RADIATION SAFETY

Introduction
The following sections provide general safety guidelines and procedures for radiation safety. This chapter covers the following topics:

Radiological Safety at UTA

UTA maintains strict requirements for working with sources of radiation. The radiation safety program at UTA protects employees, students, and visitors as well as the public and the environment from the harmful effects of exposure to ionizing and nonionizing radiation. The UTA Radiation Safety Committee governs the protocol and use of radioactive materials and radiation-producing devices on campus, assisted by the Radiation Section of Environmental Health & Safety

Any faculty or staff member who desires to work with radioisotopes or radiation-producing devices must apply for and receive a permit from the Radiation Safety Committee (RSC). 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 "Radiation Safety Manual" has been distributed to users of radiation materials on campus and is available from the Environmental Health & Safety Office. It is divided into the following parts:

Chapter 1: Radiation Safety Program Management
Chapter 2: Radiation Facilities and Equipment
Chapter 3: Operational Radiation Safety Procedures
Chapter 4: Radiation-Radioisotope Accountability
Chapter 5: Radiation Instrumentation
Chapter 6: Required Tests and Records
Chapter 7: Disposal of Radioactive Waste
Chapter 8: Emergency Procedures

Radioactive Materials

The purpose of the Radiation Safety Manual is to establish the policies of UTA with regard to the use of licensed radioactive materials. These policies apply to sealed sources as well as to open isotopes regardless of physical or chemical form.

Radioactive materials may only be possessed by or under the supervision of individuals who have been formally permitted by the RSC..

Principal Investigators (PI's) or their designees shall obtain approval from the Radiation Safety Officer (RSO) before placing an order for radioactive materials.

Approvals are also required before PI's 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 through the RSO or via written procedures approved by the RSC.

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 PI or, if responses are not satisfactory, to the RSO, RSC or the Texas Bureau of Radiation Control.

PI's and users of radioactive materials shall comply with all aspects of the Radiation Safety Manual.

Radiation-Producing Devices

Radiation-producing devices such as X-ray machines and electron microscopes are regulated through the BRC, Texas Department of Health. All radiation-producing devices must be registered with the UTA Radiation Section, Environmental Health & Safety.

Radiation-producing devices (other than human diagnostic devices) shall be interlocked to prevent access to the unshielded beam during normal or routine operations. Exceptions may be granted by the UTA Radiation Safety Committee.

IMPORTANT:

The door(s) to a room where a radiation-producing device is located should be posted with a radiation warning sign.

Lasers

The State of Texas regulates the use of lasers through the Bureau of Radiation Control (BRC), Texas Department of Health. The UTA Radiation Section, Environmental Health &Safety, 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 materials 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 3 or 4 laser, you must obtain a Laser Permit from the Radiation Section of EH&S.

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

The following information is required for obtaining a laser permit:

Name of P.I.
Authorized Users
Manufacturer
Model No.
Serial No.
Description
Location of Use
Classification of the laser device
Wavelength of the laser output
Power output
Appropriate eyewear

Follow these guidelines when working with Class 3 and 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 (see Electrical Safety chapter).
Control access to areas where lasers are used (i.e., no spectators).
If possible, enclose the entire laser beam path on Class 4 lasers.

Magnets

The information in this section pertains only to large magnets at UTA 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. Credit cards and watches may also be adversely effected.

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.

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 it is 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 or food preparation only.
Microwave ovens should only be repaired by trained personnel.