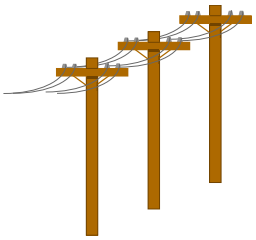



UCI NON-IONIZING RADIATION SAFETY PROGRAM

A. Scope of the Program

Sources of **non-ionizing radiation *(NIR)*** are used on the UCI campus for numerous applications in a many fields of research, including medicine, biological sciences, engineering, chemistry, and physics. In addition, several forms of NIR are commonly utilized in telecommunication and data transfer applications, and some forms are encountered by everyone during normal daily activities. NIR sources include *microwave antennas, microwave ovens, ultraviolet lamps, high intensity magnets, mobile/cellular phones, and alternating current electromagnetic field sources such as electrical power lines, transformers, electrical panels, and electrical appliances (like computers).* While the use of sources of non-ionizing radiation is not without risks, safe use is readily achievable if appropriate safety precautions are taken and adequate safety controls are in place.

The goal of the **UCI Non-ionizing Radiation Safety Program** is to provide reasonable and adequate guidance for the safe use of NIR sources by all personnel who can be impacted by them on campus; this includes faculty, staff, students, visitors, and the general public. The scope of the program includes:

a) Providing written information dealing with the recognition, evaluation and control of the hazards associated with sources of NIR;
b) Consulting with NIR users regarding source-appropriate safety principles;
c) Surveying NIR operations/installations when indicated;
d) Approving plans for new sources of NIR, such as high-intensity magnets and microwave antennas *(not for microwave ovens).*

☞ ***Note: Lasers, which also produce non-ionizing radiation, are covered in the Laser Safety Program document, not in this one.***

B. Definitions

Useful NIR safety terminology is presented below:

[Note: The word "frequency" refers to the rate of oscillations of the electric and magnetic fields that constitute the NIR wave forms. The frequency is expressed in terms of cycles per sec, with 1 cycle per second = 1 Hertz (Hz); 1 million Hz = 1 megahertz = 1 MHz)]:

Cellular Phone
A mobile telephone that emits a relatively low level of radiofrequency radiation at about 800 - 900 MHz for older cellular phone service, and between 1850 and 2000 MHz for newer Personal Communications Service (PCS) systems.

Electric Power Frequency
The frequency of the electric power which is delivered to our homes, offices, labs, etc., by electric power generating companies. These 60 Hz fields are present adjacent to all appliances connected to electrical power lines, including computers, heaters, television sets, blenders, shavers, hair dryers, etc.

Health Effects of NIR
The health effects produced by NIR are normally caused by tissue heating or photochemical phenomena. The target organs related to NIR exposure are often the eyes and skin. *[Ionizing radiation causes different – generally far more serious - health effects and can impact the entire body, including the bone marrow, gastrointestinal tract, and nervous system.]*

Infrared Radiation
Radiation with frequencies just below those in the visible light spectrum. Infrared radiation is often perceived as heat.

Magnetic Field
An energy field that exists near a magnet or an electric current-carrying structure (like an electrical wire). The high magnetic fields that exist around medical magnetic resonance imaging (MRI) scanners and nuclear magnetic resonance (NMR) systems are static fields, meaning they do not vary with time (frequency = 0 Hz).

Microwave Antenna
An antenna which emits microwave energy primarily for communications and data transfer purposes. Many such antennas are so-called dish antennas. Other antennas are rectangular, etc.

Microwave Oven
An oven that use microwave radiation at 2450 MHz to heat food and other materials.

Microwave Radiation
Short wavelength radiofrequency radiation. The frequency range is about 300 MHz to 300 GHz. [1 GHz = 1 billion Hz.]

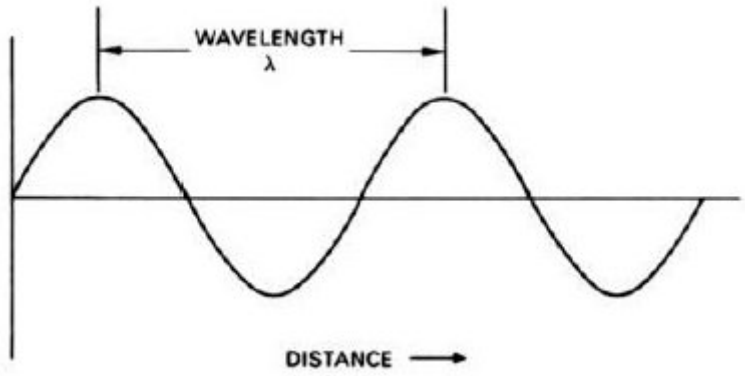
Non-ionizing Radiation
Radiation which is not of sufficient energy to dislodge electrons from atoms. Non-ionizing forms of radiation can produce atomic and molecular excitation.

Optical Radiation
A collective category which includes infrared, visible and ultraviolet radiation.

Radiofrequency Radiation
Loosely defined as radiation in the frequency band between 0.3 MHz and 300 MHz. Uses include radars, television signals, and industrial applications.

Ultraviolet Radiation
Radiation with frequencies just above those in the visible light spectrum. Ultraviolet radiation can cause photochemical effects such as sunburn and cataracts (clouding of the lenses of the eye.

Wavelength (λ)
The distance between two successive points in an electromagnetic wave which have the same phase.



C. Responsibilities

1. *EH&S Personnel*

The **UCI Radiation Safety Officer (RSO)** has oversight responsibility for the administration of the NIR Safety Program on the UCI campus, and to ensure that all hazards related to the use of NIR sources are adequately controlled.

The **RSO** supervises the **NIR Safety Officer (NIRSO)**, who is an EH&S Health Physicist who has the background needed to properly address NIR safety issues on the UCI campus. The NIRSO provides consultative services related to the recognition, evaluation and control of NIR hazards, and establishes and maintains appropriate NIR rules and guidelines for the UCI campus.

The **NIRSO**, in conjunction with the Principal Investigator (PI) for each NIR installation, ascertains whether warning devices (signs, alarms, etc.) are necessary, and assists in the determination of the type of radiation safety control measures that should be used.

All major NIR equipment purchase requisitions *(except for those for microwave ovens)* and related construction plans are reviewed by the NIRSO to ensure proper hazard control.

Real or suspected accidents resulting from NIR operations on the UCI campus are investigated by the NIRSO, and appropriate corrective actions are taken.

2. *Principal Investigator (PI) of NIR Facility*

It is the responsibility of the PI, in consultation with the NIRSO, to provide for adequate instructions on the proper use of his/her NIR systems to all personnel who work with them under his/her supervision.

The PI must not permit the operation of a NIR system unless there is adequate control of hazards for employees, visitors, students and the general public.

Only the PI, or his/her designated representative, may authorize the use of a NIR system for which he/she is responsible.

In the event that deficiencies in hazard controls are identified by the NIRSO during a safety evaluation, the PI must take appropriate corrective actions immediately.

When the PI knows of or suspects an accident resulting from the use of a NIR system operated under his/her supervision has occurred, EH&S must be notified immediately! If necessary, assistance will be given in obtaining appropriate medical attention for the individual involved in the accident.

The PI must not permit the modification of a NIR system to be made which may result in an additional hazard, nor will he/she give permission to energize a new system, without ensuring that all necessary and appropriate control measures are in place.

The PI ensures that all maintenance and repair work is only performed by qualified, trained individuals in a safe manner.

3. *NIR System Operators, and Others Working Them*

A person is not to energize a NIR system, or work with or near one, unless authorization has been given by the PI of the facility, or his/her designated representative.

All persons must be adequately trained regarding, and comply with appropriate safety requirements and procedures, and the rules prescribed by the PI.

When a person knows or suspects that an accident has occurred involving a NIR system operated by himself/herself or other persons responsible to the PI, that person must immediately inform the PI, and if the PI is not available, the person is to notify the NIRSO.

D. Program Components

The major elements of the UCI NIR Safety Program are listed below, together with link to related NIR safety documents:

a) Providing information dealing with the recognition, evaluation and control of the hazards associated with sources of NIR, including information in the following documents/factsheets that can be found on the EH&S website (http://www.ehs.uci.edu/radsafe.html).

- *Mobile Phone Safety*
- *Are Cellular Phone Base Stations Safe?*
- *Ultraviolet Lamp Safety*
- *Static Magnetic Field Safety*
- *Electric Power Frequency (60 Hz) EMFs*

b) Users of NIR systems are generally trained by experienced personnel in their research groups, but EH&S assists as needed.

c) EH&S inspects all potentially-hazardous NIR operations on campus, as needed.

E. Reporting Requirements

The UCI NIRSO must be notified whenever a potentially hazardous NIR source is brought onto campus, unless it is purchased through UCI Procurement Services, in which case the NIRSO is notified when the order is placed and needs to approve each such purchase.

If a NIR system is modified such that the hazards attendant to its use are substantially increased, the NIRSO needs to be notified in order to ensure that enhanced safety controls are in place before the system is operated.

If a person knows or suspects that he/she has been injured by a NIR system, the NIRSO must be notified as soon as possible.

If somebody is observed to be operating a laser in an irresponsible manner, the LSO needs to be notified immediately.

F. Information

For information on NIR safety, contact:

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