



# RADIATION REVIEW



**UW - Madison Safety Department**

**Radiation Safety Program**

**30 N. Murray St.**

**262-8769**

**September 1997**

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

## Security

The UW's Security program has been approved by the UW's Radiation Safety Committee as an acceptable solution to the security violation cited during the NRC's August inspection. This program applies a slightly more liberal standard than the NRC regulations because it is based on a graduated response to security violations. NRC regulations specify that security applies to even negligible (i.e., < 1 mCi) quantities of radioactivity. The program the Radiation Safety Committee approved states:

1. Rooms posted with Caution - Radioactive Materials should be secured if unoccupied
2. Unsecured and unoccupied posted labs with small or undetectable (<sup>3</sup>H, <sup>14</sup>C) quantities of radioactivity are a violation, but will not likely result in a citable violation for the UW.
3. Unsecured and unoccupied posted labs with detectable quantities of radioactivity in excess of the Table 1 quantities are significant violations and may result in a citation and/or fine.

In addition to the routine audits conducted for each PI, Radiation Safety personnel will conduct two security

audits a year in each building. During these audits, if they find a lab unlocked and empty they will check for radio-activity with a meter. Depending on that check, they will leave a flyer noting whether unsecured radioactive material was present or all material was secured in locked cabinets or refrigerators. The RSO will maintain a database of the number of security violations (both minor and significant) versus the total number of rooms checked.

The primary goal of the audits will be to recommend corrective actions. We believe that security can be improved via a few small, insignificant fixes such as:

**Table 1 Security Levels**

Isotope	Citable Violation
H-3, F-18, Cr-51	10 mCi
C-14, Na-24, P-33, S-35, Ca-45, Hg-203	1 mCi
Na-22, P-32, Sc-46	0.1 mCi
I-125	0.01 mCi

1. Having Safety install hasps and locks on refrigerators/freezers/cabinets containing large quantities (e.g., stock vials, solutions, waste) of radioactive material
2. Disposing waste frequently (e.g., weekly) rather than only when large boxes are full necessary
3. Not storing waste for decay

If solutions can not be found and a lab receives a citable security violation in 2 consecutive audits, the Safety Department will pass the problem to the RSC member responsible for that department to correct the problem.

**NRC - Some Questions Answered**

The UW recently received a renewal of its NRC license. We had delivered the renewal packet to their office in February, 1994. Prior to final approval, the NRC sent a 43 item "deficiency" letter which pertained primarily to authorized users / PIs. Since the answers to these questions also explain why you are required to perform certain tasks, I will briefly summarize some of them:

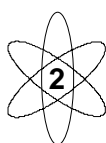
1. The NRC concept is that each PI has a mini NRC license issued through the UW's Radiation Safety Committee. Therefore, NRC requires the principal user to meet the minimum training and experience for an NRC license, specifically a minimum of 40 hours of training and experience in radiation safety and use.

2. Quantities of radioactive materials authorized are based upon (ingestion) radiotoxicity, type lab, and type use. Tables of radiotoxicity have been promulgated since the National Bureau of Standards published NBS Handbook 42, Safe Handling of Radioactive Isotopes in September, 1949. We are using the toxicity table published by the Inter-national Labor Organization which has 4 toxicity levels; very high to low. The classification of some common nuclides is listed in Table 2. Because licensing is concerned with protecting workers, the use of high toxicity nuclides requires more care than low toxicity. Most procedures performed in labs are very simple, wet operations which follow a well delineated protocol. Complex procedures or those with higher risk for contamination or airborne effluents are evaluated to insure safety. Lastly, the type of lab enters into the evaluation. At the UW we have 2 types of labs. A Type 1 lab is one in which protocols can be carried out on lab benches. A Type 2 lab is one in which the protocol must be carried out inside a properly vented fume hood that has been approved by Radiation Safety.

When Safety receives a new isotope request, we determine the radiotoxicity, ranking it from low to high. We review the Protocol Summary Sheet to determine the quantities used at any one time and the type of procedure.

**Table 2 Laboratory Classification**

Radiotoxicity	Nuclides	Level I	Level II
Low	H-3	135 mCi	1350 mCi
Moderate	C-14, F-18, Na-24, P-32, P-33, S-35, Cr-51, Hg-203	13.5 mCi	135 mCi
High	Na-22, Ca-45, Sc-46, Sr-90, I-125, I-131	1.35 mCi	13.5 mCi
Very High	Po-210	0.135 mCi	1.35 mCi



We call the least hazardous uses Level I use. This type of use carries with it the requirement for monthly meter and wipe surveys, portable survey meters on hand and in use during the procedures, annual audits of use by Safety. Level II use carries with it more requirements, such as either daily surveys of the lab or, as in the case of  $^{125}\text{I}$  use, surveys immediately after the procedure. While a Level III use is possible, it requires well engineered labs, survey requirements more stringent than Level II, and perhaps bioassays and environmental monitoring. We do not have any procedures which currently fall under Level III. Thus, Table 2 summarizes these three factors for simple, wet operations.

3. The NRC suggested that Safety conduct an audit of each PI quarterly. Our audit program is outlined in the UW Radiation Safety Regulations, Section XX. It promulgates an annual audit of PIs (unless the PI's compliance status requires more frequent audits). The NRC noted that Level II uses should have monthly audits by Safety. Therefore, every month Safety conducts a radiation and contamination audit of labs in which Level II uses occurred. This means Safety conducts a monthly survey of  $^{125}\text{I}$  hot labs.

It is for these reasons that we have set the single stock vial order limit to 10 mCi for most radiochemicals. Except for low toxicity nuclides, receiving more than 10 mCi in a single stock vial will require additional surveys and surveillance by the lab and Safety will apprise the PI of the additional requirements.

## Health Physics Resources on the Internet

### Radiation and Health Physics Home Page

<http://www.sph.umich.edu/group/eih/UMSCHPS/index.html>

This site, maintained by University of Michigan Student Chapter of the Health Physics Society, contains information and links related to radiation and radiation safety. It is an excellent place to start surfing through radiation related topics.

### Chart of the Nuclides

<http://www.dne.bnl.gov/CoN/index.html>

This is a nice, searchable version of the chart containing radionuclides and their decay data.

### National Nuclear Data Center (Brookhaven National Laboratory)

<http://www.nndc.bnl.gov/>

This site has lots of nuclear decay and reaction data, as well as good links to other radiation sites.

### Nuclear Regulatory Commission

<http://www.nrc.gov/>

Lots of useful information including latest news and information from the federal agency that oversees our license.

### Title 10 Code of Federal Regulations Part 20 from Worcester Polytechnic Institute

<http://www.wpi.edu/Admin/Depts/Safety/RSO/10CFR20/>

Many of the regulations we follow come from this document titled "Standards for Protection Against Radiation". This is a nicely organized, easy-to-use reference site.



**Radiation Training for Radiation Workers**

Training is held at Union South. Refer to "Today in the Union" for location.

All training starts at 12:30 p.m. and lasts approximately 4 hours. Training dates are subject to change, please call Safety at 2-8769 a few days before the scheduled training date to confirm.

**Radiation Safety For Radiation Workers  
1997 Training Dates**

<b>DATE</b>	<b>DAY</b>	<b>DATE</b>	<b>DAY</b>
September 19	Friday	November 13	Thursday
September 25	Thursday	November 19	Wednesday
October 3	Friday	November 25	Tuesday
October 9	Thursday	December 5	Friday
October 15	Wednesday	December 12	Friday
October 21	Tuesday	December 18	Thursday
October 27	Monday	December 29	Monday
November 7	Friday		

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