Source Inventory and Control Program

I. Purpose

A. To ensure all licensed material on campus is controlled and accounted for.

B. To provide guidance on the proper handled and care of licensed material to maintain exposure As Low As Reasonably Achievable (ALARA)
Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>Purpose</td>
<td>i</td>
</tr>
<tr>
<td>II.</td>
<td>Definitions</td>
<td>2</td>
</tr>
<tr>
<td>III.</td>
<td>Responsibilities</td>
<td>2</td>
</tr>
<tr>
<td>IV.</td>
<td>Requirements For NRC Licensed Material/Equipment and State Registered Material/Equipment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. Permissible Quantities</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>B. Security</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>C. Inventory</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>D. Leak Test of Sealed Non-Gaseous Sources</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>E. Sealed or Unsealed Sources</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>F. Radiation Producing Machines</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>G. Transfer Responsibilities of RAM/Machines Between WMU AUs/Supervisors or The Location of Radiation Producing Machines</td>
<td>4</td>
</tr>
<tr>
<td>V.</td>
<td>Requirements For General Licensed (GL) Material/Equipment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. Inventory</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>B. Leak Test</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>C. Procurement, Receipt, and Transfer of Ownership With Another WMU User.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>D. Transfer of the Machine to an Off-Campus Location</td>
<td>5</td>
</tr>
<tr>
<td>VI.</td>
<td>Final Conditions</td>
<td>5</td>
</tr>
</tbody>
</table>

Appendix

| A.      | Procurement, Receipt, and Transfer of Responsibility for Sealed and Unsealed RAM | 6    |
| B.      | Movement of Unsealed Radioactive Material on Campus | 8 |
| C.      | Procurement, Receipt, Transfer of Responsibility, or a Change in Location of Radiation Producing Machines | 9 |
| D.      | Procurement, Receipt, or Transfer of Generally Licensed Material/Machines | 12  |
II. Definitions

<table>
<thead>
<tr>
<th><strong>Contact Reading</strong></th>
<th>Dose rate readings taken within 1/4 - 1/2 inch from the surface of an object.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Leak test</strong></td>
<td>A wipe survey performed on non-gaseous sealed sources to ensure that there is no leakage of radioactive material. Devices containing only Kr-85 or H-3 are exempt from leak testing. Also, devices that contain $\leq 100 \mu$Ci of $\beta$ or $\gamma$ emitting material are exempt.</td>
</tr>
<tr>
<td><strong>License</strong></td>
<td>Official authorization to possess and use radioactive material or radiation producing machines. The license also stipulates additional parameters by which we must abide while using radioactive materials or machines.</td>
</tr>
<tr>
<td><strong>Package</strong></td>
<td>The packaging together with its radioactive contents as presented for transport.</td>
</tr>
<tr>
<td><strong>Packaging</strong></td>
<td>The container or receptacle that make up the containment system for radioactive transport. This includes any absorbent materials, shielding, etc.</td>
</tr>
<tr>
<td><strong>RAM</strong></td>
<td>An acronym for radioactive material or licensed material; the source material, special nuclear material, or by-product material received, possessed, used, transferred, or disposed of under a license issued by the NRC.</td>
</tr>
</tbody>
</table>

III. Responsibilities

A. Executive Manager
   1. Support the RSO and AUs in complying with the requirements of this program.

B. Radiation Safety Officer (RSO)
   1. Order the needed radioactive material.
   2. Receive the radioactive material ordered.
   3. Maintain the Campus RAM inventory.
   4. Investigate discrepancies between the Campus RAM inventory and the AU semi-annual inventories.
   5. Review radiation producing machine registration requests.
   6. Complete and submit radiation producing machine registrations to the appropriate State Agencies.
   7. Perform initial run surveys for radiation producing machines.
   8. Provide storage for the documentation required by this program.

C. Authorized User (AUs)
   1. Perform the semi-annual source inventory.
   2. Maintain the RAM Activity Log.
   3. Leak test sealed non-gaseous sources under their control.
   4. Complete or verify complete RAM order requests prior to submitting them to the RSO.
   5. Notify the RSO of the need to transfer RAM accountability from one AU to another.
6. Move or direct the movement of RAM to and from the storage area and their lab.

D. Radiation Producing Machine Supervisors
   1. Complete the registration requests before the machine is purchased or brought on campus.
   2. Develop the operating procedures for the safe operation of the machines.
   3. Run the machines in accordance with approved procedures.

IV. Requirements For NRC Licensed Material/Equipment and State Registered Material/Equipment
   A. Permissible Quantities
      1. *Maximum quantity of licensed material on campus is directed by our license.*
      2. *Each AU is authorized by the RSO a maximum quantity per isotope allowed to be in use, storage, and in waste in their lab.*

   B. Security
      1. *Unattended sources and radiation-producing machines OR the rooms containing them will be locked.*
      2. *A central storage area will be used for unsealed material.*
      3. While working with material, the user is responsible for its security.
         a. A good work practice is to maintain the material within 'line of sight.'

   C. Inventory
      1. *A semi-annual inventory of all sealed and unsealed sources will be conducted.*
      2. The semi-annual inventory will include:
         a. An area by area accounting.
         b. For each isotope:
            i. Useable or contained in the original vial
               a. Calibration date,
               b. Lot number,
               c. Estimate of volume remaining.
            ii. Waste generated in the lab
               a. Estimated volume of liquid waste,
               b. Estimated volume of dry waste,
               c. Estimated volume sent to the storage area.
      3. The RAM activity log for each area will:
         a. Assist in maintaining the inventory,
         b. Provide an accounting of use to verify compliance,
         c. Provide a record of procurement, use, disposal, and transfer.
D. Leak Test of Sealed Non-Gaseous Sources
1. **Tests are required semi-annually (every 6 months).**
2. The source owner is responsible for conducting the leak test.
3. The leak test will be performed in accordance with Appendix F to Radiological Controls Program procedure.
   a. A source specific procedure may be used with approval from the RSO.

**NOTE:** NUREG-1556, Vol. 11. "Program Specific Guidance about Licenses of Broad Scope" states that the NRC has found centralized purchasing and receipt to be effective in controlling licensed material entering the institution through normal commercial channels, particularly for larger institutions.

E. Sealed or Unsealed Sources
1. Orders are given to the RSO.
2. The RSO places the orders.
3. The RSO will receive all orders.

**NOTE:** The Michigan Department of Consumer and Industry Services Ionizing Radiation Rules states a person shall not … acquire, own, possess, or use a radioactive material or other source of ionizing radiation unless licensed, registered, or exempted by the department.

F. Radiation Producing Machines
1. Should not be brought on campus before it is registered.
2. The user will develop and submit operating procedures for each machine.
3. Users give registration requests to the RSO.
4. The RSO submits registration applications to the Department of Consumer and Industry Services.
5. A survey must be done during the initial run of a new machine or machine that had maintenance performed on it.

G. Transfer Responsibilities of RAM/Machines Between WMU AUs/Supervisors or The Location of Radiation Producing Machines
1. Handled the same as an order to a vendor.
2. Requests are given to the RSO.
3. The RSO documents the transfer.
V. Requirements For General Licensed (GL) Material/Equipment

NOTE: These requirements are for instruments and articles such as Gas Chromatograph - Electron Capture Detector (GC-ECD) and does NOT pertain to items such as smoke detectors which are also under a GL.

A. Inventory
   1. The RSO will keep a record of GL items, including:
      a. Name of person responsible of the equipment,
      b. Isotope, quantity and type,
      c. Location
      d. GL reference number
      e. Frequency of required Leak Tests

B. Leak Test
   1. The frequency specified under the terms of the GL.
      a. Tests are required semi-annually (every 6 months) for items that do not have a specified frequency.
   2. The machine owner performs leak tests.
   3. The leak test will be performed in accordance with Appendix F to Radiological Controls Program procedure.
      a. A specific procedure may be used with approval from the RSO.

C. Procurement, Receipt, and Transfer of Ownership With Another WMU User.
   1. The user will develop and submit operating procedures for each machine.
   2. The user must notify the RSO of the intent to purchase a GL machine.
   3. A survey must be conducted when it arrives.
   4. A record of all transfers will be maintained by the RSO.

D. Transfer of the Machine to an Off-Campus Location.
   1. Permission must be obtained from the Vendor holding the GL before the item can be moved.
   2. The Transportation of Radioactive Material/Waste Program governs the transportation requirements.
   3. A record of all transfers will be maintained by the RSO.

VI. Final Conditions
A. All licensed and registered material is accounted for.

B. All records are maintained in accordance with the Administrative Controls Program.
Appendix A
Procurement, Receipt, and Transfer of Responsibility for Sealed and Unsealed RAM

A. Procurement

The following steps will be performed by the AU or Permit Holder needing RAM:
1. Determine the isotope and quantity needed.
2. Complete the Radionuclide Order Form.
3. Obtain authorization from the responsible AU.
4. Submit the completed form to the RSO.

The following steps will be performed by the RSO:
5. Review the order form.
   a. AU is authorized for the type, quantity, and use.
   b. Quantity will not exceed user's inventory.
   c. Quantity will not exceed the campus' inventory.
   d. The form is complete and information is valid.
6. Submit a MDEQ registration application, if necessary.
7. Place the order with the vendor.
   a. Direct the vendor to clearly mark the package: “Atten: Radiation Safety Officer”
   b. Direct the location and time for the delivery.

B. Receipt of RAM

The following steps will be performed by the RSO:
1. Receive the package from the vendor, shipper, or WMU's Shipping and Receiving personnel.

**NOTE:** Licensed material must have its receipt survey conducted within three (3) hours of receipt for packages labeled Radioactive White I, Yellow II, or Yellow III.

**NOTE:** Licensed material must have its receipt survey conducted within three (3) hours of receipt for packages damaged or degraded.

2. Inspect the shipping packaging.
4. Perform a radiation and contamination survey of the exterior of the package.
   a. Notify the vendor, the final carrier, Department of Transportation, and Nuclear Regulatory Commission, if:
      i. > 200 mR/hr contact
      ii. > 10 mR/hr at 1 meter
      iii. > 2200 dpm/100 cm² β−γ and/or > 220 dpm/100 cm² α
5. Document the results of the surveys and package inspection.
6. Open the package.
7. Perform a radiation and contamination survey of the package contents.
8. Verify the shipping documentation and the contents agree.
10. Transfer and place the material in the proper storage location.
11. Notify the Authorized User of the receipt of their ordered material.
12. Update the RAM Activity Log.
13. Update the Campus’ RAM Inventory list.

C. Transfer of responsibility for RAM between WMU AUs

The following steps will be performed by the AU or Permit Holder needing RAM:

1. Determine the isotope and quantity needed.
2. Complete the Radionuclide Order Form, specifying a material transfer.
3. Obtain authorization from the responsible AU.
4. Submit the completed form to the RSO.

The following steps will be performed by the RSO:

5. Review the order form.
   i. AU is authorized for the type, quantity, and use.
   ii. Quantity will not exceed user's inventory.
   iii. Quantity will not exceed the campus' inventory.
   iv. The form is complete and information is valid.
6. Submit a change to the MDEQ registration, if necessary.
7. Notify the receiving AU of approval or disapproval.
8. Transfer the RAM Activity Log with the material.
Appendix B
Movement of Unsealed Radioactive Material on Campus

NOTE: This section refers to on-campus movements ONLY. Movement of radioactive material over public roadways is addressed in the Transportation of Radioactive Materials/Waste Program.

NOTE: This section refers to usable material. The requirements movement of radioactive waste is addressed in the Radioactive Waste Program.

A. Movement of Unsealed Radioactive Material from the storage area to the work area.

The following steps will be performed by the AU or Permit Holder using the RAM:
1. Ensure the material is in its shipping container.
2. Ensure the outside of the container is clearly marked as radioactive material.
3. Transfer the material using the predetermined transfer path.
   a. Notify the RSO if the predetermined transfer path is unavailable.
   b. Transfer the material using an approved alternate path.
4. Notify the RSO of any problems with the movement.

B. Movement of Unsealed Radioactive Material from the work area to the storage area.

The following steps will be performed by the AU or Permit Holder using the RAM:
1. Wipe test the outside of the source vial.
   a. Decontaminate as necessary to < 1,000 dpm/wipe.
2. Place the sample vial into its shipping container.
3. Wipe test the outside of the shipping container.
   a. Decontaminate as necessary to < 1,000 dpm/wipe.
4. Transfer the material using the predetermined transfer path.
   a. Notify the RSO if the predetermined transfer path is unavailable.
   b. Transfer the material using an approved alternate path.
5. Notify the RSO of any problems with the movement.
Appendix C
Procurement, Receipt, Transfer of Responsibility, or a Change in Location of Radiation Producing Machines

NOTE: The Michigan Department of Consumer and Industry Services Ionizing Radiation Rules states a person shall not ... acquire, own, possess, or use a radioactive material or other source of ionizing radiation unless licensed, registered, or exempted by the department.

A. Procurement
The following steps will be performed by the Supervisor or Permit Holder needing the machine:
1. Identify the machine needed.
2. Complete the Radiation Machine Registration Request Form.

NOTE: The Vendor’s manual or instructions may be used in lieu of developing a WMU operating procedure.

3. Develop the operating procedures for the machine, including:
   a. Precautions and limitations of the machine operation.
   b. Radiation protection guidelines.
      i. The Radiation Safety Officer can assist.
   c. Steps for safe operation.
   d. Any pertinent technical information from the vendor’s manual.
4. Submit the completed form and a copy of the operating procedure(s) to the RSO.

The following steps will be performed by the RSO:
5. Transcribe information from the request form to the State’s Registration Application or draft a letter stating the desired change to an existing registration.
6. Submit the application or letter and necessary fees to the State.
7. Notify the applicant of the application status.
8. Authorize the order for the machine when the registration certificate and tag has arrived.

B. Receipt of a Radiation Producing Machine
The following steps will be performed by the Supervisor or Permit Holder needing the machine:
1. Notify the RSO when the machine arrives, is in place, and ready for operation.
2. Post the required documents in the room. (See the Radiological Controls Procedure)
The RSO must be present to verify radiation levels during the initial operations of a radiation producing machine.

3. Run the machine in accordance with the approved operating procedures.

The following steps will be performed by the RSO:

4. Perform a radiation survey during the initial run, include as a minimum:
   a. Contact; all sides, top and bottom if accessible.
      i. See Part 13 of the Michigan Department of Consumer and Industry Services Ionizing Radiation Rules for specific requirements based on the machine type.
   b. General Area.
   c. Adjacent areas, if a contact readings or General Area levels cannot be obtained.

5. Determine if the room needs additional posting or shielding. (See the Radiological Controls Procedure)

6. Provide a copy of the initial survey to the area supervisor for future comparison.

7. File the survey, application, and registration.

8. Update the records as necessary.

C. Transfer of responsibility for the machine between WMU Supervisors or a change in the machine's location.

The following steps will be performed by the Supervisor or Permit Holder needing the machine:

1. Identify the machine needed.

2. Complete the Radiation Machine Registration Request Form specifying the transfer.

3. Obtain the approval signatures.

4. Submit the completed form.

The following steps will be performed by the RSO:

5. Transcribe information from the request form to the State’s Registration Application or draft a letter stating the change.

6. Submit the application or letter and necessary fees to the State.

7. Notify the applicant of the application status and when the registration arrives.

The following steps will be performed by the Supervisor or Permit Holder needing the machine:

8. Move the machine when the registration certificate and tag has arrived.

9. Notify the RSO when the machine is in place, and ready for operation.

10. Post the required documents in the room. (See the Radiological Controls Procedure)
NOTE: The RSO must be present to verify radiation levels during the initial operations of a radiation producing machine.

11. Run the machine in accordance with the approved operating procedures.

The following steps will be performed by the RSO:

12. Perform a radiation survey during the initial run, include as a minimum:
   a. Contact; all sides, top and bottom if accessible.
      i. See Part 13 of the Michigan Department of Consumer and Industry Services Ionizing Radiation Rules for specific requirements based on the machine type.
   b. General Area.
   c. Adjacent areas, if Contact readings or General Area levels cannot be obtained.

13. Determine if the room needs additional posting or shielding. (See the Radiological Controls Program.)

14. Provide a copy of the initial survey to the area supervisor for future comparison.

15. File the survey, application, and registration.

16. Update the records as necessary.
Appendix D
Procurement, Receipt, or Transfer of General Licensed Material/Machines

A. Procurement
The following steps will be performed by the Supervisor or Permit Holder needing the machine:
1. Identify the machine needed.
2. Notify the RSO of intent to purchase/obtain.
3. Obtain a copy of the General License (GL) from the vendor.
4. Develop the operating procedures for the machine, including:
   a. Precautions and limitations of the machine operation.
   b. Radiation protection guidelines.
      i. The Radiation Safety Officer can assist.
   c. Steps for safe operation.
   d. Any pertinent technical information from the vendor's manual.
5. Submit a copy of the GL and the operating procedure(s) to the RSO.
6. Order the machine.

B. Receipt of a Radiation Producing Machine
The following steps will be performed by the Supervisor or Permit Holder needing the machine:
1. Notify the RSO when the machine arrives, is in place, and ready for operation.

The following steps will be performed by the RSO:
2. Survey the instrument.
3. Determine the frequency for conducting required leak tests.
4. Update and file the records as necessary.

C. Transfer of responsibility for the machine between WMU AUs or a change in the machine’s on-campus location.
The following steps will be performed by the Supervisor or Permit Holder needing the machine:
1. Identify the changes needed.
2. Draft a letter to the vendor holding the General License.
3. Obtain the approval for the change from the vendor.
4. Submit a copy of the General Licensee's approval of the change to the RSO.
5. Make the prescribed change.

The following steps will be performed by the RSO:
6. Update the records as necessary.