

Open Source – Posting

1.0 Statement

All areas listed on Open Source Radioisotope User Permits (RUP) shall be posted with the information required for compliance with the legal requirements. Such postings are provided to communicate the type of radiation hazard and to provide information for emergency and routine work within these areas.

2.0 Definitions

ALI (Annual Limit of Intake)

The activity, expressed in Becquerels (Bq), of a radionuclide that will deliver an effective dose of 20 mSv during the 50-year period after the radionuclide is taken into the body of a person 18 years old or older, or during the period beginning at intake and ending at age 70 after it is taken into the body of a person less than 18 years old. ALI's are listed in the Radiation Safety Manual, Pg. 21.

Exemption Quantity (EQ)

Isotope specific quantity defined by regulations below which Federal licensing is not required. Exemption Quantities are listed in the Radiation Safety Manual.

Open Source Permits

Open source RUP are internal nuclear substance permits specifically authorizing the use of open source nuclear substances and the conditions of that use.

Open Source Radioisotopes

For the purposes of this procedure manual an unsealed source is a radioactive liquid, powder or gas that can be absorbed ingested or inhaled into the body presenting both an internal and an external radiation hazard.

Radiation Warning Symbol

The radiation warning symbol shall be used as outlined in this procedure to identify all areas where nuclear substances and radiation devices are used or stored.

Radioisotope/Nuclear Substance Laboratory Posters

CNSC authorized posters which identify laboratory classification. There are two Nuclear Substance Laboratory posters; one for "Basic Level" Laboratories" and one for "Intermediate Level" Laboratories" (available through HSMS>Documentation).

Laboratory Classification

Open source permits may be classed as RAM Storage, Exemption Quantity, Basic or Intermediate based on the maximum amount of radioactivity per any individual container in the lab at any time.

RAM Storage Laboratory

RAM Storage laboratories are used only for the storage of open or sealed source radioisotopes. No handling or disposal of radioisotopes is permitted in a RAM Storage laboratory.

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Exemption Quantity (EQ) Laboratory

The maximum activity in any single container is less than the EQ for the radioisotope in an Exemption Quantity laboratory. See the Radiation Safety Manual for isotope specific EQ's

Basic Level Laboratory

No more than 5 ALI in any single container may be used or stored in a Basic Level Laboratory. See the Radiation Safety Manual for isotope specific ALI's.

Intermediate Level Laboratory

No more than 50 ALI of nuclear substances may be used or stored in an Intermediate Level Laboratory.

Action Level

An action level refers to a specific parameter (in this case, level of radioactive contamination) that if reached may indicate the loss of control of part of the radiation protection program and must trigger (a) specific action(s) to regain control.

At Memorial University, the Action Level for removable radioactive contamination is 0.5 Bq/cm² for class B and C radionuclides, 0.3 Bq/cm² for class A radionuclides. Different Action Levels for certain nuclear substances may be required and will be listed in the conditions of the Radioisotope User Permit. The contamination level may be averaged over an area not exceeding 100 cm².

Nuclear Energy Worker (NEW)

A Nuclear Energy Worker is a person who is required in the course of their work at the University to perform duties in such circumstances that there is a reasonable probability that the person may receive a dose of radiation that is greater than the prescribed limit for the general public (1 mSv/year). All workers will be informed in writing by the RSO of their NEW status.

3.0 Procedures

3.1 Lab Classification

3.1.1 The University Radiation Safety Committee (URSC) approves classification of open source laboratories as Exemption Quantity, Basic or Intermediate on the basis of container limits submitted by the individual researcher for each isotope.

3.1.2 If a laboratory is a multi-permit facility, listed on both Basic and Intermediate permits, then all individuals working in the laboratory shall comply with the Intermediate rules.

3.2 Posting and Labeling

3.2.1 A copy of the Radioisotope User Permit and Authorized Worker List shall be posted in a prominent place in each location listed on the permit as approved for manipulation or storage of nuclear substances (the exception to this involves sealed source/instrumentation laboratories housing shared liquid scintillation counters (LSC) where only the responsible person listed on the LSC permit is required to post an active RUP and worker list). It is the responsibility of Permit Holder to remove expired permits.

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- 3.2.2 All laboratories listed as approved locations on a RUP shall have the fully completed Radiation Hazard Sign (available through HSMS>Documentation) posted at all entrances to the laboratory. The RUP holder is responsible for ensuring that up to date signs are posted in COLOR. The Contact Information shall include information on how to reach the Permit Holder and/or Designate during the workday as well as after hours. The University Emergency Contact Information (CEP) shall also be included.
- 3.2.3 All laboratories listed as approved locations on a RUP shall have the following signs/posters posted within the laboratory;
- CNSC “Basic Level”, or “Intermediate Level” room classification poster (Figures 1 & 2), or MUN “Sealed Source” or “Exemption Quantity” laboratory poster.
 - CNSC Guidelines for Handling Packages Containing Nuclear Substances poster.
 - CNSC Spill Procedures poster.
- All posters are available through HSMS>Documentation and must be printed IN COLOR..
- 3.2.3
- 3.2.4 Any occupied location outside the storage area, room or enclosure where radiation fields are in excess of 25 $\mu\text{Sv/hr}$ at any time shall be posted as a radiation area and be accessible only to Nuclear Energy Workers (NEW) or personnel under the supervision of a NEW from that area. The warning “Rayonnement – Danger – Radiation” shall be posted.
- 3.2.5 Areas and equipment within laboratories where open source nuclear substances are used and or stored shall be clearly labeled with the radiation warning symbol. The radiation warning symbol **shall** be removed when the nuclear substances and/or radiation devices are removed and contamination monitoring has confirmed that there is no removable radioactive contamination in excess of the Action Level. As long as the radiation warning symbol is in place, the work in the area shall follow the procedures outlined in the Radiation Safety Manual.
- 3.2.6 Vessels containing nuclear substances and radiation devices in excess of one exemption quantity (1 EQ) shall be labeled with the radiation warning symbol, the name of the radioisotope, activity and the corresponding date of measurement, physical form and the name of the Permit Holder. A fridge, freezer or cabinet used to store such a vessel shall be marked on the exterior with the radiation warning symbol to indicate the presence of nuclear substances and radiation devices. The warning “Rayonnement – Danger – Radiation” shall be posted.
- 3.2.7 Receptacles designated for radioactive waste shall be clearly marked with the Radioisotope Warning Symbol and be inaccessible to unauthorized workers.

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- 3.2.8 Cages housing animals injected with nuclear substances shall be labeled with a radiation warning symbol, radioisotope, quantity of nuclear substance (i.e, activity) at a given time and the name of the Permit Holder.
- 3.2.9 Radiation warning symbols shall only be used as outlined in this RSOP. Unwarranted/frivolous radiation warning symbols **must** be removed.

Summary of Required Postings for every Open Source Radioisotope Labs

- a) Radioisotope User Permit and Authorized Worker List
- b) CNSC Laboratory Classification Poster or equivalent
- c) CNSC guidelines for handling packages containing nuclear substances poster.
- d) CNSC Spill Procedures poster.
- e) Radiation Hazard Sign at all laboratory entrances.

Note: The use of Log Sheets is recommended but not required if copies of the Nuclear Substance Inventory Forms for disposed vials or kits are stored in the Records Binder along with the corresponding Weekly Contamination Monitoring Sheets.

Summary of where Labeling with Radiation Warning Symbols is required:

- a) Benches when nuclear substances are present
- b) Equipment when nuclear substances are present
- a) Storage areas when nuclear substances are present
- b) Doors of rooms with >100 exemption quantities (EQs) or >25 $\mu\text{Sv/hr}$
- c) Sinks and fume hoods designated for use with nuclear substances
- d) Containers when nuclear substances are present.

When nuclear substances are no longer present, the radiation warning symbol **must be removed.**