safety Procedure [HM-08-002](#).
    - Protective clothing must be worn with sources such as ultraviolet which are capable of producing skin burns.
  - b. General Laboratory
    - Interlocks are to be used whenever possible on chambers containing hazardous sources of non-ionizing radiation. For example, opening a door to a chamber should deenergize the source and it should be possible to reenergize the source only through a specific action such as pressing a switch. When an experimental procedure calls for overriding the interlocks the procedure must be approved by the Environmental Health and Radiation Safety Department.

- Warning signs approved by the Environmental Health and Radiation Safety Department are to be prominently displayed where hazardous sources of non-ionizing radiation exist. Administrative procedures are to be prominently displayed where interlocks do not exist or where they are overridden.
- c. Electromagnetic/Microwave Radiation
- Sources not confined in a shielded chamber are to be operated such that exposure intensities to anyone near the apparatus are less than the guidelines listed in the latest edition of the "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices".

## ULTRAVIOLET RADIATION

1. Responsibilities
  - a. Supervisor
    - Ensures that personnel are adequately trained in the use, maintenance and hazards involved in use of UV sources.
    - Ensures that adequate protection is provided, available and used when UV lights are utilized.
  - b. Employee
    - Uses good safety practices and follows institutional policies on the use of UV sources.
    - Uses the correct protective clothing and eye protection necessary for the circumstances.
    - Reports and institutes repair of malfunctioning UV equipment.
    - All ultraviolet lamps should be cleaned at two-week intervals, or more often, if located in an unusually dusty area. The lamps should be turned off and wiped with a soft cloth pad moistened with alcohol. Cleaning is the responsibility of the personnel in charge of the laboratory. Cleaning dates should be noted on a card attached to the installation.
2. Procedure
  - a. Ultraviolet lamps will be replaced when they emit 70 percent or less of their rated initial output. This figure is higher than the manufacturer's suggested cutoff point. The safety factor thus provided permits semi-annual testing and virtually eliminates the possibility of complete failure within a short time after passing a satisfactory intensity test.
  - b. Ultraviolet lamps in air locks and door barriers will be installed by Facilities Maintenance or a contractor such that they are automatically shut-off when the doors are opened and personnel that are in the area must wear personal protective equipment (goggles, caps, gowns, and gloves) or turn off the lights before entering laboratories, animal rooms, etc., which have ultraviolet installations.
  - c. Ultraviolet lamps in biological safety cabinets will be turned on only when the cabinet is not in use.
  - d. Special problems concerning use, cleaning, or installation of ultraviolet lamps should be referred to the Environmental Health and Radiation Safety Department.
  - e. Caution will be used with handheld UV lights to avoid direct exposure or indirect exposure by strong reflection to the eyes or skin.
3. Radiation Exposure
  - a. The eyes and skin should not be exposed to direct or strongly reflected ultraviolet radiation. The effect of radiation overexposure is determined by such factors as dosage, wave length, portion of body exposed and the sensitivity of the individual.
  - b. Overexposure of the eyes will result in a painful inflammation of the conjunctiva, cornea, and iris. Symptoms will develop 3 to 12 hours following exposure. There is a very unpleasant foreign body sensation accompanied by lacrimation (tearing). The symptoms usually disappear in a day or two.
  - c. Exposure to the skin will produce erythema (reddening) 1 to 8 hours following exposure.
  - d. Adequate eye and skin protection must be worn when working in an irradiated area. Ultraviolet safety glasses with side shields, goggles with solid side pieces, or face shields should be worn. The side pieces prevent the entrance of reflected radiation and direct radiation from a side source. Skin protection is afforded by face shields, caps, gloves, gowns, etc.
  - e. Overexposure to ultraviolet radiation should be reported to the supervisor and Environmental Health and Radiation Safety Department.

- f. All UV sources capable of causing eye or skin burns should be interlocked so that direct viewing or bodily exposure is not possible. The total intensity of UV light from lamps and reflecting surfaces should not exceed the levels specified in the latest edition of the reference "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices".
- UV sources should be placed out of the direct line of sight and highly reflective surfaces painted with low reflectance paint.
  - UV sources contained in other pieces of equipment such as Biological Safety Cabinets (BSCs) are no less hazardous and all of the above precautions should be followed along with the required use of gloves and long sleeve lab coats while experiments are performed in the cabinet.
  - UV light sources freestanding and portable commonly utilized in research laboratory applications require the user to avoid contact with the UV light and by policy are required to wear gloves and long sleeve lab coats while using the light source.

Source: Safety & Health Committee

Effective Date: 7/21/87

Review/Revision Date: 8/9/88

7/9/91

10/19/92

12/13/93

6/20/96

1/27/99

7/8/02

2/22/05

2/7/08

2/2/11

12/10/13

09/29/16

09/27/19

09/27/22