

## SECURITY & SAFETY FIRST, REST NEXT

### UMDNJ Radiation Safety Policy on Security of Radioactive Materials:

Section 4.5(e) states that: Once under the control of the licensee, radioactive material shall be secured in such a manner as to prevent unauthorized access or accidental exposure to the radioactive material. All radioactive materials shall be locked in a cabinet, refrigerator, or freezer, for which only the licensee and authorized individuals to handle the material possess a key. Laboratories containing radioactive material should be locked when the licensee or a designated user is not present.

Section 7.3(d) iii states that: The issuance of a violation for failure to secure radioactive material from unauthorized removal or access shall immediately result in placement of the license on a probationary period of at least six months. The accumulation of a second security violation within the probationary period may result in extension of probation or suspension as determined by the Licensing Subcommittee.

## RADIOACTIVE MATERIALS (RAM)

Review your security procedures to ensure that unauthorized entry or removal of RAM from radioactive storage area is prevented..

Perform frequent inventories of RAM.

Be aware of unauthorized individuals in shipping and receiving areas.

If possible, reduce the number of areas where RAM are stored and/or used and properly decontaminate and decommission the areas to be released.

Review your current and future RAM activities. If you possess RAM that are just being stored and have no future use, bring it to ORSS for storage or disposal.

Investigate all incidents of unaccounted (missing) RAM and report these incidents to the ORSS as soon as possible.

Note: The ORSS recommends a locked storage box that is attached to the refrigerator.



**ALWAYS  
SECURE RAM**

## RADIOACTIVE WASTE (RAW)

Any waste that contains or is contaminated with RAM is known as radioactive waste. No licensee shall dispose, or allow to be disposed, any RAM through release with normal trash. Never place RAW in corridors - even while waiting for ORSS staff. Ensure that all waste containers are closed securely. Shield radioactive material such that radiation levels are  $< 2$  mR/hr within a laboratory. Stock vials are the vials in which RAM is shipped by the manufacturer & may include a *Lead Pig* container. Stock vials and *Lead Pigs* must be brought separately to the radioactive waste room for disposal. Be sure to "deface radioactive label" and remove any lead shielding material prior to bringing to ORSS waste room. Stock vials being disposed to ORSS must be marked "disposed" in RAM inventory records. Do not place/mix stock vials with other types of waste. They may create unacceptable radiation levels ( $> 2$  mR/hr) in the vicinity of the waste container. ORSS personnel will be happy to answer questions on proper RAW disposal procedures.

There are four basic categories of radioactive waste for disposal purposes, such as: **dry solids, liquids, scintillation vials, and biological** materials.

Dry Solid Waste - Radioactive waste that does not contain free liquids. Dry waste may be damp from aqueous materials, but must not contain organic solvents or other material regulated as a hazardous waste. All waste must be

collected in blue bags provided by the ORSS. Sharps must be placed in a hard-walled sharp container. Each bag must be labeled with a Radioactive Waste Tag. This solid waste should be further segregated according to half-life category. Materials contaminated with short-lived nuclides ( $\leq 120$  days) are to be kept separate from long-lived nuclides ( $> 120$  days).

Liquid Waste: RAM to be disposed that does not contain solids (filters, pipette tips, stir bars, gels, etc. are not allowed). Disposal of RAM into sanitary sewer system shall not be performed. ORSS shall provide gallon containers to collect the liquid waste. Leave at least 10% head space for thermal expansion, neutralization, and to facilitate pouring of the waste when the containers are emptied at the waste facility. "Do not bring liquid waste to ORSS. You must call ORSS for pickup of liquid waste". Remove external contamination prior to waste pickup. Limit one radionuclide to container, if possible. Each gallon container must be labeled and completed with the information on Radioactive Waste Tag, such as, (a) Licensee name; (b) Radionuclide(s); (c) Activity amount (mCi or  $\mu$ Ci); (d) Date of pickup; (e) Chemical name(s).

Scintillation Vials: Segregate by media type (miscible or non-miscible or hazardous chemicals depending on the content and type of liquid scintillation cocktail), and half-life category. *Vials are to be stored upright in their flats.* Do not include dry vials, test tubes or any other waste forms. Vials must have tight, secure tops to prevent leakage during storage. It is encouraged to use the biodegradable liquid scintillation cocktail to minimize the volume of flammable liquids on hand and to minimize the volume of hazardous waste generated.

Biological Waste: Animal carcasses and bedding material contaminated with RAM are classified as biological waste. These are to be segregated by

three categories based on the half-life of the radionuclide; short-lived half-life  $\leq 120$  days; long-lived half-life  $> 120$  days; and  $^3\text{H}$  &  $^{14}\text{C}$  in concentrations less than  $0.05 \mu\text{Ci/g}$ . They are placed in a clear plastic bag which is then placed in a blue bag. Each bag must be labeled with a Radioactive Waste Tag and a Disposal Form. All infectious waste must be autoclaved prior to placing in a blue bag.

**Use of RAM in Animals:** All animals which have been given RAM should be isolated from the other animals that do not contain RAM. Cages that are used for housing animals containing RAM should be labeled with an appropriate RAM warning signs. The "Notice to Employees" and "Emergency Procedures" should be posted in a conspicuous place within the animal facility. The bottom of the cages should be lined with absorbent paper pads with plastic backing or other appropriate absorbent materials. A radioactive material waste disposal container should be in the area where the animals are located for use when cleaning the cages. The licensee must perform animal bedding changes. Licensees and animal attendants must use disposable gloves when handling wastes from RAM animals. These should be disposed of in the radioactive materials waste disposal. Cages are to be cleaned and surveyed at the end of each individual experiment. Survey records are to be maintained by the licensee. If available, the dishwasher in ORSS may be helpful for cleaning RAM contaminated cages. Once cages are cleared for release by ORSS, they should be returned to the animal facility for conventional washing.

**SURVEY METER OPERATION:**

Please conduct the following tests before performing personal survey or ambient survey:

Check calibration due date on the calibration certificate. If the calibration date is not current, please bring it to ORSS for calibration. Perform battery check, by rotating the knob to "BATT". Make sure the needle is on "Battery Test".

1. Locate and note the check source reading in mR/hr, cps, or cpm on calibration certificate.

2. Select appropriate meter scale (1X, 10X, etc.).
3. Place the probe against the check source.
4. Note meter reading in mR/hr, cps, or cpm and compare with calibrated value.
5. If the value differs by  $\pm 10\%$  contact ORSS.



**Monitoring for Contamination:**

A daily survey is required each day when unsealed RAM is used in experiments. The daily survey should include monitoring of hands, lab coat, work surfaces used, the floor adjacent to work area, your shoes, and potentially contaminated equipment using GM survey meter. The frequency of surveys may vary depending on the type of radionuclide, amount of activity used. Weekly contamination surveys shall be performed in areas where a total of  $\geq 200 \mu\text{Ci}$  of RAM is used in a week. Monthly surveys shall be performed in areas where  $< 200 \mu\text{Ci}$ , but more than exempt quantities, of RAM are routinely used (contact ORSS for procedures). One must document the GM counter survey results as well as the smear/wipe tests on the form provided by the ORSS. Once each month, a complete contamination survey of each laboratory must be completed using smear wipes. At least ten probable places of contamination must be surveyed and swipes counted by appropriate techniques. These surveys shall be retained for three years in lab record book for inspection by ORSS or NRC or NJDEP inspectors. Any contaminated areas found during the monthly survey must be decontaminated and resurveyed. The survey is to be annotated with a note indicating the "decontamination follow up survey results".

**Survey Procedure for Removable Contamination:** The smear or wipe test is used for surface contamination monitoring. A filter paper, fiberglass

disk, or paper (2.5 – 5 cm diameter) is wiped over a minimum surface area of  $100 \text{ cm}^2$ . Smear samples must be kept separated to avoid cross contamination of samples. Data should be maintained with the date and location of each sample. Counting for  $\beta$ -radiation is done with the liquid scintillation counter (LSC).  $\gamma$ -contamination on wipes can be measured with LSC or gamma counter. Decontamination procedures shall be initiated immediately whenever a contamination survey or spot check yields positive results. The trigger level for removable contamination surveys of all areas and equipment are  $< 200 \text{ dpm}/100\text{cm}^2$  for all radionuclides with the exception of  $\alpha$ -emitting radionuclides, such as  $^{210}\text{Po}$ , which has a trigger level of  $20 \text{ dpm}/100\text{cm}^2$  above background levels.

**Converting CPM into DPM:**

$$\text{DPM} = \frac{\text{CPM}}{\text{Counter Efficiency}}$$

DPM = disintegrations per minute;

CPM = sample cpm – background cpm;

cpm = counts per minute.

For counter efficiency, contact ORSS.

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