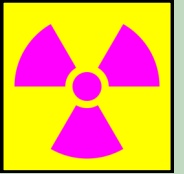




# RADIATION SAFETY INFORMATION FOR NON-RADIATION WORKERS



**Ionizing Radiation is identified with a universal radiation warning symbol called the Trefoil.  
Official radiation symbols are colored magenta & yellow, or black & yellow.**



The U. S. Nuclear Regulatory Commission (NRC) has granted MSU permission to use radiation. The Office of Environmental Health & Safety (EHS) is responsible for radiation safety at MSU. EHS also administrates MSU's license with the NRC. Any problems, concerns or questions on radiation safety issues should be directed to EHS. Radioactive materials and instruments are important tools used in research and medicine. As a worker supporting operations at Michigan State University, you may need to enter or be near areas that use radiation or radioactive material. This document identifies and explains ionizing radiation's use, locations and risks at Michigan State University. Additional information on these topics can be found on the EHS website at [ehs.msu.edu](http://ehs.msu.edu)

## Security

Security is the **Top Focus** of all regulators. Federal law requires that regulated material must be under the licensee's constant control and surveillance; or otherwise be locked and secured to prevent tampering or removal. This means that radioactive materials in storage or unattended must be kept in locked containers or in areas that are not readily accessible to unauthorized individuals. All areas labeled as a Radiation Area must be locked when not in use. MSU community members should seek an authorized individual or EHS for assistance with radiation restricted areas, or anytime any unusual activity is observed regarding objects or spaces marked with the radiation symbol.

## Contact EHS when

Contact your supervisor & EHS if any of the following occur:

- Radioactivity has been released, might have been released or has been lost
- Radioactive labeled material is found in normal trash or in public areas
- If you have contaminated yourself with radioactive material
- If there is any emergency involving ionizing radiation.

## EMERGENCY NUMBERS

### During Work Hours:

Call EHS: 517-355-0153

### After Work Hours:

Call Police: 911

## NEVER LEAVE A MESSAGE

## Office of Environmental Health & Safety

4000 Collins Road, B20  
Lansing, MI 48910

Phone: 517-355-0153  
FAX: 517-353-4871  
Email: [ehs@msu.edu](mailto:ehs@msu.edu)  
Web: [ehs.msu.edu](http://ehs.msu.edu)

## Points to remember

- Stay away from situations where radiation work is in progress, material has been spilled, or warning signs or barriers are in place.
- Emergencies involving personal injury take priority over radiation concerns. Human life saving efforts always take priority.
- Don't hesitate to contact EHS with questions, all calls are welcome.

## Radiation Areas at MSU

Ionizing radiation sources are used in many places throughout MSU. They are restricted to well defined and labeled areas, and are only to be handled by trained personnel. If you have additional questions about the areas listed below, contact EHS.

The most common types of radiation areas on campus are research laboratories, and medical treatment areas for humans, and medical treatment areas for animals. Members of the public might enter some of these areas without special training. The potential for a measurable radiation dose in these areas is low. Within these areas radioactive material can be found in:

**Storage areas:** Concentrated solid and liquid material typically stored in small volumes

**Waste areas:** Diluted solid and liquid material typically stored in larger volumes

**Work areas:** Variable amounts and volumes; this is where radioactive material is handled

**X-ray machines:** Used in research and medical procedures for humans and animals. They can be found in research buildings and medical facilities throughout MSU.

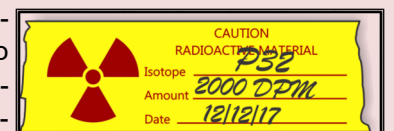
## Radiation Warning Signs

Ionizing radiation's presence is identified by specific labels and signs. Shown below are some example labels. Labels include units and terms that describe the relative hazard degree. Labels will be found on objects, containers, devices, & doors. All labels should be heeded and assumed to be accurate at all times.



Left is a label used to notify persons of the presence of radioactive material. It is used to label rooms, work areas, storage areas and equipment. There are no special radiation risks present, other than the likely presence of radiation.

Right is a common label used to indicate the presence of radioactive material.



They can be found on equipment, stock solutions and contaminated areas. Activity units in **DPM**, **mCi**, **µCi** or **Bq** will appear on this label. Avoid contact with items and work areas with this label.



Left, and below are radiation area warning signs. Areas where high radiation exposures may occur are marked by labels like these. Warnings may state "Hazard" or "Danger".

The ionizing radiation dose units **R**, **mR**, **REM** and **mREM**, are associated with these signs. Do not enter these areas without authorization.



## Ionizing Radiation...

- can be particles or pure energy
- can have enough energy to penetrate through the human body or have so little energy that it is stopped by a sheet of paper
- can cause chemical changes in matter
- moves out from a source in all directions, becoming weaker with distance
- from radioactive decay, is from the transformation of an atom of one element into an atom of another element.
- cannot be felt or seen, but can be detected with the proper instruments.
- radiates from natural sources, which are all around us and in our bodies

## Radiation Dose

Radiation dose is the energy absorbed during exposure to ionizing radiation. Radiation dose is measured in a unit called the REM. The REM is a special unit of dose that represents the effects of radiation on humans. The NRC has set limits on the amount dose an individual can receive. Some dose effects and limits are listed below.

Radiation Dose	Significance
1000 REM	Lethal dose for any person
100 REM	Mild radiation sickness
10 REM	No detectible physical effects
<0.30 REM/Yr	Michigan's background dose
<0.02 REM/Yr	A MSU rad worker's avg. dose

## Avoiding Radiation Dose

Follow these guidelines to minimize the chance for a radiation dose:

- Identify yourself to lab workers
- **Do not enter** radiation labeled areas alone
- Ask questions about work areas
- **Do not touch** radioactive labeled items
- **Do not touch** any items if not necessary
- Do not try to clean work areas
- Follow instructions during an incident
- Call EHS for information and instructions