Hazard Communication

Right to Know
OSHA 29 CFR 1910.1200
COMAR 09.12.33

You have a Right to Know about the hazards that you might encounter on the job.

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Hazard Communication

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Introduction

The University of Maryland Center for Environmental Science (UMCES) recognizes the responsibility of protecting the safety and welfare of our campus communities and visitors. **Hazard Communication (HC)** is also termed the Employee **Right to Know Law (RTK)**. You have a Right to Know about the hazards that you might encounter on the job. Employees who work with or around hazardous material must have some knowledge of the materials and have a right to understand how the materials can hurt them and how to protect themselves from such harm. Hazard Communication is a requirement of State and Federal laws:

- Occupational Safety and Health Administration (OSHA) regulation
  - 29 CFR 1910.1200
- Maryland regulations
  - COMAR 09.12.33 and
  - Title 5, Subtitle 4, §5-401 thru 410 of the Annotated Code of Maryland – Labor and Employment Article (Access to Information about Hazardous and Toxic Substances).

In order to ensure chemical safety in the workplace, information about the identities and hazards of the chemicals must be available and understandable to all workers. Everyone including the business personnel and others who do not work with chemicals still need to know how to work safely around the hazardous materials others use on campus. For instance, you may need to ask a question of someone working in a laboratory that uses hazardous materials. You need to recognize the hazards in that laboratory to avoid injury or to identify the material if there is a spill. How does this affect you?

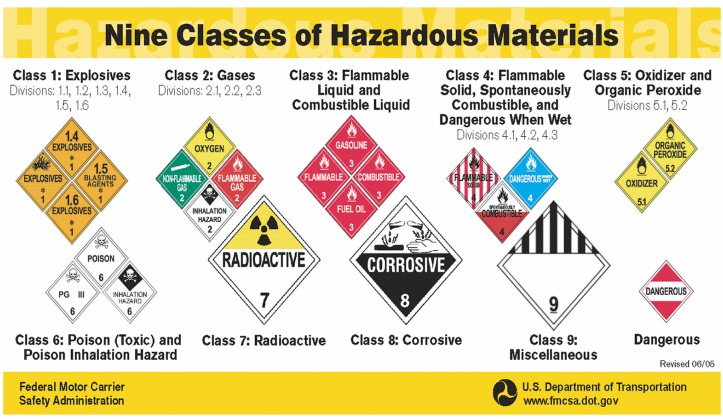
Although the Hazard Communication Standard applies mainly to employers, hazard communication is not effective unless you also do your part in working safely around these materials. As an employee, you must be able to identify the possible hazards of a chemical. Do not wait until you have been exposed to find out that you have put yourself in danger. Always follow instructions and warnings about how to use hazardous materials safely whether at work or at home. These instructions are found on labels, Safety Data Sheets (SDSs), and verbal instructions you may receive. To view a Safety Data Sheet for any chemical go to: https://login.ehs.com/ and login with ID: **SViewer** and your Password is **UMCESchemicals$2**. All the safety information in the world will not help protect you if you do not listen, pay attention, or understand the information you are given. Remember, you should never hesitate to ask questions so that you clearly understand what it takes to protect yourself from hazards of potentially dangerous materials.

What is a Hazardous Material?

So, what is a hazardous material? DOT Definition of Hazardous Material: "Any substance which may pose an unreasonable risk to health and safety of operating or emergency personnel, the public, and/or the environment if not properly controlled during handling, storage, manufacture, processing, packaging, use, disposal, or transportation". Hazardous materials are grouped into classes, based on: the hazards they present; and the safety precautions needed when working with them.

There are nine classes of hazardous materials.

Class 1	Explosives
Class 2	Compressed Gases
Class 3	Flammable Liquids
Class 4	Flammable solids
Class 5	Oxidizing Materials



Class 6	Poisonous Materials
Class 7	Radioactive Materials
Class 8	Corrosives
Class 9	Miscellaneous

A combination of these different classes of materials can be found in laboratory refrigerators, freezers, cabinets, bench tops, maintenance shops, housekeeping closets and storage areas, and even in the business offices. Never eat or store your lunch and snacks in areas where hazardous materials are used or stored (laboratories, maintenance shops, or storage areas containing hazardous materials). Surfaces, appliances, machines and equipment in these areas have all had hazardous materials in or on them at some time and you do not want to contaminate what you will be eating.

Do not throw food wrappers or containers in the laboratory trashcans – this State and Federal regulation and could incur a fine if OSHA were to visit. No food/beverage or their containers should ever be found in the lab or lab trashcans. Why? Because if food and beverage containers and wrappers appear in a lab or lab trashcan you cannot prove you did not consume that product in the lab. You may have casually tossed it there as you passed by. However, you cannot prove that to the inspectors! Keep the labs free of consumables.

RISKS

No matter where you look these days, a myriad of products are considered health and/or safety risks. A risk is the likelihood that exposure to a hazard will result in injury, disease or other loss. There are two components of risk – likelihood (probability) that an incident will occur, and the consequences (outcomes or severity) of the incident. The combination of these factors constitute 'risk'. Hazardous materials are any product that could potentially harm the environment, animals or humans. Knowing how to minimize your risk keeps everyone safer.

HAZARDS

There are two types of harmful hazardous materials:

- those that cause **health hazards** and
- those that cause **physical hazards** or **both**.

Health Hazards

A "health hazard" is a product for which there is statistically significant evidence that acute or chronic health effects may occur in exposed employees. The goal of defining precisely, in measurable terms, every possible health effect that may occur in the workplace because of chemical exposures cannot realistically be accomplished. This does not negate the need for employees to be informed of such effects and protected from them.

Health hazards, depending on the exposure, may cause significant changes in the body. These changes are indicated by the occurrence of signs and symptoms in the over-exposed person, such as shortness of breath, skin irritant, headache, feeling ill, or getting cancer. The determination of occupational health hazards is complicated by the fact that many of the effects or signs and symptoms occur commonly in non-occupationally exposed populations, so that effects of exposure are difficult to separate from normally occurring illnesses. Not all people are affected to the same degree by the same material. Each individual has different levels of susceptibility depending on a variety of factors including age, inherited characteristics (relating to body chemistry and metabolism), weight, general health, and etcetera. Any material that meets any of the following definitions is considered health hazards. However, this is not

intended to be an exclusive categorization.

- **Carcinogens** and **Suspected Carcinogens**
  - These chemicals are linked to cancer.
- **Toxic** or **highly toxic** materials:
  - Have the potential to disrupt physical processes such as breathing, coordination, and other bodily functions.
  - Can cause illness, organ damage, and possible death.
  - Toxic materials include pesticides, cleaners, solvents, gases, and polymers.
- **Corrosives and Irritants:**
  - **Corrosives** can cause serious, even permanent damage to any part of the body coming into contact with the material
  - Acids are corrosive and are in the labs, dyes, paints, petroleum processing, and automobile batteries.
  - Bases are also corrosive, such as sodium hydroxide and other chemicals, detergents, water treatment chemicals.
  - Corrosive material in contact with your skin can cause redness, swelling, blisters, and severe burns.
  - Eye contact can result in permanent eye damage, even blindness
  - Swallowing corrosives can result in extreme pain, severe internal injuries, and even death.
  - Inhaling corrosives can seriously damage the tissues of the nose, mouth, throat, and lungs.
  - **Irritants** are often diluted forms of corrosive substances.
  - Irritants generally cause only minor, temporary inflammation or swelling at the point of contact.
- **Sensitizers** cause an allergic reaction in normal tissue after repeated exposure to the chemical.

Health Effects

There have been many attempts to categorize health effects and to define them in various ways. The terms "acute" and "chronic" delineate between effects based on severity or duration.

- "**Acute**" effects occur rapidly because of short-term exposures, and may be of short duration. The acute effects referred to most often are irritation, corrosion, sensitization, narcosis (light-headedness) and death.
- "**Delayed effects**" appear hours after exposure. Delayed pain and irreversible damage begins before you are aware of it. Delayed effects may begin from the slow onset of disease after exposure.
- "**Chronic**" effects generally occur because of long-term exposure, and may be of long duration. The term chronic effects covers **carcinogenesis** (cancer**), teratogenesis**, (effects on the unborn) and **mutagenesis** (chromosomal damage).

Toxicology

The science of toxicology is based on the principle that there is a relationship between a toxic reaction (the *response*) and the amount of poison received (the *dose*). Knowing the dose/response relationship is a necessary part of understanding the cause and effect relationship between exposure and illness. "*The right dose differentiates a poison from a remedy".* **The right dose of medicine is good but if taken in excess it becomes a poison.**

The more toxic a material is, the smaller the dose necessary to be absorbed before harmful effects occur. The lower the toxicity, the greater the quantity is needed for it to be absorbed

and be harmful. The danger, or risk of adverse effects of chemicals, is determined by how they are used, not by the inherent toxicity of the chemical itself.

PHYSICAL HAZARDS

Physical hazard means a material that poses one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas. Some chemicals have both health and physical hazards associated with them. Physical hazards are the most common and will be present in most workplaces at one time or another.

Flammables and Combustibles include gasoline, kerosene, acetylene, and toluene.

- **"Flashpoint"** is the key in determining whether a chemical is flammable or combustible. This is the temperature at which the chemical releases vapors that can burn. It is not the liquid that burns, but the vapor.
  - Liquids that have a flashpoint of less than 100°F are flammable.
  - Liquids that have a flashpoint between 100°F and 200°F are combustibles. Combustibles are easier to control because they must be heated before they will produce burnable vapors.

Explosive material causes a sudden almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

Compressed gas

- Causes asphyxiation, fire, explosions, and can penetrate the skin like a needle injection.

Oxidizers

- Bring about an oxidation reaction causing a fire of itself or through the release of oxygen or other gases.

Pyrophoric materials

- Ignite spontaneously in air at 130^0F or below without an ignition source.

Reactive chemicals

- Cause damage by the release of gases that will burn, explode, or produce high pressure that can cause injury to a person. Organic peroxides, unstable materials, and water reactive materials are examples of reactive chemicals.

Exposure Limits

To guard against both acute and chronic health effects, scientists have identified exposure limits for different kinds of materials.

- The **PEL**, or Permissible Exposure Limit, is the quantity of hazardous chemical that an average employee can safely be exposed to in an 8-hour workday without ill effects.
- Short-term exposure limit (**STEL**) is the maximum concentration to which workers can be exposed to a hazardous materials or agent for a short period of time (15 minutes) four times throughout the eight-hour day, with at least one hour between exposures.
- Concentrations of hazardous materials in the environment are expressed as parts per million (**ppm**) and parts per billion (**ppb**). Government tolerance limits for various poisons usually use these abbreviations.

Routes of Entry

In order for a chemical to become hazardous to a person's health, it must first contact or enter the body and the chemical must have some biological effect on the body. There are four major routes of entry:

- **Inhalation** (breathing)
  Breathing of contaminated air (fumes, dusts, mists, vapors) is the most common way that workplace chemicals enter the body.
- **Absorption** (skin/eye contact)
  Some hazardous materials, when contacted, can be absorbed through the skin into the blood stream, especially organic solvents, materials dissolved in the solvents, acids, and bases. The eyes may also be a route of entry.
- **Ingestion** (eating)
  Less commonly, workplace hazardous materials may be swallowed accidentally if food, Chap Stick, lipstick, gum, your hands, or cigarettes are contaminated. For this reason, workers should not drink, eat, or smoke, chew gum, or apply Chap Stick or lipstick in areas where they may be exposed to toxic chemicals. **Never eat or store your lunch and snacks in the lab**. Laboratory surfaces and appliances have all had hazardous materials in or on them at some time and you do not want to contaminate what you will be eating. **Do not throw food wrappers or containers in the laboratory trashcans** – this State and Federal regulation and could incur a fine if OSHA were to visit. ***Do Not*** dispose of food/beverage containers in the lab trash cans.
- **Injection**
  Injection is the fourth way hazardous materials may enter the body. While uncommon in most workplaces, it can occur when a sharp object (e.g., needle, shard of glass or a stream of high-pressure gas) punctures the skin and "injects" a chemical or biohazard directly into the bloodstream. For example: If a beaker contains a chemical solution and it breaks and a piece of the glass gets injected into your foot, hand, etc. it will inject the chemical that is adhered to the piece of glass.

Once a hazardous material enters the body the blood stream distributes it throughout your body. In this way, the chemicals can attack and harm organs which are far away from the original point of entry as well as where they entered the body.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

When adequate engineering controls (i.e. fume hoods) and administrative hazard controls are not technically, operationally, or financially feasible, personal protective equipment is used as a supplement. "**Personal protective equipment**" **(PPE**) includes a wide variety of items worn by an individual to isolate the person from chemical hazards. PPE includes articles to protect the eyes, skin, and the respiratory tract (e.g. goggles, face shields, coats, aprons, gloves, shoes, and respirators). PPE does not eliminate hazards but merely minimizes damage from hazards. The effectiveness of PPE is highly dependent on the user. Each type of PPE has specific applications, advantages, limitations, and potential problems associated with their misuse. PPE must match the hazards and the conditions of use and be properly maintained in order to be effective. Those using PPE must be fully knowledgeable of these considerations. Their misuse may directly or indirectly contribute to the hazard or create a new hazard. The material of construction must be resistant with the chemical's hazards and must maximize protection, dexterity, and comfort. Employers must provide appropriate personal protective equipment (PPE) for employees. Although you do not "work" in the labs be aware that when you enter a lab to be conscious of the hazards (note the signage on the lab door) and you may be asked to wear PPE when you enter certain labs.

GLOBAL HARMONIZATION STANDARD (GHS)

The Hazard Communication Standard (HCS)/Right to Know (RTK) is aligned with the **Globally Harmonized System of Classification and Labeling of Chemicals (GHS).** OSHA's Hazard Communication standard is a UN approved universal communication system for the handling of potentially hazardous materials. GHS replaces the various classification and labeling standards used in different countries by using consistent criteria for classification and labeling on a global level. This update to the Hazard Communication Standard provides a common and coherent approach to classifying chemicals and communicating hazard information on labels and **Safety Data Sheets (SDS**s). Manufacturers and distributors have had to reclassify their chemicals and produce GHS-formatted Safety Data Sheets (SDSs) and labels for their products. Employers must be fully compliant with OSHA's adoption of GHS.

Labels

There will be six important components to all GHS labels:

1. Product Identifier	**Sulfuric Acid**
2. Pictogram(s)	
3. Signal Words	**Danger**
4. Hazard Statement	Causes severe skin burns and eye damage. Fatal if inhaled, harmful to aquatic life
5. Precautionary Statement	Do Not breathe dust/fume/gas/vapors/sprays Wear protective gloves, cloths, eye, and face protection
6. Supplier Information	Sigma Aldrich, Any town USA, 46414, Phone: 218-777-6666, Fax: 1-800-889-9999

SIGNAGE

- Hazard warning signs are posted at the entrance(s) to each laboratory or other areas that utilize hazardous materials.
- This signage fulfills regulatory signage requirements as well as alert everyone to specific hazards located in individual laboratories.
- It also gives emergency contact information for the Principal Investigator, laboratory safety, radiation safety, and a number for after hour facility maintenance.
- **Please note the signage prior to entering a lab so you are aware of the dangers present.**
- Only enter initially if you are accompanied by one of the scientists.

CAUTION

Flammable

Corrosive

Health Hazard

Toxic

Aquatic Toxicity

Irritant

Oxidizer

ADMITTANCE TO AUTHORIZED PERSONNEL ONLY

CONTACT	NAME	OFFICE LOCATION	WORK EXT.	AFTER HOURS PHONE
FOR ENTRY OR ADVICE	PI of the lab			
IN EMERGENCY	PI/Safety Officer			
Maintenance: X 8334	After Hours: 410-221-8300	Safety Officer:	After Hours:	

GHS Pictograms and Hazards

GHS chemical hazard pictograms provide the basis for national systems of hazard pictograms. Please note the door signage and labels of hazardous materials prior to entry. This reminds you to be aware of your surroundings and recognize the hazards specific to that laboratory. Know what the pictograms represent.

CMR (carcinogenicity, mutagenicity and toxicity for reproduction) Specific Target Organ Toxicity (STOT)

GHS SAFETY DATA SHEETS (SDSs)

The Safety Data Sheet or SDS provides comprehensive information about the product that allows employers and workers to obtain concise, relevant and accurate information that is put in perspective with regard to the hazards, uses and risk management of the product in the workplace. Manufacturers are required to supply an SDS for all hazardous materials they produce. This includes housekeeping supplies, office supplies, and chemical supplies. The SDS contains 16 sections. While there were some differences in existing industry recommendations, and requirements of countries, there was widespread agreement on a 16 section SDS that includes the following headings in the order specified:

1. Identification of the substance or mixture and of the supplier
2. Hazards identification
3. Composition/information on ingredients
4. First aid measures
5. Firefighting measures
6. Accidental release measures
7. Handling and storage
8. Exposure controls/personal protection
9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological information
13. Disposal considerations
14. Transport information
15. Regulatory information
16. Other information including information on preparation and revision of the SDS

EMERGENCY PROCEDURES

Knowing proper emergency procedures is another important part of hazardous material safety. Check your UMCES Safety websites for specific instructions and information. Having read the SDS for the hazardous materials you work with can help your respond appropriately in case you or a co-worker becomes overexposed. For emergencies, including fires, accidents, explosions, and medical emergencies, dial 911.

Medical Emergencies

Take the SDS of the chemical that caused the injury to the Emergency Room if possible. Know where spill kits, eyewash stations, emergency showers, and first aid kits are located for your work area. Emergency procedures may include:

- Flushing eyes with water for 15 minutes in case of chemical contact
- Washing skin with soap and water, and removing contaminated clothing
- Moving to fresh air if a person has been inhaling hazardous dust, fumes, or vapors
- Getting emergency medical assistance if a person has swallowed a hazardous chemical. There are no general first aid measures for swallowing – vomiting may cause more harm, diluting with water or milk may increase the risk. Call **911** or the Poison Hotline (**1-800-222-1222**) and have the appropriate SDS available.

Chemicals on Skin or Clothing

- Flush with water for no less than 15 minutes. For larger contamination, the safety shower is used. Do not waste time because of modesty. Remove all contaminated clothing or jewelry.
- Solvents such as paints, varnishes, lacquers, adhesives, glues, and degreasing/cleaning agents are capable of dissolving or dispersing one or more other substances dissolved in them. **Do not** use solvents to wash skin. Solvents remove the natural protective oils from the skin and can cause irritation and inflammation of the skin in addition to increasing the absorption of the toxic material dissolved in it.
- For flammable solids on skin, first brush off as much as possible, then flush with water for at least 15 minutes. Read the SDS and make sure the flammable solid is not reactive with water before you rinse.
- In all cases of severe contamination, seek medical attention.

Inhalation

- Close containers, move to fresh air.
- If symptoms such as headaches, nose or throat irritation, dizziness, or drowsiness persist, seek medical attention. Explain what chemicals you were using and if possible take the appropriate SDS with you.

Ingestion

- Call 911 or the Poison Control Center (1-800-222-1222).
- **Do not induce vomiting** unless directed to do so by a health care provider.

Injection

- Wash area with soap and water and seek medical attention, if necessary.

Spills

If you accidently cause a spill when no one is in the laboratory, contact the PI of that lab or your Safety Officer immediately. If you can see the name of the material without touching, the container let the PI/Safety Officer know the name of the material. Leave the lab, close the door and wait outside the door until help arrives. **Do not** attempt to clean up a spill if you do not know what the material is or the precautions required to clean it up safely.

Fires

Individuals are not required to fight fires, but those who choose to do so may fight small, incipient fires (no bigger than a wastepaper basket) as long as they have been trained in the proper use of fire extinguishers. Fight the fire from a positon where you can escape and only if you are confident that you will be successful. If the fire is large or spreading, activate the fire alarm. Evacuate the building, help those who may need assistance, and wait for the fire department's arrival to inform them of the exact location, details of the fire, and chemicals that are stored and used in the area.

RADIATION SAFETY

Another occupational hazard present at UMCES is **radioactive materials (RAM)**. Radiation is not usually associated with chemicals but it can cause serious damage to the body's cells and tissues. Radioactive materials are powerful research tools in biological and physical research. Strict exposure limits apply. Because of controls, the risk of work involving exposure to these sources of radiation is insignificant. No one may use, bring, purchase, or remove any radioactive material or radiation producing devices without the approval of the Radiation Safety Officer and the Radiation Safety Committee at UMCP. All radioactive materials and instruments containing radioactive sources are purchased through UMCP. Contact UMCES' Assistant Radiation Safety Officer for more information.

UMCES works under the Broad Scope Radioactive Material License held by University of Maryland College Park (UMCP). Maryland is an "Agreement State". This means that Maryland has signed a formal agreement with the U. S. Nuclear Regulatory Commission (NRC) pursuant to Section 274 of the Atomic Energy Act authorizing the State of Maryland to regulate certain uses of radioactive materials within the *State*. This license is monitored and strictly audited by Maryland Department of the Environment.

Restricted Area

The Code of Maryland Regulations classifies any laboratory that stores or uses radioactive material or radiation producing devices as a "restricted area" (COMAR) 26.12.01.01. A pre-requisite of entering that area requires that you be informed of the hazards involved. These areas (labs) labeled with the radiation symbols, which are on the outside of the door to the lab.

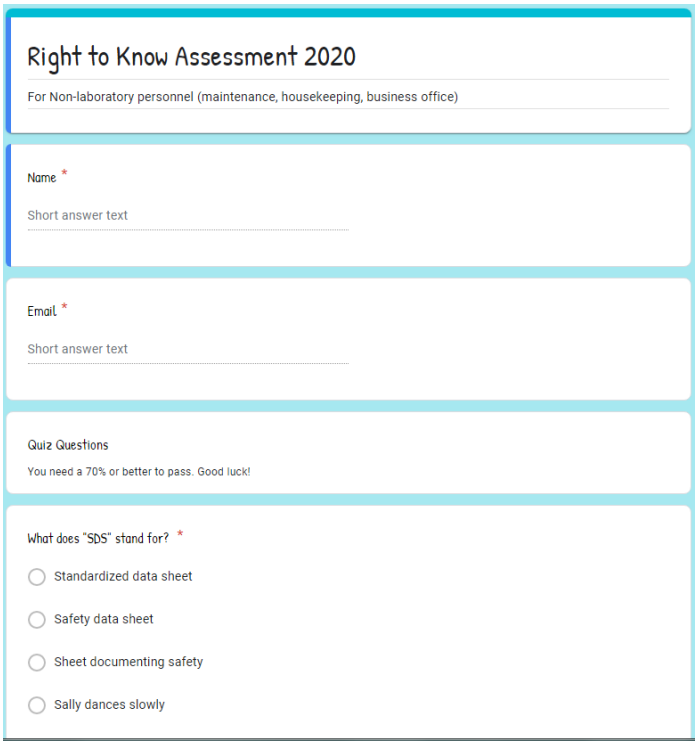
If a pregnant employee encounters a restricted area in the course of designated work, it is her duty to make a declaration of her pregnancy to her supervisor and the Safety Officer/Assistant Radiation Safety Officer. Following her declaration, she will be monitored with the proper dosimetry during the course of pregnancy to ensure that her exposure does not exceed 10% (0.5rem) of that normally allowed for adult workers (5rem). This declaration is optional to and dependent on the individual to provide notification.

ALARA Policy

At all times, the amount of radiation received by an individual is to be kept -- **A**s **L**ow **A**s **R**easonably **A**chievable (**ALARA**). Qualifications of each applicant are reviewed by the Radiation Safety Committee (RSC) to ensure that they have the required formal training, on the job training, history of past use of radioactive material, etc. All protocols are reviewed and approved by the RSC and the RSO prior to use. Personnel using radioactive material are trained in ALARA techniques (time, distance, and shielding). Users of radioactive material keep logs that record any contamination and the immediate measures to remove any contamination after doing an experiment or, monthly whichever comes first. In addition, the Assistant Radiation Safety Officer checks these records on a monthly basis and does a wipe survey quarterly for each laboratory with open sources of radioactive material, UMCP Radiation Safety does an annual audit and Maryland Department of the Environment Radiation Section occasionally does

an unannounced inspection. During these audits/inspections, the licensee (user) must defend their results and methods of carrying out ALARA.

Radioactive material and radiation producing devices are labeled with the same Radioactive symbol that is on the door signage. When radioactive materials are not being actively used by a trained employee they must be secured behind a locked area (refrigerator, freezer, cabinet, or laboratory door). If you need to consult with someone in a laboratory that has radioactive materials or equipment present check with the Principal Investigator where and how the material is stored or if anyone is actively using radioactive material. If radioactive material/samples are not in a locked cabinet, refrigerator, or freezer the main door(s) to that laboratory must be locked at all times. Please make sure you close and lock the door behind you if/when you leave the laboratory. For additional information concerning radioactive material, contact UMCES' Environmental Safety Compliance Officer (umces-safety@umces.edu).


Right to Know Assessment 2020

For Non-laboratory personnel (maintenance, housekeeping, business office)

Name *

Short answer text

Email *

Short answer text

Quiz Questions

You need a 70% or better to pass. Good luck!

What does "SDS" stand for? *

- Standardized data sheet
- Safety data sheet
- Sheet documenting safety
- Sally dances slowly

Congratulations! You have now completed Right to Know/Hazard Communication training. Please click the link to the left.

It will direct you to a short quiz you <u>MUST</u> take.