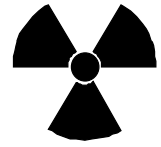




RADIATION REVIEW



UW - Madison Safety Department

Radiation Safety Program

30 N. Murray St.

262-8769

February 1999

<http://www.wisc.edu/safety>

Y2K

You hear a lot about the year 2000 problem with certain time-keeping chips. This problem may affect your Liquid Scintillation Counters, Autogamma Counters and other analytic equipment. If your computer is doing date math (e.g., decay, counting a standard and calculating efficiency, etc.), your results may be miscalculated. Some systems can be upgraded (the Safety Department spent approximately \$1700 per system) to avoid Y2K problems. A list of Health Physics -related Y2K sites, including links to companies can be found at:

<http://www.physics.isu.edu/radinf/hpy2k.htm>



Pregnancy Surveillance

Because the embryo/fetus is more sensitive to effects from high (> 10 rem) radiation doses than adults, lower radiation dose limits apply to the fetus of a pregnant radiation worker than to the adult worker: 500 mrem for the fetus versus 5000 mrem for the adult. In addition, the NRC mandates each licensee to have a pregnancy surveillance program.

The University's Pregnancy Surveillance Program is a voluntary program. Together with the pregnant worker, the Safety Department will review her radiation exposure history, her lab's workload (type and quantity of radionuclides), and, if appropriate, provide suggestions to reduce exposure to ALARA and well below the 500 mrem limit.

To inquire into this program or if you have questions, call Leola at 2-9180 or Sharon at 2-7530.

The Who, What, When, Where & Why of Surveys

A survey is a check for radiation and contamination levels within a lab. Surveys can be formal or informal. A worker using radioactive material should have a survey meter at hand whenever unsealed radioactive materials are being used and, at the conclusion of work (e.g., before taking a break or leaving for lunch or the day), the worker should conduct a cursory (informal) survey of the immediate area to determine whether contamination from radioactive microdroplets occurred.

Formal monthly surveys are required by the UW's NRC license. If only ^3H is used, then wipe surveys only are required. Otherwise, for labs where medium or high energy beta and/or gamma emitters (e.g., ^{14}C , ^{22}Na , ^{32}P , ^{35}S , ^{36}Cl , ^{51}Cr , ^{125}I , etc.) are used or stored, surveys for radiation and radioactive contamination must be done using a calibrated radiation survey meter and wipes. Because contamination may be encountered, wear lab coat, safety glasses, and disposable gloves.

This formal survey is documented on a survey map which is posted within the lab area. On the map identify the areas where radioactive material are used and/or stored.

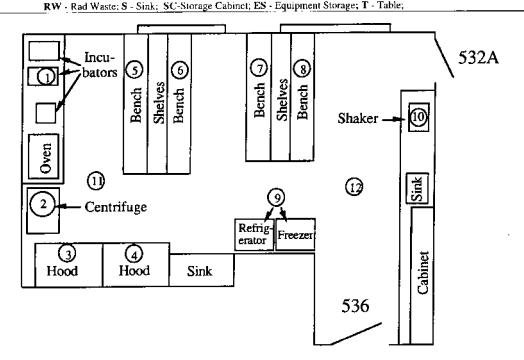
The meter survey is performed to measure radiation levels and possible contamination levels throughout the lab. Beta particles have limited range so you should hold the detector within 1 cm of the area or equipment you are monitoring and slowly move the detector over each point. Make sure you do not contaminate the probe. For surveying ^{32}P you may cover the probe with a thin sheet of plastic wrap, for ^{35}S or ^{14}C , do not cover the detector, use care to prevent contamination. If your meter has a speaker on, move the detector about 2 inches per second, listening to the speaker's clicking. If your meter does not have a speaker, move the detector about 1 inch every 2 seconds, observing the readout needle for rapid movement. Pay special attention to doorways, door knobs, floors, telephones, log books, instrument handle(s) and computer keyboards (all of which should remain contamination free). Record all information on the survey form, including: (1) Date and room number of survey, (2) Background radiation count rate, (3) Initials of the person conducting the survey, (4) Make, model, type, and serial number of meter. Areas or locations with meter count rates exceeding 650 cpm must be decontaminated or shielded, as appropriate. Document your decontamination results on the original survey. Add your initials and the date.

The meter survey is usually performed first to identify radiation levels in the laboratory and potentially contaminated areas. After performing the meter survey, perform a wipe survey at the same points. This is because radiation levels do not necessarily mean the contamination is removable and some contamination may not be detected with a meter. Loose surface contamination is radioactive material in a form that is easily spread and is in a place where we don't want it to be or don't know it is there. If persons walk through a contaminated area, some radioactive contamination will be picked up by their shoes and spread as they go about their work. Removable contamination poses three potential problems. It might: (1) be inadvertently ingested if not quickly discovered and decontaminated, (2) be spread beyond the laboratory and cause undue stress to families and friends of the workers involved, or (3) become airborne and become a potential inhalation hazard.

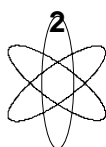
Radionuclide Facility Survey

Principle Investigator: ZERMAT MT Date: 13 Oct 99
 Building / Room: Bardeen 536 Surveyor: WAR

Code: B - Bath; C - Centrifuge; D - Desk; F - Freezer; H - Hood; I - Incubator; LB - Lab Bench; R - Refrigerator;
 RW - Rad Waste; S - Sink; SC - Storage Cabinet; ES - Equipment Storage; T - Table;

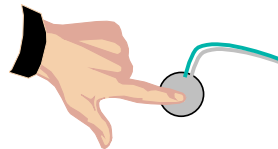


Action Levels		Wipes		^3H , ^{14}C , ^{35}S	
Meter	cpm (above background)	cpm	β, γ	cpm	cpm/100 cm^2
Survey Meter Results		Wipe Test Results			
Make / Model:	<u>LUDLUM 3</u>	Make:	<u>Peckard</u>	Model:	<u>1900</u>
SN:	<u>133139</u>	Background Region A:	<u>20</u> cpm	B:	<u>17</u> cpm
Probe:	<u>End-window / Pancake / LEG / B.Y.</u>	C:	<u>37</u> cpm		
Background:	<u>40</u> cpm	Wipe #	cpm	Wipe #	cpm
<input checked="" type="checkbox"/> All points are background except:		1	42	10	313
Location	cpm	2	10	11	20
5	420	3	8	12	7
8	280	4	157		
10	530	5	21	RESURVEY 16 OCT 99 Background - 35 cpm	
		6	34		
		7	12		
		8	210		
		9	22	# 10	123



REVIEW

Loose surface contamination can usually be cleaned up using conventional janitorial methods although the rags and other cleaning materials will then have to be controlled as contaminated materials, that is, placed in your radioactive waste container. If loose contamination is absorbed into or worked into surfaces, it becomes more difficult to remove. Although it would now appear to be **fixed contamination**, it may once again become loose contamination due to grinding or abrasive actions (e.g., walking) or may simply leach from the surface. The survey for loose contamination is called a wipe survey.



The wipe survey is performed by wiping areas with a small piece of filter paper or cotton swab. The survey is performed over an area of approximately 100 cm² because that is the approximate surface area that would be brushed by a person walking through the lab. Even though this area is equivalent to a square approximately 4-inches on a side, the preferred method of performing this survey is to wipe an area in an S-shaped pattern over a distance of about 12 - 14 inches. If the item to be surveyed is small and does not have 100 cm² of surface to wipe, attempt to wipe the entire surface and report the results as activity per total surface area.

Moisten your wipe which can be pieces of filter paper, cloth smears, cotton-tipped swabs or Kimwipes. Key each wipe to the identified locations on the survey map. The number of wipes should be commensurate with the level of use. Concentrate more wipes and metering in areas of high activity or frequent usage. Once taken, the wipe is considered radioactive until analysis proves otherwise. Handle wipes so that you avoid cross-contaminating the wipe samples. Do not place them in your pocket as they may contaminate your clothing.

Wipe surveys are usually analyzed on low background, high efficiency laboratory equipment such as a liquid scintillation counter. Include a background sample, that is a sample vial which contains the same type of wipe material, but one which has not wiped any laboratory surfaces. Place all vials into counter trays including the background vial, and place trays in the counter. Set the counter windows as appropriate. We recommend that one counting region be kept *wide open*, that is to cover the entire energy range 0 - 2000 keV. In this mode, contamination spread from other labs may be detected and mitigated. It may be convenient to use the background subtract mechanism if the system has one. To insure good counting statistics, set the count time for at least 2 minutes and then count the wipes. Review the results for any indication of contamination. Areas with removable contamination in excess of the levels in the table below must be decontaminated and then re-wiped. Document your decontamination results on the original survey. Add your initials and the date.

Action Levels for Removable Surface Contamination

Contamination Units	Type of Radioactive Emitter		
	Alpha (α)	β^1 , γ , x	Low Risk β^2
dpm/100 cm ²	66	660	2,200
Net cpm/100 cm ²	23	230	770

¹ β emitter values are applicable for all β except **Low Risk** β

²Low Risk includes β maximum energies less than 200 keV (e.g., ³H, ¹⁴C, ³⁵S)

Meter and wipe survey results must be recorded on the survey sheet. Post the most recent survey in or next to the room (or post the location where survey results are kept), keep the previous surveys on file. All survey records, including counter results, must be kept for a minimum of 3 years.



New Liquid Scintillation Cocktail

For reasons of expediency and economy, the primary scintillation cocktail offered by MDS (formerly Stores) will now be Scintisafe Econo 2. The Safety Department Chemist has reviewed the composition literature and done some benchtop testing and determined that where appropriate, Scintisafe Econo 2 is suitable for disposal to the sanitary sewer. The literature claims good counting efficiencies for common radio-nuclides.

Spring Training Schedule

Radiation safety training has been scheduled from 15 February through 31 May at Union South. All classes begin at 12:30. Manuals can be obtained at Radiation Safety's Annex in room 19, Biochemistry, 11:00 am-2:45 pm Monday through Friday. Classes will be held on: February 16, 22; March 2, 10, 18, 26, 31; April 7, 13, 19, 28; and May 6, 14, 20, 26.

Schedules and other information can be found at
<http://www.wisc.edu/safety>

Newsletter questions? Suggestions? Subscription request? Email

ralph.north@ccmail.adp.wisc.edu

**UW-Safety Dept.
30 N. Murray St. 53715-2609**

(608)262-8769

