



# RADIATION REVIEW



**UW - Madison Safety Department    Radiation Safety Program**  
**103 N. Lake St.                    262-8769                                    May 1995**

## Radiation Safety Requirements

The University Radiation Safety Regulations (URSR) were revised to keep abreast of continuous Federal changes. These regulations are now less ambiguous and easier to implement than previous editions. Regardless, their goal is, and always has been, a radiation safe workplace implemented by responsible PIs and workers.

This newsletter will address minimum PI requirements. Please circulate this newsletter among your personnel so all workers understand the guidance.

## Surveillance / Security

When radioactive materials are used in a lab, there must be a worker present (**surveillance**) or the lab must be locked (**secure**). Emphasize awareness to your workers. If they see persons walking about who they do not know, they should ask the person if they need help.

Several times the UW has received license violations for having radiation labs unsecured and no workers inside (e.g., the worker had "just stepped out" or was "really only gone for a minute"). In 1978 four NRC inspectors walked into a lab, took pictures, made radiation measurements, and left without seeing any radiation workers.

Each PI is responsible for the security of all radioactive materials, to include radioactive waste, in his/her labs. Material not being used in active experiments should be secured in storage containers (e.g., refrigerator, freezer, cabinet, etc.).

## Radioactive Waste

Although no user has ever reported the loss of stock vials or active experiment containers, each year we receive 3 or 4 reports of lost radioactive waste because the container was misidentified. When Safety reviews such losses, we often find the container wasn't sufficiently labelled, often just identified by a small (1" x 2") piece of radioactive tape. A large container needs a large sign. All containers of radioactive materials must be conspicuously labelled with a yellow and red sign / label that is at least 3" x 8" printed with the radiation symbol and the words, **Caution - Radioactive Materials**. Safety has several thousand of these signs / labels. Call 265-5241 or go to the **Safety Annex, Rm 19 BioChem (11 AM - 3 PM)** to pick up these items.

PIs also need to uniquely identify radioactive waste. This is done by placing radioactive wastes in yellow bags inside conspicuously labeled waste containers. University Stores has (250 bag) cases of yellow bags for about \$60 (they can special order 25 bag lots for \$28). If 250 bags is too many, several PIs could buy one case together. Stores has sold about 25,000 bags, so there are enough bags sold for 2 - 3 years of radioactive waste at the UW.

Segregate sharps in a smaller container that can then be placed in your radioactive waste container. Safety personnel often open your waste and sort through it prior to incineration. Uncontained sharps have injured our workers.



## Surveys

It is our goal to have each PI survey every one of his/her authorized rooms monthly. Because some PIs use only small quantities of materials, we have promulgated these survey requirements based on the following survey frequency and radioactivity tables.

The survey results must be posted along with a description of the counting systems used during the survey. For a meter survey include make, model, and serial number of meter, type of probe (end-window, pancake, etc.), and background count rate (**cpm**).

Survey Frequency

Frequency	On-Hand Activity
Monthly	\$ 200 :Ci
Semi-annually	< 200 :Ci
Immediately	\$ 5 mCi use of <sup>125</sup> I

Survey Requirements for Beta (8) Emitters

Energy (keV)	On-Hand Activity	Type Survey
< 100	See Survey Table	wipe
100 - 200	< 200 :Ci	wipe
> 100	> 200 :Ci	meter and wipe

## Survey Action Levels

Action levels are equivalent to unacceptable radiation or contamination levels and require mitigation in the form of decontamination or shielding. The table lists both meter and wipe survey action levels. These

limits are only for radioactive materials work areas. Laboratory areas not used for radioactive materials work (e.g., floors, telephones, key pads, door knobs, etc.) should be at background levels (< 100 cpm with a meter and twice background on a wipe).

Action Levels<sup>1</sup> Unless Excepted

		8 (	<sup>3</sup> H, <sup>14</sup> C, <sup>35</sup> S
<b>Wipes</b>	dpm/100 cm <sup>2</sup>	660	2,200
	cpm/100 cm <sup>2</sup>	230	770
<b>Meter</b>		650 cpm	

<sup>1</sup>numbers are minus background

## Meters

Users who handle vials containing greater than 1 mCi of <sup>32</sup>P or greater than 5 mCi <sup>35</sup>S or <sup>14</sup>C must own a thin-window radiation survey meter. The NRC requires radiation survey meters be calibrated annually. Safety calibrates meters for free, saving PIs about \$80 per meter. The meter calibration program is a part of CORD. Thirty days prior to a meter's calibration due date, the program generates a letter which is sent to the PI giving notice that one of the lab's meters is due for calibration. If a meter is past the calibration due date, the PI is automatically suspended until the meter is brought in for calibration. Safety calibrates these meters to be read using the counts per minute (**cpm**) or **counts per second**



(cps) scale. For the type of work done on campus, the mR/hr scale does not truthfully represent the radiation levels encountered. A calibration sticker is placed on the meter listing its efficiency for 3 different beta energies:  $^{14}\text{C}$  (160 keV);  $^{99}\text{Tc}$  (300 keV); and  $^{32}\text{P}$  (1710 keV). LEG probes are calibrated for  $^{125}\text{I}$  energy x-rays and the efficiency is noted on the sticker.

## Training

All persons who will work with or handle radioactive materials, including new PIs and workers who only perform lab surveys or carry radioactive waste boxes, must be trained. Radiation Safety presents a 4-hour training block to prepare workers in the basics of radiation safety at the UW (the Summer training schedule is found at the end of the newsletter).

Each PI is responsible for providing additional training in the special potential hazards found in his/her laboratories. Also, **iodine** users must implement a radioiodine training program for their iodine workers. The requirements of this training are detailed in Section V, para. B, **URSR** and a checklist is included in Appendix T, **URSR**.

## Exceptions

The **URSR** is applicable to nearly every PI and practically every situation, however, we know it is not 100% applicable. If a PI is unable to comply with certain regulations, that PI should request an exception by writing to the RSO the reasons why compliance is impractical and what the lab desires to do instead to insure radiation safety. A Health Physicist will investigate each exception request and make recommendations to the University Radiation Safety Committee. Once approved, exceptions become part of a PI's authorization.

## Inventories

The CORD computer maintains an inventory of the activity received by each user. This computer does no decay calculations. PIs are responsible for reporting to CORD material

disposed of either through routine waste pick-ups, sewer release (if approved on the PIs authorization), or decay. Disposals by decay or sewer release must be reported quarterly.

## Radiation Monitoring

Of the approximately 4000 radiation workers on campus, only about 2000 are routinely monitored for radiation exposure. The UW has an \$80,000 contract with a commercial vendor to provide dosimeters. A worker must have the likelihood of working with at least 1 mCi of high energy ( $E_{\text{max}} > 200$  keV) beta or gamma emitters ( $^{18}\text{F}$ ,  $^{32}\text{P}$ ,  $^{45}\text{Ca}$ ,  $^{51}\text{Cr}$ ,  $^{125}\text{I}$ ) to receive a dosimeter. These dosimeters are not given to workers who work **only** with  $^3\text{H}$ ,  $^{14}\text{C}$ , or  $^{35}\text{S}$  or those who work with small quantities of  $^{125}\text{I}$  in (RIA) kits because these radiations are not penetrating enough to be detected by radiation dosimeters.

Some radiation workers also have the potential to be exposed to internal hazards, primarily  $^3\text{H}$  and  $^{125}\text{I}$ . Workers ordering more than 10 mCi (to include two 5 mCi vials) of  $^3\text{H}$  or more than 0.1 mCi of unbound  $^{125}\text{I}$  or 1 mCi of bound  $^{125}\text{I}$  must complete a bioassay.

For a  $^3\text{H}$  bioassay, the worker must submit a urine sample, and for an  $^{125}\text{I}$  (or  $^{131}\text{I}$ ) bioassay, the worker must have their thyroid counted for iodine uptake. See Section XIII, paras. B and C, **URSR** for more information.

## Questions

If you have questions in the following specialty areas, please contact the Health Physicists assigned that specialty. Below are some of the Health Physics responsibilities:

Waste	Ralph North
CORD	Larry Veleke
Iodine	Leola DeKock
Dosimetry	Sharon Johnston
Electronic Sources	Arne Jansen
Irradiators	Abdul Ben-Zikri



## Training

All radiation worker training classes are conducted in Biochemistry Rm. 1B (Biochem Teaching Lab) beginning at 12:30 PM on the dates indicated in the table. The training class is 4 hours long and concludes with a comprehensive exam based on the *Radiation Safety for Radiation Workers* booklet. Although the test is based on this training booklet, the training block does not cover all of the booklet. Therefore, workers should read this booklet prior to class. Call Radiation Safety at 2-8769 or 5-5241 to get a copy of the book.

Radiation Safety Training Schedule

2 June	20 July
8 June	26 July
14 June	4 August
20 June	10 August
28 June	16 August
6 July	22 August
14 July	28 August

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