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In this issue:

"Safety Comes First"

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Environmental Health and Safety

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Identifying indoor air quality problems

Symptoms and problems you should know

Identifying the cause of indoor air quality (IAQ) problems can be a complicated task. Understanding the symptoms resulting from poor IAQ is the first step to maintaining a comfortable, safe and healthy work environment.

Symptoms arising from poor IAQ often mimic those symptoms commonly associated with a cold, flu, or allergies. These symptoms may include:

- Upper respiratory irritation;
- Congestion;
- Headaches;
- Nausea;
- Fatigue; *and*
- Itchy or watery eyes.

Through occupant interviews, building inspection, and air quality testing, EHS and facilities staff are often able to determine the cause of indoor air quality problems. If you are experiencing these symptoms, a supervisor should be notified.

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RADUCATION–Ionizing Radiation Detection and Measurement

"Contamination means that radioactive material is present, but it is someplace other than where we want it to be."

1. Exposure versus Contamination

There are two important differences that we need to discuss before we look at detection and measurement of ionizing radiation: Exposure and Contamination. We can get a general idea of what these two terms mean if we look at what happens if we aren't careful with a cup of hot coffee.

Exposure (sometimes called Irradiation) refers to the transfer of energy from the radioactive material. The radiation may penetrate the body, as in the case of gamma radiation or an x-ray, but there is no transfer of material that takes place. Looking at our cup of coffee, we could say that we are receiving exposure from the heat being given off by the hot liquid (although we know from earlier *RADUCATION* modules that heat is not a type of ionizing radiation).

Contamination means that radioactive material is present, but it is someplace other than where we want it to be. The material may be present on an object or person and must be removed. Generally, such situations are complications to the normal work being performed, are not life-threatening, and are no longer an issue once the radioactive material has been removed. Using our coffee analogy, a full cup waiting to be enjoyed would be the typical situation. If coffee is spilled from the cup into the saucer (or onto a table, newspaper, or computer keyboard) the spilled liquid would be considered contamination – the coffee isn't where we want or expect it to be for its intended use. Cleaning up the spilled beverage (and maybe replacing the tablecloth, newspaper or keyboard) will correct the problem.

2. Detecting Ionizing Radiation

Ionizing radiation is not detectable simply by any of the human senses – it cannot be seen, tasted, smelled or touched. However, a number of measuring devices that have been developed to detect and measure ionizing radiation. These devices measure the interaction of ionizing radiation on some type of element or media, and convert those interactions into electrical data that may be read on a screen, graph, or monitor.

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RADUCATION–Ionizing Radiation Detection and Measurement. Cont.

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Detection devices may be used in academic, research, and laboratory settings, or in field locations in the form of portable, hand-held units. Below are some of the most common types of detection devices, with brief descriptions of how they operate:

Geiger Counter (also known as a Geiger-Mueller or GM tube) – This is a gas-filled device that uses a high voltage. When radiation interacts with the tube wall or the gas in the tube, an electrical pulse is created. The electrical pulses are read on a meter installed on the device.

Sodium Iodide Detector – These detection systems get their name from the crystal used inside them. The crystal emits a light pulse when it interacts with ionizing radiation. The light pulses are changed to electrical signals by a device known as a photo-multiplier tube, and the signal may then be read on the attached device meter.

Ion Chamber – An ion chamber takes measurements as a result of the ion pairs that are produced when x-ray or gamma radiation interacts with the air in an electrically-charged tube. The electrons produced generate a small current that is electronically measured and displayed on an attached meter.

Liquid Scintillation Counters – These devices are primarily used in research or laboratory settings to measure low-energy beta radiation. Samples are placed in vials that contain a liquid detection media, or cocktail. This media gives off light which is collected and measured in a similar manner to the sodium iodide detector mentioned above. A liquid scintillation counter is typically able to detect very low amounts of radiation present in the samples through the use of shielding, cooling methods, and electronic enhancements.

3. Units for Measuring Ionizing Radiation

We use many different units of measure in our everyday life to define things like size, shape, speed, etc. Height or width may be measured in

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"A liquid scintillation counter is typically able to detect very low amounts of radiation ..."

RADUCATION–Ionizing Radiation Detection and Measurement. Cont.

Marie Curie

> *"Activity is measured in a unit called a Curie."*

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inches, feet, or meters. How fast something is traveling may be expressed in miles per hour or revolutions per minute; the distance traveled in kilometers, furlongs, or light years. Area and volume are measured using units like square feet, cubic centimeters, or acres.

Just like these applications mentioned above, there are special units we use to define quantities of ionizing radiation. Those who work in the field of radiation safety, or health physics, use terms like: half-value layers; becquerel; action levels; quality factors; committed effective dose; and derived air concentration. However, for this *RADUCATION* module, we will focus on two of the most common and relevant terms:

Activity – the amount of a radioactive material present.

Dose – the amount of ionizing radiation exposure that has been received.

Activity is measured in a unit called a *Curie*. The curie is named after Marie Curie, and is based on the observations she made with her husband, Pierre, in their pioneering work with radium in the late 1800's. A curie is defined as the amount of radioactive atoms present that will have 37 billion disintegrations in one second.

This number of atoms will be different for each radionuclide. A large amount of material can have a very small amount of radioactivity; a very small amount of material can have a lot of radioactivity. To help us better understand this, let's look at two different non-radioactive materials: marbles and feathers.

If we were to put a pound of glass marbles in a box, we would probably have a relatively small box. However, if we wanted to box up a pound of feathers, we would need a much larger box, because each feather weighs substantially less than each marble and it would require a lot more of them to make up a pound.

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RADUCATION–Ionizing Radiation Detection and Measurement. Cont.

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The same idea holds true when talking about a curie of radioactive material – the number of atoms necessary will be different for each radionuclide and will require a different size "box" to hold them.

Dose is measured in *rads*, a unit that describes how much ionization occurs in air. Rad is actually an acronym for the term "*radiation absorbed dose*". **When referring to the dose received by a person, we use a unit called the *rem*.** A rem is essentially the same as a rad, with a "quality factor" added to account for the type of ionizing radiation exposed to (i.e., alpha, beta, gamma) and the ease in which the different types of radiation can transfer their energy to the body.

* * * * * *

If you would like more information on the topics covered in this *RADUCATION* module, these links may be helpful:

The Ohio State University Agriculture Extension Service:
http://ohioline.osu.edu/rer-fact/rer_23.html

Health Physics Society web-site:
http://hps.org/publicinformation/ate/faqs/radiationdetection.html

U.S. Department of Labor, OSHA web-site:
https://www.osha.gov/SLTC/radiationionizing/introtoionizing/radiationdetectioninstru.html

Centers for Disease Control and Prevention web-site:
http://emergency.cdc.gov/radiation/measurement.asp

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"A rem is essentially the same as a rad, with a "quality factor" added to account for the type of ionizing radiation exposed..."

Reducing Foodborne Infections

"...Salmonella Typhimurium, which has been linked to poultry, beef, and other foods, was 27 percent lower..."

CDC data show progress in reducing some foodborne infections in 2014

In 2014, rates of infection from a serious form of E. coli and one of the more common Salmonella serotypes decreased compared with the baseline period of 2006-2008. Meanwhile, some other less common types of Salmonella increased. Campylobacter and Vibrio rose again in 2014, continuing the increase observed during the past few years, according to data published today by the Centers for Disease Control and Prevention. Today's report summarizes the rates of infection per 100,000 population and tracks illness trends for key foodborne illnesses.

Infection with Shiga-toxin producing E. coli O157, which can sometimes lead to kidney failure, decreased 32 percent when compared with 2006-2008 and 19 percent when compared with the most recent three years. These infections are often linked to consumption of undercooked ground beef and raw leafy vegetables. Salmonella Typhimurium, which has been linked to poultry, beef, and other foods, was 27 percent lower than it was in 2006-2008, continuing a downward trend begun in the mid-1980s. Two other less common types of Salmonella, Javiana and Infantis, more than doubled for reasons that are unclear. Salmonella Javiana is concentrated in the southeastern United States, but has been spreading within the Southeast and to other areas of the country. However, when all Salmonella serotypes are combined, there was no change in 2014. Campylobacter increased 13 percent and Vibrio increased 52 percent compared with 2006-2008. Yersinia has declined enough to meet the Healthy People 2020 goal.

The data are from FoodNet, CDC's active surveillance system that tracks nine common foodborne pathogens in 10 states and monitors trends in foodborne illness in about 15 percent of the U.S. population. Today's report compares the 2014 frequency of infection with the frequency in the baseline period 2006-2008 and in the three most recent years. Overall in 2014, FoodNet logged just over 19,000 infections, about 4,400 hospitalizations, and 71 deaths from the nine foodborne germs it tracks. Salmonella and Campylobacter were by far the most common– accounting for about 14,000 of the 19,000 infections reported.

"We're cautiously optimistic that changes in food safety practice are having an impact in decreasing E.coli and we know that without all the food safety work to fight Salmonella that more people would be getting sick with Salmonella than we are seeing now,," said Robert Tauxe, M.D., deputy director of CDC's Division of Foodborne Waterborne and Environmental Diseases. "The increasing use of whole

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Reducing Foodborne Infections, cont.

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genome sequencing to track foodborne illness cases will also help; however, much more needs to be done to protect people from foodborne illness.”

The recent decline in the incidence of Shiga toxin-producing E. coli (STEC) O157 follows several years of increasing scrutiny for beef products. Since 1994, the Food Safety and Inspection Service of the U.S. Department of Agriculture has taken STEC O157:H7 extremely seriously and made a number of changes in its regulatory oversight of the beef industry to protect public health.

"We are encouraged by the reduction of STEC O157:H7 illnesses, which reflects our science-based approach to beef inspection, and we look forward to seeing further reductions in Salmonella and Campylobacter infections as our improved standards for poultry take effect later this year, " said Al Almanza, Deputy Under Secretary for Food Safety at USDA. "Data sources like FoodNet allow us to be strategic in developing our food safety policies, and we will do everything within our power to keep reducing cases of foodborne illness from all meat and poultry products."

Under the provisions of the FDA Food Safety Modernization Act, the U.S. Food and Drug Administration is planning to publish major new regulations in 2015. The regulations are geared toward ensuring produce safety, implementing preventive controls on processed foods, and improving the safety of imported foods.

“Prevention of illness is the fundamental goal of our new rules under the FDA Food Safety Modernization Act,” said Michael Taylor, deputy commissioner for Foods and Veterinary Medicine at FDA. “We have worked with a wide range of stakeholders to devise rules that will be effective for food safety and practical for the many diverse elements of our food system. Once the rules are fully implemented, FoodNet will help us evaluate their impact.”

The FoodNet report also includes results of culture-independent diagnostic tests (a new method for diagnosing intestinal illnesses without needing to grow the bacteria) done in the many hospital laboratories in the FoodNet sites. In 2014, the results of more than 1,500 such tests were reported. More than two-thirds of the tests were for Campylobacter. Other tests performed were for STEC, Salmonella, Shigella and Vibrio. Some of the tests had a positive result. However, the infections were not confirmed by culture, and so CDC experts did not include them in the overall FoodNet results for 2014.

For more information on avoiding illnesses from food, please visit www.foodsafety.gov.

“Under the provisions of the FDA Food Safety Moderniza-tion Act, the U.S. Food and Drug Administra-tion is plan-ning to pub-lish major new regula-tions in 2015. ”

Drink Water but Ditch The Bottle

"...drinking the recommended eight glasses of water a day at the U.S. tap rate costs about $0.49 per year."

Reduce waste and help your wallet

It's summer and more people are drinking bottled water. While hydrating, it's good to remember some facts about disposable plastic bottles! According to the EPA, containers and drink bottle packaging contribute the largest chunk to plastic waste. Some of those drink bottles contain juice and soft drinks, which don't flow out of the faucet, but water sure does!

According to www.banthebottle.net, many people believe that bottled water is of higher quality and cleaner and better tasting than tap water. But, that may not be entirely true. For example, did you know that two of the biggest name brands in bottled water come from purified municipal water? In addition, public water is regulated by the EPA, which requires multiple daily tests for bacteria and makes results available to the public. The FDA regulates bottled water and that agency requires only weekly testing and does not share its findings with the EPA or the public.

For one person, drinking the recommended eight glasses of water a day at the U.S. tap rate costs about $0.49 per year. That same recommended amount in bottled water is about $1,400.

Try replacing your bottled water with tap water filtered with a water pitcher. Each filter produces 40 gallons of water and the average owner uses six filters in a year, to produce 240 gallons, or 30,720 ounces, of fresh-filtered water. This amount is equivalent to 1,818 16.9-ounce water bottles. At the cost of $1 per bottle, that's $1,818 from your wallet!

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Preventing Mercury Exposures

How to handle fluorescent bulbs safely

When handling fluorescent bulbs on carpets, put a drop cloth down to prevent contamination if a bulb breaks. Remove and replace the carpet if a bulb does break on it. If you break a bulb, open windows in the area and leave; let the air clear for 15 minutes to reduce mercury vapor levels before returning to clean up the broken bulb. The room should be ventilated for several hours. In addition:

- Keep coworkers out of the area until cleanup is complete.
- Put on rubber gloves to protect yourself from broken glass.
- Prepare a sealable container to hold all broken glass and cleanup materials and prevent further release of mercury vapors.
- Pick up large pieces of glass and put them in the container.
- Use two stiff pieces of paper, such as index cards, to collect smaller shards and dust.
- Use sticky tape, such as duct tape or packing tape, to pat the area and pick up fine particles.
- Use a damp paper towel to clean up the finest particles.
- Put all debris and cleanup materials into the container and label as “Universal Waste—broken lamp.”
- Place the sealed container in an appropriate storage area for universal waste. It should be disposed of as universal waste.
- Wash your gloves, remove them, and wash your hands and face.
- Don’t use a vacuum cleaner to clean up broken fluorescent bulbs. Vacuuming spreads mercury vapor and dust throughout the area and contaminates the vacuum.

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“…let the air clear for 15 minutes to reduce mercury vapor levels before returning …”

Identifying indoor air quality problems, cont

"Refrain from using candles, air fresheners, and any "air freshener" sprays in the work area. ."

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Inadequate ventilation can increase indoor pollutant levels by not bringing in enough outdoor air to dilute emissions from indoor sources and by not carrying indoor air pollutants out of the immediate work area. High temperature and humidity levels can also increase concentrations of some pollutants.

Here's what you can do to prevent indoor air pollution:

- Keep all heating, ventilating, and air conditioning (HVAC) supply and return grills open. The amount of ventilation is compromised by obstructing these openings.
- Inform your supervisor of any troublesome odors or air quality concerns.
- Check with the indoor air quality manager before you use air purifying units and other air scrubbers. These units may add chemical pollutants to the air.
- Refrain from using candles, air fresheners, and any "air freshener" sprays in the work area. These may also add chemical pollutants to the air.
- Keep the personal use of colognes and perfumes to a minimum as they may be irritating to some individuals.
- Avoid using pesticides.

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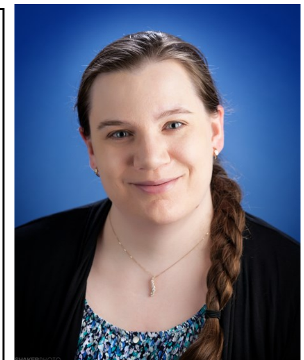

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Contact her with any questions concerning clearance of radioactive use equipment, materials and laboratories

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