



Lab Safety

Spectrum

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UW - Madison Safety Department Chemical and Radiation Protection
30 N. Murray St. 262-8769 <http://www.fpm.wisc.edu/safety>

Radioactive Materials License No. 25-1323-01

Help Line 265-5518

Regulatory Issues at the UW

The use of hazardous material on campus is governed by regulations published by different government agencies. Radioactive materials are regulated by the Nuclear Regulatory Commission and the State's Radiation Protection Section, use of chemicals follows OSHA or State Department of Commerce rules, and waste items are regulated by the EPA or the State Department of Natural Resources. In all instances, the purpose of the rules is protection. The NRC protects by insuring exposures to radioactive material are kept ALARA (as low as reasonably achievable). OSHA protects workers who use hazardous materials in the work place. EPA protects both the environment and workers from waste products and emissions. To achieve this protection, the regulations require that workers perform certain tasks. When the UW is inspected, these inspectors often go to labs to ascertain that lab workers are aware of how to do certain basic tasks. For the next two issues, we will look at several of these tasks.

Radioactive Material Surveys

Labs that use radioactive materials must perform surveys to verify that general lab areas are contamination-free and contamination in radioactive work areas is within limits. The survey normally consists of a meter survey to identify possible contamination and radiation levels and a wipe survey to check on removable contamination. All survey meters are calibrated yearly and the Calibration Sticker shows the meters efficiency for three common beta particle energies. The sticker also has the expected response for the meter's check source.

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Use CPM scale only. Cal Date: 7/18/xx
Window: Fixed Beam ⊥ to probe center
Battery: OK Check Source: 1500 CPM
Isotope: C-14 Tc-99 P-32
160 keV 300 keV 1.71 MeV
Efficiency: 2% 13% 27%
@ Cs-137 energy: 2400 cpm / mR/hr
DO NOT USE mR/hr SCALES
UW Safety Dept. Calibration Lab 262-8769

Meter Calibration Sticker



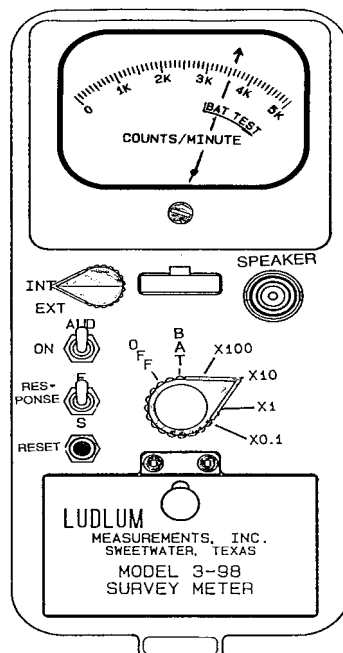
Each day, the first time you use your meter:

- ◆ Wear lab coat, safety glasses, and disposable gloves; you may need to clean contamination found on the survey.
- ◆ Check the calibration sticker for the date the meter was calibrated. If the date is more than one year ago, do not use the meter; contact Safety at 2-8769 for re-calibration.
- ◆ Check the batteries. Turn selector switch to

the **BAT** position.

The readout's needle must move into the **BAT TEST** (or **BATT OK**) range. If not, the batteries are weak and must be replaced. To save on batteries, turn off the meter and speaker when not in use. When storing the survey meter for extended periods, remove the batteries and call Safety to have the meter posted with an **In storage, insert batteries and calibrate before use** label.

- ◆ Measure the check source. With the meter and speaker turned on, choose the appropriate count range, place the detector window over the check source on the side of the meter, and measure the source. Compare the results with that given on the calibration sticker, it should be within $\pm 15\%$ - 25% of the "Check Source" value.
- ◆ Determine the background count-rate. With the selector switch on the lowest scale, point the detector away from any radiation fields and measure the background count-rate. Remember, the meter reading must be multiplied by the selector switch range (e.g., x 0.1, x 1, x 10, etc.). This is the background reading and for a thin-window GM is between 20 - 40 cpm.



Survey Meter Controls

- ◆ With speaker on, point the probe window at the area or equipment you wish to monitor for radiation or radioactive contamination.
- ◆ Unless contamination is expected, place the selector switch on the lowest scale.
- ◆ Multiply the meter reading by the selector switch setting. For example, the figure shows the needle is on 3.7K cpm and the selector switch is on the "X 10" scale, the radiation count rate is 37,000 cpm.
- ◆ Hold the window of the probe within 1 cm of the surface or piece of equipment you wish to monitor. Pay special attention to door knobs, telephones, log books, instrument handle(s) and computer keyboards which should be clean, but may be cross-contaminated. Slowly move the detector over each survey area.
- ✓ With speaker on, move detector about two inches per second and listen for a change in the rate of clicking from the speaker.
- ✓ If the meter does not have a speaker, move detector about one inch every two seconds, observing the readout needle for rapid movement.
- ✓ Be careful when moving the detector, since electrical noise may be generated in the cord and these may register as radiation counts. If you find an elevated spot, recheck it to see that it was not cable noise.
- ✓ Do not contaminate the probe. If you only use ^{32}P , you may cover the probe with a thin sheet of plastic (e.g., saran) wrap. For ^{14}C , ^{33}P , ^{35}S or ^{45}Ca , do not cover the detector, use care to prevent contamination.
- ✓ Survey points with count rates exceeding 650 cpm must be cleaned up.
- ✓ Remember, efficiencies for ^{35}S are about 1 - 3% and for ^{32}P about 35%.
- ◆ Record the following information on the survey form: ✓ Date and room number of survey ✓ Initials of the person conducting the survey ✓ Background radiation count rate ✓ Meter information (make, model, type, and serial number)
- ◆ Turn the meter and speaker off when completed or when the meter is not in use.



EPA Waste Issues

Most groups publish newsletters to advise their customers of important issues. We review various federal government web sites to anticipate future rules. The EPA's November 2004 Enforcement Alert newsletter (<http://www.epa.gov/compliance/resources/newsletters/civil/enfalert/index.html>) titled "Mismanagement of Laboratory Waste Creates Risk of Serious Injury," is especially applicable to universities. The first paragraph states, "Routine inspections at laboratories have found a pattern of hazardous waste management problems in recent years. EPA has discovered chemicals forgotten in university stockrooms for decades, a research lab with wastes in damaged containers, some labeled "unknown." Improper disposal of waste is also common. Laboratories in colleges and universities ... use a wide variety of chemicals to do a wide range of work. The chemicals and resulting wastes are not managed properly, they can endanger both laboratory workers and the surrounding community. The most serious of these problems can lead to serious injury or death."

The entire article is interesting and your lab may be interested in reading it from the EPA's site. Lets look at some of the main issues:

1. Label all chemical containers - Lab workers need to know what is in each container, this will allow them to properly store reactives, solvents, and other chemicals properly. A container labeled only "waste" could mistakenly be used to by another lab member to hold a waste that might react with the primary waste. Your lab should not have any "unknowns." If you do not know what they are, how do you know they are being safely stored? Call or email Chemical and Radiation Protection for a pick-up.
2. Chemicals stored for an inappropriately long time - It is important to maintain an inventory of chemicals, and to review the inventory at least annually.

Additionally, inspect all containers for signs of damage or chemical degradation, or deteriorating labels. Call Safety for a pick-up of unneeded / unused chemicals.

3. Properly store chemicals and chemical wastes - Keep incompatible chemicals and chemical wastes separated. The benefit of labeling all containers is that it facilitates proper storage. Insure that the storage environment is proper for the chemical, some chemicals require controlled conditions to prevent degradation over time. Review Chapter 4 of our Laboratory Safety Guide for information on storage and use.
4. Properly Dispose of chemical wastes - Do not evaporate any volatile wastes. Keep all waste containers capped unless actively using the container. Review Chapter 7 in our new Laboratory Safety Guide; this discusses how to dispose of certain types of chemicals and chemical wastes. Insure that, if you want to dispose of a chemical via the sanitary sewer, that this method is listed as safe and legal in Appendix A and Chapter 7 of the Laboratory Safety Guide. If you have any question about proper disposal, call the Chemical and Radiation Protection help line, 5-5518 for advice or collection.
5. Train all workers - Insure all persons in your lab know both what you are doing as well as where appropriate safety equipment is located. If your lab has special decontamination equipment, insure all persons are aware of this and where it is located. For example, if only the person working with hydrofluoric acid knows where the calcium gluconate gel is located, in an accident situation, immediate care may not be forthcoming.

The thing to bear in mind, laboratories have a duty to operate safe facilities and manage risks posed by waste chemicals.



Training

Chemical and radiation safety training is available weekly. There are two types of class schedules, **Chem AM** classes have the chemical safety class beginning at 9:30 AM and the radiation safety class beginning at 12:30 PM. **Rad AM** classes have radiation safety classes beginning at 8:30 AM and the chemical safety class beginning at 1 PM. The schedule of these classes through June is:

Chemical AM Chemical Safety Radiation Safety	Start Time 9:30 AM 12:30 PM	March 3, 9, 21; April 7, 13, 25; May 3, 11, 19; June 9, 15, 27;
Radiation AM Radiation Safety Chemical Safety	Start Time 8:30 AM 1 PM	March 15, April 1, 19; May 27; June 21

All training classes are held in Union South. No sign-up is needed; a quiz documents training. Booklets for either class can be picked up at our Annex, Room 62, Biochemistry (11 AM - 2 PM). A complete listing of classes is found at <http://www.fpm.wisc.edu/safety>.

Transportation: If you send out or sign for hazardous material (i.e., red-bordered shipping paper), you must initially receive a formal DOT training class and a refresher training class every 3 years. Radiation, Biological and Chemical Safety each offer classes to satisfy this requirement. The DOT classes for chemicals are held at Union South on the following dates / times: March 24 (9 AM - 1 PM); April 28 (11 AM - 3 PM); May 24 (9 AM - 1 PM) and June 30 (9 AM - 1 PM). You can sign up via the Safety Department web site:

<http://www.fpm.wisc.edu/safety/Transportation/transportation.html>.

Alternatively, call Chemical Safety, 2-9178, Radiation Safety, 2-1524 or Biological Safety, 3-2037 (whichever is applicable) to schedule yourself for a class.

UW-Safety Dept.
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Help Line: (608) 265-5518