



“Safety Comes First ”

Case Western Reserve Environmental Health and Safety

Service Building, 1st Floor

Phone: (216) 368-2906/2907

FAX: (216) 368-2236

Website: case.edu/ehs

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Fume Hood Safety Tutorial

Take a moment to visit the University of Memphis Office of Environmental Health and Safety’s website (<http://www.memphis.edu/ehs/training.php>) for a short online tutorial. This tutorial demonstrates the operation of the VAV fume hood exhaust systems with the phoenix monitor and zone presence sensor. The VAV (Variable Air Volume) fume hood maintains constant face velocity by adjusting the exhaust air flow as the sash position changes. If you have any additional questions or concerns, please contact EHS directly at 2906.

Radiation Exposure: How Much Is Too Much?

“A reasonable approach to monitoring your radiation exposure is to understand how radiation is measured and what those measurements might mean for you.”

Since the Japanese earthquake and subsequent problems with several reactors close to the city of Sendai, press reports of radiation leaks have been continually in the news. However, these press reports have done little to educate the general public on what an acceptable level of radiation exposure, how we are exposed to radiation from many sources (man-made and natural), and what we can do to reduce our exposure. This article addresses these three concerns:

What is an acceptable level of radiation exposure?

The first thing to note is that some scientists argue that there is no “acceptable” level of radiation exposure. The problem with this position is that long before the “nuclear age,” humans were exposed to radiation from multiple natural sources from the soil they tilled to the food they ate to the sun in the sky. In other words, avoiding any contact with radiation is simply not possible. A reasonable approach to monitoring your radiation exposure is to understand how radiation is measured and what those measurements might mean for you.

The first step is to determine what your estimated annual radiation dose level is. In order to do this, you must first understand how radiation is measured. According to the CDC, there are two measurements that are important to understanding how radiation exposure affects your body: the first measures your total radiation dose. When a person is exposed to radiation, energy is deposited in the tissues of the body. The amount of energy deposited per unit of weight of human tissue is called the absorbed dose. The absorbed dose is measured using the conventional unit *rad* or the System Internationale (SI) unit *Gy*. The rad, which stands for *radiation absorbed dose*, was the conventional unit of measurement, but it has been replaced by the Gy. One Gy is equal to 100 rad.

The second measurement measures your biological risk. A person's biological risk (that is, the risk that a person will suffer health effects from an exposure to radiation) is measured using the conventional unit *rem* or the SI unit *Sv*. To determine a person's biological risk, scientists have assigned a number to each type of ionizing radiation (alpha and beta particles, gamma rays, and x-rays) depending on that type's ability to transfer energy to the cells of the body. This number is known as the Quality Factor (Q). When a person is exposed to radiation, scientists can multiply the dose in *rad* by the quality factor for the type of radiation present and estimate a person's biological risk in rems. Thus, risk in *rem* = *rad* X Q. The *rem* has been replaced by the *Sv*. One *Sv* is equal to

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Radiation Exposure: How Much Is Too Much?

(continued from previous page) 100 rem.

The U.S. Nuclear Regulatory Commission (NRC) sets an acceptable level of radiation exposure from any one source at 100 millirem a year. In contrast, the average level of natural background radiation in the United States is about 350 millirem a year. (A chest X-ray, for further comparison, gives the equivalent to 1 or 2 millirem to the whole body.)

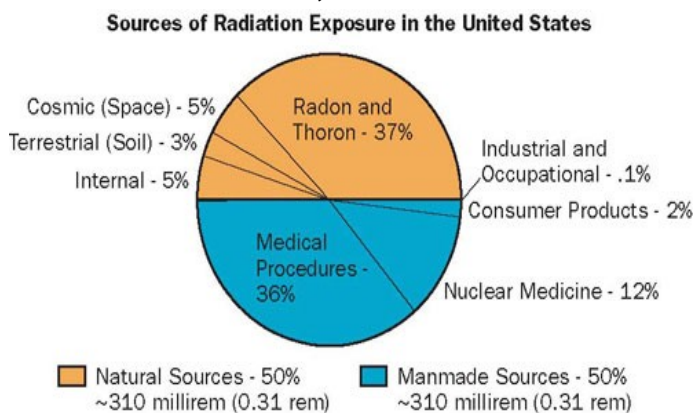
How are you exposed to radiation from sources, man-made and natural?

As you can see from the pie graph, most of the radiation the average person receives comes from a relatively even distribution of man-made and natural sources. For the typical person, *longitudinal exposure* comes from natural sources such as radon (see last month's article in our *EHS Newsletter*

on radon exposure) which is released naturally from the soil and can affect people who live in houses with basements that do not have proper ventilation and/or radon abatement systems. *Acute* or *periodic exposure* comes primarily from medical procedures. Certain types of imaging tests, such as x-rays, CT scans, and nuclear medicine tests (such as PET scans and bone scans) expose people to low levels of radiation in order to create internal pictures of the body. (MRI and ultrasound exams do not use ionizing radiation.) Minor sources of exposure include consumer products, sunlight (depends on location and length of time, of course), food like bananas with high levels of potassium, and yes, even your own body emits radiation as cells decay!

What can you do to reduce your exposure?

Again, while radiation exposure can never be fully avoided in your daily life, common sense approaches can reduce risks to your health. Avoid getting unnecessary medical exams, reduce your time in direct sunlight with protection, if you have a home with a basement, have it tested for radon and if radon levels are high, take appropriate measures to ventilate your basement. If you work in an environment on campus that exposes you to radiation, be sure to know the policies and procedures outlined in the EHS Radiation Safety Manual.



Source: NCRP Report No.160(2009)
Full report is available on the NCRP Web site at www.NCRPpublications.org.

“Certain types of imaging tests, such as x-rays, CT scans, and nuclear medicine tests (such as PET scans and bone scans) expose people to low levels of radiation...”



Inactive AU Status, Absence from Laboratory

“The RSOF has an AU classification of ‘Inactive AU’ status for laboratories that do not need to possess or use radioactive material (RAM) for the foreseeable future or in ‘Storage Mode’ for more than one year.”

Policy

The RSOF has an AU classification of ‘Inactive AU’ status for laboratories that do not need to possess or use radioactive material (RAM) for the foreseeable future or in ‘Storage Mode’ for more than one year. An inactive AU is relieved of the requirements to send in environmental release summary reports, complete laboratory contamination surveys, and adhere to the annual retraining policy

What do I need to do to become inactive?

1. Send a letter of intent to the RSOF. This can be either a fax or an email.
2. Follow the guidelines as stated in the Laboratory Decommissioning/ Laboratory Relocation section of this manual.
3. Return all personnel dosimeters to the RSOF

What if I want to become active again?

If you have been ‘Inactive’ for less than one year:

1. Send a letter to the RSOF requesting reactivation. This can be either a fax or an email.
2. Send updated room maps with survey locations, as well as an updated protocol to the RSOF.
3. Verify that survey meter instruments are within annual calibration.
4. Verify that radiation workers, ancillary radiation workers, and the AU were retrained within the past year.
5. Obtain required personnel dosimeters for radiation workers, ancillary radiation workers, and AU.
6. Replace all required postings and labels.

If you have been ‘inactive for more than one year:

1. Resubmit RAM application, for RSC Review.

What if I store isotopes in my laboratory, have not used them for an extended period of time, but still want to retain active AU status?

The AU may request that the laboratory or laboratories under his/her supervision be formally in ‘Storage Mode,’ meaning isotopes will be retained in storage but not used until the laboratory is reinstated to active-use mode. For periods of isotope use exceeding six calendar months, required AU survey frequency shall be reduced to once each six calendar months, starting on the date of declared

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Inactive AU Status, Absence from Laboratory (continued from page 4)

...non-use. A letter from the AU must be submitted to the RSOF to start this reduced survey frequency. This can be either a fax or an email. Resumption of isotope use shall not occur until and unless a letter to the RSOF reinstates regular survey frequency. "Storage Mode" lasting greater than one year will be reviewed to determine if they should go 'Inactive' or they intend to become 'Active' again.

What if I do not have isotopes in my laboratory, but still want to retain active AU status?

The AU should survey the laboratory monthly or decommission the laboratory for radioactive material (RAM) use. If the AU decides to use radioactive materials (RAM), contact the RSOF so the room can be posted with the appropriate signage and labels. The AU will be made 'Inactive' if no isotope is used or stored in the laboratory for more than six months.

What if I'm going to be absent from my laboratory?

If you are going to be absent from your laboratory for greater than five working days, designate another AU (not a technician) to assume responsibility for all radiation safety issues. Please contact the Assistant RSO indicating the date you are leaving, when you will be returning, as well as the AU that will be assuming responsibility for all radiation safety issues in your absence.

What if I am going on sabbatical?

If you are going on sabbatical, an individual must be designated to assume responsibility for all radiation safety issues in your absence. This individual must be another AU (not a technical) preferably within the same department. Please contact the Assistant RSO indicating the date you are going on sabbatical, when you will be returning, as well as the AU that will be assuming responsibility for all radiation safety issues in your absence.

"If you are going to be absent from your laboratory for greater than five working days, designate another AU (not a technician) to assume responsibility for all radiation safety issues."

Please remember: Our department is now known as Environmental Health and Safety (EHS). Our website is available at case.edu/ehs. Please change your links!

First Aid Reminders for Biological Hazards

“Always be aware of any special precautions and procedures required to mitigate toxic or infectious responses to materials in use, by reading and understanding the MSDS for these dangerous substances BEFORE starting any work with them.”

NOTE: Always be aware of any special precautions and procedures required to mitigate toxic or infectious responses to materials in use, by reading and understanding the MSDS for these dangerous substances **BEFORE** starting any work with them. In the event that a substance enters the mouth, eyes, lungs, or penetrates/comes in contact with the skin follow the instructions below and seek immediate medical attention.

1. Remove all contaminated clothing and place it in the biological safety cabinet.
2. Warn others of the biohazard.
3. Take a shower or rinse the exposed area with disinfectant.
4. Report the spill to the PI or Laboratory Manager. If an individual is injured during work:
 - a. Go to the University Hospital Emergency Room to obtain emergency care.
 - b. On-site emergency assistance can be obtained by dialing Protective Services at 368-3333.
 - c. Persons requiring immediate emergency care should seek it. Preparation of paperwork will be secondary to obtaining prompt medical attention.
5. Post accident serum samples for diagnosis of possible laboratory acquired infection will be coordinated by the PI or Laboratory Manager.
6. The PI or Laboratory Manager should accompany injured personnel to receive a medical evaluation and complete an incident form.
7. The healthcare provider will make an initial assessment of risk.
8. University Health Services will provide follow-up and counseling on risk of infection and its consequences.
9. Personnel working in the laboratory, or who have performed duties in the past 6 months in an area containing infectious materials, must attempt to notify their supervisors before seeking medical attention if they:
 - a. Develop a fever greater than 100 °F; OR
 - b. Display initial onset symptoms consistent with contraction of the infectious agent used in the laboratory.

Safety with Chemicals: A Short Precautionary Checklist

Oftentimes, when we know something well, we take that knowledge for granted. Obviously, taking simple activities like tying our shoes or brushing our teeth is no problem. But when working with chemicals in the lab, we can never take safety procedures for granted. As a reminder, a number of rules for safe laboratory practices are outlined below. This list is intended to provide a practical base line for laboratories required to handle hazardous chemicals. **Because of the nature of specific chemical hazards, this list is not comprehensive**, but it will help PIs provide an appropriate safety plan for laboratories. Please remember that EHS is available for consultation on all safety and health-related issues:

- a. All heating of potentially hazardous chemicals must be performed in a chemical hood. Prior to heating a liquid, place boiling stones in vessels (other than test tubes). Use an alcohol thermometer (mercury thermometers are prohibited in laboratories) in a boiling liquid if there is the possibility of a dangerous exothermic decomposition, as in some distillations. Explosions are one of the most serious physical hazards in the laboratory.
- b. NEVER place your nose directly over a container to smell the contents.
- c. NEVER look down the opening of a vessel unless it is empty.
- d. Caution should be used when opening bottles which the lid or stopper is stuck. Wrap the bottle with a towel and place it in a container before applying additional force. The same precaution should be taken when opening ampoules.
- e. All containers with hazardous chemicals must be clearly labeled with the contents of the container. Use the complete chemical name, not the chemical formula or abbreviation.
- f. NEVER use any substance from an unlabeled or inadequately labeled container. Any unlabeled containers should be disposed of according to the University guidelines on waste disposal outlined in Chapter Four of this LSM.
- g. Flasks containing large volumes of toxic solutions, volatile solvents, boiling liquids and so forth, should be kept in pans large enough to contain the contents if the flask breaks. These should also be transported in appropriate transport containers.
- h. All chemicals or biological materials with an objectionable odor should be kept in the chemical hood or in an appropriately vented safety cabinet.

As always, contact EHS with specific questions and/or consult the full EHS Laboratory Safety Manual available @ (www.case.edu/finadmin/ehs/LabSafety/LabMan.pdf)

“When working with chemicals in the lab, we can never take safety procedures for granted.”

EHS STAFF

Chuck Hart, PhD, (fch13), Executive Director

W. David Sedwick, PhD, (wds), Director of Radiation Safety, Professor, and Radiation Safety Officer

Marc Rubin (mdr6), Director, Biological Safety Officer, Chemical Safety Officer, Select Agents ARO

Felice Thornton-Porter (fst2), Assistant Radiation Safety Officer, Laboratory Compliance Specialist II

Shirley Mele (smm5), Office Manager; Ergonomics/Respirator Program

Gwendolyn Cox-Johnson (gxc13), Radiation Safety Department Assistant

Jason May (jason.may), Chemical Safety Department Assistant

Charles Greathouse (cxg118), Analyst Programmer I

Ronald Tulley, PhD (rxt33), Science and Technical Writer

CHEMICAL SAFETY

Robert Latsch (rnl2), Safety Services Specialist II

Bill DePetro (wjd11), Safety Services Specialist II

Tom Merk (tlm8), Safety Services Operations Manager, Specialist II

Mary Ellen Scott, PhD (mas35), Safety Services Specialist II

Anna Dubnisheva (anna.dubnisheva), Safety Services Specialist I

RADIATION SAFETY

Joe Nikstenas (jen), Operations Manager Specialist II, RRPT

Yelena Neyman (yxt13), Health Physics Specialist I

Victoria Cook (vcook), Health Physics Specialist I

Sylvia Kertesy (sylvia.kertesy), Health Physics Specialist I

Please Remember, all back issues of the EHS Newsletter can be found online at case.edu/ehs . Simply click on the "Newsletter" link in the left-hand column!

Environmental Health and Safety

Case Western Reserve University

(216) 368-2906/2907 FAX: (216) 368-2236