



ENVIRONMENTAL HEALTH AND SAFETY
STANDARD OPERATING PROCEDURES

SOP No. 24.01.01.W1.20AR Radiation Safety Procedure

Approved: August 15, 2010
Last Revised: January 2, 2019
Next Scheduled Review: January 2, 2024

Environmental Health and Safety at WTAMU is composed of two distinct but integrated environmental safety departments that report to the Vice President of Research and Compliance. Academic and Research Environmental Health and Safety (AR-EHS) is responsible for research and academic related compliance, which includes laboratory and academic research and the associated compliance committees. Fire and Life Safety (FLS-EHS) is responsible for fire related compliance and conducts fire and life safety inspections of campus buildings and assists with the testing all fire detection and suppression systems.

Supplements TAMUS Regulation 24.01.01

Contents

1. Purpose..... 1
2. Scope..... 2
3. Ionizing and Non-ionizing Radiation..... 2
3.1. Radioactive Materials..... 2
3.2. Lasers ..... 2
3.3. Magnets ..... 3
3.4. Microwaves ..... 3
3.5. Radiation-Producing Devices..... 3
3.6. Previously Disposed of Materials..... 4
4. Ultraviolet Lamps ..... 4
4.1. Health Hazards ..... 4
4.2. Personal Protective Equipment..... 4
4.3. Germicidal Function..... 4
4.4. Maintenance ..... 4
5. Record Retention ..... 5
6. Training..... 5
7. Governing Documents ..... 5

1. Purpose

WTAMU maintains strict requirements for working with sources of radiation. The radiation safety program at WTAMU protects employees, students, and visitors, as well as the public and the environment, from the harmful effects of exposure to ionizing and non-ionizing radiations. AR-EHS governs the protocol and use of radioactive materials and radiation-producing devices on campus. Any faculty or staff member who desires to work with radioisotopes or radiation-producing devices must apply for and receive a permit from AR-EHS. In addition, their employees and other employees who work with sources of radiation must receive formal training in equipment operation, safety guidelines, and emergency procedures.

The "Radiological Safety Program Procedure Manual" is available from AR-EHS. It is divided into the following

parts: Part One: Procedure Manual for the Use of Radioactive Materials  
Part Two: Procedure Manual for the Use of Radiation Producing Devices  
Part Three: Procedure Manual for the Use of General License Acknowledgment Sources  
Part Four: Procedure Manual for the Use of Lasers

## 2. Scope

This procedure applies to all employees, students, and visitors. All WTAMU facilities, operations, and activities are governed by the WTAMU Radiation Safety Procedure.

## 3. Ionizing and Non-ionizing Radiation

### 3.1. Radioactive Materials

The following policies apply to the use of licensed radioactive materials. The policies apply to sealed sources as well as open isotopes regardless of physical or chemical form.

- Radioactive materials may only be possessed by individuals or under the supervision of individuals who have been formally permitted by AR-EHS.
- Permit holders or their designees shall obtain approval from AR-EHS before placing an order for radioactive materials. Approvals are also required before permit holders receive radioactive materials via transfer from another licensee, via donations, etc.
- All sources of radiation shall be secured from unauthorized access or removal.
- All radioactive wastes shall be disposed of through AR-EHS or via written procedures approved by AR-EHS.
- All persons are responsible for safe working practices and for maintaining their own exposures to ionizing radiations As Low As Reasonably Achievable (ALARA).
- Each user is responsible for reporting unsafe practices and/or rules violations to the Permit Holder or, if responses are not satisfactory, to AR-EHS or the Texas Bureau of Radiation Control (Texas Department of State Health Services).
- Permit Holders and users of radioactive materials shall comply with all aspects of the "WTAMU Radiation Safety Procedure."

### 3.2. Lasers

The State of Texas regulates the use of lasers through the Bureau of Radiation Control (BRC), Texas Department of State Health Services Radiation Control. AR-EHS registers and is responsible for the safe use of all lasers on campus.

Lasers present many safety threats, but the most common threat is damage to the eyes. Other common laser concerns include skin damage, electrical hazards from high-energy power sources, chemical exposure, fire/explosion hazards, and exposure to cryogenic material such as hydrogen and oxygen. Many lasers emit invisible ultraviolet or infrared radiation.

Lasers are classified into four basic categories as indicated below:

- Class 1: Lowest power lasers that do not emit hazardous levels.
- Class 2: Low-power lasers that pose a hazard only if viewed directly for extended periods.
- Class 3: Medium-power lasers that pose moderate risk and can cause injury.
- Class 4: High-energy, high-risk lasers that can cause injury to the eyes and skin from direct or diffused reflection.

*NOTE:* If you work with a Class 3b or 4 laser, you must obtain a Laser Permit from AR-EHS.

Laser devices require engineering controls to ensure safety. All Class 3b or 4 lasers require a combination of protective housing area, area warning signs, or remote firing capabilities.

The following information is required for obtaining a laser permit:

- Classification of the laser device
- Wavelength of the laser output
- Power output
- Appropriate eyewear

Follow these guidelines when working with Class 3 or 4 lasers:

- Never aim a laser at a person.
- Be very careful when working with hand-held laser pointers.
- Do not allow children access to pointers.
- Wear protective clothing such as eyewear and skin protection as appropriate.
- Post warning signs at entrances where lasers are present.
- When working with power supplies, remove jewelry, stand on a dry surface, and work with only one hand at a time. Observe high voltage precautions.
- Control access to areas where lasers are used (i.e., no spectators).
- If possible, enclose the entire laser beam path on Class 4 lasers.

### 3.3. Magnets

The information in this section pertains only to large magnets at WTAMU, such as those used for magnetic resonance imaging.

Because the magnetic flux lines (or *pull*) from the main magnetic field can extend well beyond the actual magnet, the greatest hazard associated with large magnets is the *missile effect*. Ferromagnetic objects such as pens, scissors, screwdrivers, oxygen cylinders, and other metallic devices can be pulled into the magnet with enough force to cause a serious injury or accident. In addition, magnetic fields may also disrupt pacemakers or cause injury to individuals with surgically implanted metal pins or plates.

*IMPORTANT: To protect bystanders and prevent the accidental introduction of ferromagnetic materials within the proximity of a magnet, establish a security zone around any large magnet.*

### 3.4. Microwaves

Microwaves are part of the electromagnetic spectrum; they range in frequency from 300 megahertz (MHz) to 300 gigahertz (GHz). Microwaves are used for communications, radar, intrusion alarms, door openers, and medical therapy, but they are most commonly used for cooking.

Metal reflects microwave radiation, but dry nonmetallic surfaces allow microwaves to pass through with little or no heating effect. Organic materials, however, are extremely heat conductive. Because microwaves can penetrate organic materials, including tissues, thermal burns and other effects may result from microwave exposure.

*NOTE:* Microwave ovens are very safe when kept in good working condition and used properly. They do not serve as a source of exposure to harmful microwaves.

Even though microwave ovens are not a source of harmful radiation exposure, they should be properly used and maintained.

- Do not put metal objects (including aluminum foil) into a microwave oven.
- Do not use a microwave oven if damaged.
- Ensure that the seal on a microwave oven is tight, intact, and in good condition (i.e., not charred or distorted).
- Ensure that microwave ovens are clearly labeled for laboratory use of food preparation only.
- Microwave ovens should only be repaired by trained personnel.

### 3.5. Radiation-Producing Devices

Radiation-producing devices such as X-ray machines, electron microscopes, and particle accelerators may be regulated through the BRC, Texas Department of Health. All radiation-producing devices must be registered with AR-EHS.

Radiation-producing devices (other than human and veterinary diagnostic devices) shall be interlocked to prevent access to the unshielded beam during normal or routine operations. Exceptions may be granted by AR-EHS as directed by the Radiation Safety Officer.

*IMPORTANT:* The door(s) to a room where a radiation-producing device is located should be posted with a radiation warning sign, unless the device is totally self-contained.

#### 3.6. Previously Disposed of Materials

Each component having previously buried or otherwise disposed of licensed radioactive materials on property controlled by that component shall adopt programs as necessary to control and monitor disposal of licensed radioactive materials in accordance with the applicable rules contained in 30 TAC 336. The Texas Commission on Environmental Quality administers these regulations.

## 4. Ultraviolet Lamps

Ultraviolet lamps are useful germicidal tools, but they also pose a potential health hazard. The following sections provide essential safety information for working with UV lamps and light.

#### 4.1. Health Hazards

Exposure to UV radiation can cause extreme discomfort and serious injury. Therefore, you must protect your eyes and skin from direct and reflected UV light. Pay particular attention to laboratory surfaces, such as stainless steel, that can reflect UV light and increase your UV exposure.

The effect of UV radiation overexposure depends on UV dosage, wave length, portion of body exposed, and the sensitivity of the individual. Overexposure of the eyes may produce painful inflammation, a gritty sensation, and/or tears within three-to-twelve hours. Overexposure of the skin will produce reddening (i.e., sunburn) within one to eight hours. Certain medication can cause an individual to be more reactive to UV light.

#### 4.2. Personal Protective Equipment

Adequate eye and skin protection are essential when working around UV radiation. Before entering a laboratory with ultraviolet installations, you must turn off the lights or wear protective equipment (e.g., goggles, cap, gown, and gloves).

*NOTE:* Safety glasses with side shields or goggles with solid side pieces are the only equipment that provide adequate eye protection against direct and reflected UV light.

#### 4.3. Germicidal Function

UV radiation is particularly useful in the laboratory when combined with other methods of decontamination and disinfection. UV radiation is used primarily to reduce the number of microorganisms in the air and on surfaces. It is most effective against vegetative bacteria.

UV rays can only kill organisms that are invisible to the naked eye. To be effective, UV rays must directly strike the microorganisms. If microorganisms are shielded by a coating of organic material (e.g., culture medium), the UV light will be ineffective.

#### 4.4. Maintenance

Ultraviolet lamps lose germicidal effectiveness over time and may need to be replaced even though the lamp has not burned out. It may be necessary to replace the lamp according to the manufacturer's recommendations. There are two types of UV lamps-- hot cathode and cold cathode. The hot cathode lamp has two pins at each end, and the cold

cathode lamp has one pin at each end. Manufacturers recommend that hot cathode lamps be replaced every six months and that cold cathode lamps be replaced every 12 months.

In addition to replacing UV lamps as indicated above, follow these guidelines to maintain UV lamps:

- Regularly wipe cool, unlit UV lamp bulbs with a soft cloth moistened with alcohol. Dust can decrease the effectiveness of a UV lamp.
- Do not touch a UV bulb with your bare hands. The natural oils on your hand may leave a fingerprint and create *dead space* on the bulb's surface.

## 5. Record Retention

No official state records may be destroyed without permission from the Texas State Library as outlined in [Texas Government Code, Section 441.187](#) and [13 Texas Administrative Code, Title 13, Part 1, Chapter 6, Subchapter A, Rule 6.7](#). The Texas State Library certifies Agency retention schedules as a means of granting permission to destroy official state records.

West Texas A & M University Records Retention Schedule is certified by the Texas State Library and Archives Commission. West Texas A & M University Environmental Health and Safety will follow [Texas A & M University Records Retention Schedule](#) as stated in the Standard Operating Procedure [61.99.01.W0.01 Records Management](#). All official state records (paper, microform, electronic, or any other media) must be retained for the minimum period designated.

## 6. Training

West Texas A & M University Environmental Health and Safety will follow the Texas A & M University System Policy [33.05.02 Required Employee Training](#). Staff and faculty whose required training is delinquent more than 90 days will have their internet access terminated until all trainings are completed. Only Blackboard and Single Sign-on will be accessible. Internet access will be restored once training has been completed. Student workers whose required training is delinquent more than 90 days will need to be terminated by their manager through Student Employment.

## 7. Governing Documents

- Title 25 Texas Administrative Code Chapter 289
- Title 10 of the Code of Federal Regulations (10 CFR)
- 25 TAC 289.301

---

## Related Statutes, Policies, or Requirements

---

---

## Contact Office

---

WTAMU Environmental Health and Safety  
(806) 651-2270