

RADIATION REVIEW 2006

UWM RADIATION SAFETY PROGRAM

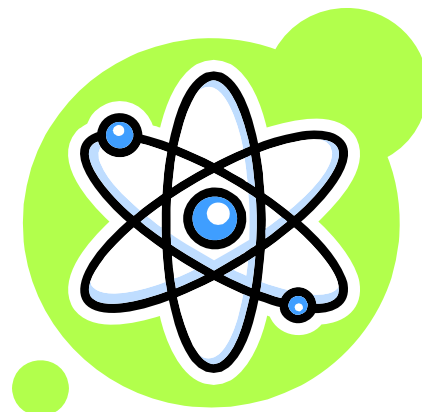
REFRESHER AND REMINDER INFORMATION

The main purpose of this document is to serve as annual refresher training for individuals working with or around radioactive materials. While there were no significant changes in the radiation safety program in 2006 (other than relocation of the program office), we want to remind you of some important topics here.

We continue to stress the importance of maintaining the security of your radioisotopes at all times. All radioactive material must be secured from unauthorized removal or tampering of the material by locking your lab or by locking up all radioactive material, including waste, in a secure area whenever the lab is unattended. Even when the lab is occupied the workers present should be able to see all the doors to the lab, be aware of anyone entering and challenge anyone they do not recognize.

Do not assume your laboratory is secure during non-working hours when the building should be locked. Outside doors may be propped open allowing easy access to the building and unlocked laboratories. Do not let persons you do not recognize into locked buildings or laboratories.

While Radiation Safety continues to perform monthly area monitoring in all labs where radioactive materials are used, each lab is responsible for performing and documenting an area monitoring survey at the completion of each day of work with radioactive material. Remember to check the lab bench, any equipment used and yourself (shoes and hands) for contamination. The floor in front of your work area, equipment, waste containers and storage units (refrigerators/freezers) are all places that should be monitored in addition to your work area. Any area in which contamination is detected should be cleaned and resurveyed immediately to prevent the spread of that contamination. All monitoring results as well as any corrective actions taken **MUST** be documented and available for review by regulatory officials. Radiation Safety has area monitoring result templates available for use. Please contact the office if you would like an updated copy for your lab.



WHAT EVERY RADIATION WORKER SHOULD KNOW

Every person who works with radioactive material should be able to answer the basic questions that are listed below. Very brief answers are also provided, however, your answers must be specific to your laboratory requirements. If regulatory officials were to inspect your laboratory these are the kinds of questions you would be expected to answer.

What do you do if someone comes into the lab who you have never met?

- *Ask for identification and reason for entry.*

What radionuclides do you work with?

- *Likely either C-14, P-32, S-35, H-3*

How did your laboratory become authorized?

- *PI submitted application materials to Radiation Safety for approval.*

What training have you had?

- *Initial Radiation Safety training (blue book); lab specific training by professor, plus annual retraining with newsletter.*

How do you get your radioactive material?

- *Notify Rad Safety of all orders. Material delivered to Rad Safety and lab picks up material from Rad Safety after they monitor and inventory.*

Where are your radioactive material stocks stored?

- *Locked refrigerator/freezer or other secure area.*

What do you do with the empty box?

- *Remove any labels or markings and put in trash.*

How do you keep track of your inventory?

- *Document all use on control sheet received with each order.*

What do you do prior to working with radioactive material?

- *Put on lab coat and gloves.*

How do you survey your work area?

- *For H-3 use wipes counted in an LSC. GM meter survey for most others.*

How do you know your GM meter is working?

- *Battery check and measure check source.*

What do you do if your meter does not respond properly to check source?

- *Use a different meter; call Rad Safety for loaner or repair info.*

What could cause high meter response?

- *Contaminated probe; bad electrical connection or cable. Or maybe the entire room is contaminated!*

What could cause a zero meter response?

- *Dead batteries or bad electrical connection.*

What do you do if the meter does not work?

- *Obtain a good meter prior to beginning rad material work.*

What do you do after you have completed work?

- *Secure materials. Survey work area and DOCUMENT results.*

What do you do if you find a little contamination?

- *Clean it following appropriate procedures.*

How would you decontaminate a small spill on a lab bench?

- *Follow posted procedures, use spill kit and resurvey frequently.*

What do you do if you find contamination all over the place?

- *Warn others, secure area and call Radiation Safety for assistance.*

What would you do if you had questions about prenatal exposure?

- *Discuss with Radiation Safety Officer.*

Where is your waste stored?

- *In designated (shielded) area, secure from removal.*

How is your waste collected?

- *Phone Radiation Safety to arrange pick-up.*

Where do you eat your lunch?

- **NEVER** in the lab!

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What do you do when you leave the laboratory and no one else is there?

- Lock the door!

Everyone in your laboratory who works with radioactive material should be able to answer these questions without hesitation. Staff who do not work directly with radioactive material should know not to touch the radioactive material, know how to keep the material secure and know about the prohibition against eating or drinking in the laboratory. Everyone should know how to contact Radiation Safety if they have any questions.

Remember, the training provided by Radiation Safety via the "blue book" or through this newsletter does not prepare you with the techniques for working safely in the laboratory. It is the responsibility of the Authorized User (PI) to ensure that the research experiments are being performed safely and properly. Ultimately, every person working with radioactive material is responsible for making sure that it is being used and handled safely.

RADIATION SAFETY OFFICE MOVED

The Radiation Safety office moved again in 2006! The "new" location is room W217 Lapham Hall --- the room next to the rad safety lab facilities. While Radiation Safety has remained in Lapham the majority of the University Safety and Assurances Department relocated to Engelmann Hall.

The major impact of that move is that radioactive material packages are now delivered to the Biological Sciences office, picked up by radiation safety staff, surveyed and then released to your lab. If your lab receives materials directly from the office please contact Radiation Safety immediately so the package can be properly surveyed and inventoried.

POSTING AND LABELING PRACTICES

In both federal and state regulations for the safe use of radioactive materials, the requirements for labeling containers, rooms and areas as to the presence of radiation or radioactivity are strictly spelled out. To have radioactivity or radiological conditions that are not appropriately posted or labeled will certainly result in an institution being cited if the situation is identified by regulators.

Likewise empty containers that do not contain radioactivity **MUST** have their labels and markings defaced or there should be some indication that the container no longer holds radioactive material. A local institution was cited during a summer inspection for placing a container bearing the words "Radioactive Material" in the trash without first defacing the label. Quoting the inspector "empty-but-labeled containers are confusing and cause unnecessary concern". State officials are always contacted when labeled containers are found at local landfills because it is always assumed that there is licensed material within the container. When the container is traced back to a licensee a citation will be issued for either failing to have control of licensed material or failing to deface an empty container.

Please be sure that you remove or deface all markings and labels from any container in which radioactive material is no longer present **before** disposing of the container.



WHAT TO DO WHEN SPILLS HAPPEN

Yes, it can happen to you. Regretfully, it probably will some day. People spill things. What do you do now? If the spill is just a couple of spots on the lab bench the answer is easy: Use your lab's spill kit, clean the area and resurvey. If the spill is widespread or has a significant amount of radioactive material, then the answer is more difficult.

- If the spill involves a small quantity of material and you are familiar with and you have been trained in proper clean-up procedures, use the spill kit and follow the attached instructions.
- If you are not comfortable in cleaning up the spill, don't have proper clean up materials or if you have not received training in proper procedures, call Radiation Safety for assistance.
- If the spill has entered a drain (e.g., floor, sink, hood), could enter the drain, or is outside of a restricted area call for assistance immediately!

When dealing with a spill, always remember you need to:

1. **Stop the spill.** Pick up the jug or turn off the pump. Make sure it does not get worse.
2. **Alert others in the laboratory.** This will minimize the spread of contamination.
3. **Isolate the area.** Prevent anyone from walking through the spill area. If there is any sign of hallway contamination, block the area at least 10 feet from the laboratory door on both sides of the lab entrance. Enforce the no-pass rule and station someone in the hallway to stop traffic.
4. **Call for help.** Contact Radiation Safety (X4275) for assistance. The Authorized User (PI) should be present as well to organize the spill cleanup.

5. **Minimize exposure to radioactive materials.** Lab coats and gloves are required whenever you work with radioactive materials.
6. **Establish a "clean area".** This should be inside the room if possible. Bench paper is a handy "tool" for covering floors to make a clean area.
7. **Survey all lab personnel.** Record results (e.g., Bob Smith, right palm of right hand: 10,000 cpm-GM at 1 cm; Center lab bench, area A, 5,000cpm-GM at 1 cm). Pay special attention to skin contamination. Measure the contamination levels prior to a quick clean, clean then recheck to see if the contamination levels are decreasing.
8. **Survey other labs or public areas.** Check neighboring labs if widespread contamination is possible. Have someone without contaminated shoes survey the hall, elevator, stairs, etc. Contact Radiation Safety IMMEDIATELY if any amount (no matter the size) is found outside the restricted area.
9. **Survey the room.** Smears are not necessary unless it is a tritium spill, but documentation is necessary.
10. **Clean, decontaminate and resurvey.** Work from cleaner areas towards areas with more contamination. Clean up the floors and other public areas before beginning to clean lab benches and equipment. Survey shoes regularly. Change gloves whenever they are contaminated. After decontamination, resurvey the room to verify no residual contamination remains.

Radiation Safety staff will not decontaminate your laboratory. They will however, help train, supervise, and monitor clean up activities. Remember there is no penalty imposed by Radiation Safety on lab groups that detect spills and promptly clean them up. Problems only arise when the spill is not detected and/or properly cleaned and those actions documented.

SPY VS. SPY POLONIUM – 210

The investigation in the United Kingdom into the November 23, 2006, death of former Russian spy Alexander Litvinenko has prompted considerable interest in the radioisotope polonium-210 (Po-210), its uses in industry, and its potential hazards.

Polonium was discovered by Marie Curie in 1898; she named it for her homeland of Poland. It exists in nature in small quantities and is found in tobacco. For industrial purposes it is produced in milligram amounts in nuclear reactors. Only about 100 grams (just greater than 3 ounces) is believed to be produced worldwide each year, making polonium quite rare. Commercially licensed distributors import a very small amount of Po-210 into the US each year.

Polonium-210 emits alpha radiation, which cannot penetrate paper or skin. Therefore, external exposure does not pose a health hazard. It also decays quickly, with a half-life of 138 days. That means Po-210 effectively loses its radioactivity in about two and a half years.

However, if swallowed or inhaled in sufficient quantities and *absorbed into the body system*, Po-210 can be extremely toxic --- many times more than cyanide. If polonium-210 is ingested in its most common form, most of it will likely pass through the system without being absorbed. Once absorbed, however, the alpha radiation can rapidly destroy major organs, DNA and the immune system. Because of this hazard, pure Po-210 must be handled very carefully. Experts estimate that as little as 3 mCi of Po-210, equivalent in size to less than a grain of salt, could be fatal to a person weighing 70 kilograms (154 pounds).

Polonium-210 is typically used in static elimination devices employed in various

industries. To be used in these devices, the isotope is combined with silver or other metals in a foil mounted inside a protective case, using designs approved by federal or state regulators. These devices are designed according to tough regulatory standards and pose no threat to public health and safety. The construction and design of the radiation source makes ingestion during normal operation highly unlikely. Similarly, any attempt to destroy or disassemble the source to extract the polonium would be extremely difficult and would require sophisticated laboratory work.

Much media attention has focused on the availability over the Internet of small Po-210 sources containing 0.1 uCi of radioactivity. This is an extremely small amount of radioactivity and is considered an "exempt quantity". These sources are typically used to check or calibrate instrumentation. Possessors of exempt quantities are not required to obtain a license. However, they are expected to handle the source using appropriate safety precautions as explained in the brochure provided with the source and not attempt to remove the radioactivity. They are typically in a form that, if ingested, would pose no health problem, and the radiation is so small that they do not pose a hazard even if the polonium were to be absorbed. It would take 30,000 of these exempt quantities to represent the 3 mCi fatal dose estimate.

Other media stories have suggested that someone could disassemble one or more static elimination devices and procure a lethal dose of Po-210 for as little as \$22.50. Such calculations discount the difficulty, expense and hazards of extracting the Po-210 from the sealed sources and rendering it in a form that could be used to harm someone. Experts agree that the material used to poison Mr. Litvinenko was in a very pure form --- more than terrorists disassembling sources in their garage and likely backed by "government" science labs.

(Material extracted from US NRC Fact Sheet-Po-210)

LIQUID SCINTILLATION VIAL DISPOSAL

There are several ways that Radiation Safety processes and disposes of liquid scintillation vials based upon the isotopes present and the type of scintillation fluid used. Liquid scintillation vials should be stored prior to disposal in the trays/flats in which the vials are received. Once your analysis is complete, please package the flats into the original case and contact Radiation Safety for a waste pick up. The case should be labeled with a waste sticker that indicates the radionuclide(s) present, the amount in either uCi or mCi, and the type of scintillation fluid used (organic or high flash point). If you would like the flats returned to your lab please mark that on the box as well.

Never empty vials that contain scintillation fluid. Do not place the vials with liquid scintillation fluid into a container with other wastes. If the vials do not remain upright they often leak. Most of the scintillation fluids will leach through the plastic waste bags and result in a smelly, wet mess!

Laboratories that count P-32 in dry vials or vials with water as the scintillator should handle their vials differently. If your P-32 counting vials contain only water, just pour the water into your liquid waste jug and place the empty vials into your solid waste container. If you had not used any fluids the vials can go straight into your solid waste container.

Please contact Radiation Safety if you have any questions about the packaging or labeling of any radioactive waste material.



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