VI. General Radioactive Material Use

A. Operating Considerations

1. Before any procedure is performed, consideration should be given to the amount and type of RAM being used to determine the need for additional precautions, such as remote handling, hoods, air sampling devices or special working surfaces. Consideration should also be taken for the volume and type of waste generated. ORS will be available for assistance on initial or unusual operations.

2. Determine if an individual will be required to have a personal monitoring device or participate in a bioassay or in vivo counting program. This depends on the radionuclide, quantity, frequency of use, chemical form, and type of work being performed. Refer to Section IV, Exposure Monitoring.

3. Transferring of RAM from one Authorized User to another user under our State license (MCW and FH) may be made ONLY with PRIOR approval from ORS.

4. Gamma emitting radionuclides are to be used and stored in such a way so that the total dose equivalent to individual members of the public does not exceed 1 mSv (100 mrem) in a year or in excess of 0.02 mSv (2 mrem) in any one hour in unrestricted areas.

B. Safety Rules for Working with RAM

1. Wear appropriate protective clothing (i.e. lab coat, gloves, closed-toe shoes).

2. Use remote handling tools, as appropriate.

3. Wash hands and monitor clothing, as appropriate, for contamination after each procedure and before leaving the area.

4. Do not eat, drink, smoke, or apply cosmetics in a restricted room or area where RAM is used.

5. Do not store food, drink, or personal effects with RAM.

6. Store radioactive waste only in specially designated and appropriately shielded receptacles in a secured area.

7. Never pipette RAM by mouth.

8. Transport RAM in appropriately closed and shielded containers.

C. Storage and Labeling of RAM

It is the responsibility of the Authorized User and radiation workers to ensure that RAM is stored and labeled to comply with the following procedures and to promptly report non-compliance to the ORS.

1. The room or area where RAM is stored shall be posted with a “Caution Radioactive Materials” sign. Refer to Section V, Radioactive Work Areas.

2. RAM must be secured from unauthorized access and removal when not in use.
3. Unbreakable containers are recommended for storage of RAM. Radioactive liquids shall not be stored in open containers.
4. Freezers used for storage of RAM shall be kept reasonably free of frost. When defrosting a freezer, caution shall be used to prevent the spread of possible contamination.
5. Radioactive gases and volatile radionuclides shall be stored in a negative pressure airflow hood.
6. Equipment or containers known or suspected to be contaminated with RAM should be marked with an appropriate sign or tape until such contamination is removed.
7. Sinks shall be designated for the disposal of radioactive liquid waste and marked appropriately.
8. Radiation caution signs and tape shall only be used in accordance with the appropriate government regulations. Indiscriminate use of caution tape (e.g., to display notices) is prohibited.

D. Security

Preventing loss or theft of RAM is essential to protect individuals and the environment from unnecessary radiation exposure. The State regulations require that MCW “shall secure licensed or registered radioactive material in an unrestricted area from unauthorized removal or access.”

For labs within the card-key access controlled areas within MCW:

- Doors to labs where RAM is used or stored should be closed and locked when unattended.
- Stock vial storage areas containing quantities greater than 10 times the ALI should be in locked cabinets or freezers, with key distribution to essential personnel.

For labs outside the card-key access areas, such as the Eye Institute or FH:

- Doors to labs shall be locked when unattended by department personnel.
- Stock vial storage areas containing quantities greater than 10 times Appendix B of DHS 157 shall be kept locked when unattended.

E. Check and Calibration Sealed Sources

A check source is any RAM less than a generally licensed quantity that is encased in a capsule designed to prevent leakage. Authorized Users may possess and use sealed sources for calibration and reference use.
F. Irradiators

Use of irradiators is limited to individuals whose training and credentials have been reviewed and approved by the RSO. Operators are required to pass a written exam for each type of use and for each irradiator they wish to operate. Contact ORS for specific details and forms.

G. High Energy Beta-Emitter Use

Individual users of high-energy beta-emitters ($\beta_{\text{max}} > 1$ MeV) in quantities greater than 1 mCi shall:

1. Use low atomic number materials, such as plastic or wood for shielding.
2. Use remote handling devices when appropriate.
3. Wear a TLD ring badge to monitor extremity exposure. Wear the ring so that the TLD chips are on the palm side of the hand.
4. Perform a GM and/or a wipe test survey after each use, but at least at the end of each day of use. The survey is to include, but not limited to, lab bench tops, floors around work area, drawer handles, utensils/equipment, lab coats and bottoms of shoes.

H. Radioiodination

Due to radioactive iodine's radiotoxicity, special safety precautions must be taken. Since free iodine has the ability to volatilize then be inhaled and concentrate in the thyroid, radioiodination procedures shall only be performed in facilities approved by the ORS and by individuals approved by the RSC.

Thyroid scans are required for workers iodinating or observing the iodination if greater than one millicurie is used.

Normally protein is only stable for a few weeks after the iodine is bound. This time duration varies depending on the nature of the protein. After a period of time, the protein is broken down by the radiation, liberating free iodine. Therefore, workers should be cautious when handling old iodinated proteins.