

Basic Radiation Safety for Lab Personnel

- ◆ Radioactive Materials
 - Radiolabelled chemicals
 - Sealed sources of radioactive material
 - Radiation Devices containing sealed sources
- ◆ X-ray (Radiation Emitting Devices)
- ◆ LASERS

Environmental Health and
Safety Office
Version September 2020



**University
of Manitoba**

Duty to Inform of Potential for Hazard

Potential Hazard from Radioactive Material - “Low level ionizing radiation may induce pre-mature aging and cancer. The exposure from radioactive materials used in areas controlled by the University of Manitoba is so small that the increase risk is insignificant.”

Additionally, the Canadian Nuclear Safety Commission (CNSC) has Federal authority to issue anyone (permitted worker or not) that violates the Nuclear Safety and Control Act or does not comply with the University training, a personal fine (fines start at \$300).

Potential Hazard from X-rays - Low level ionizing radiation may induce pre-mature aging and cancer. Based on past and current exposure reports, the exposure from X-ray equipment used in areas controlled by the University of Manitoba is so small that the increased risk is insignificant.






Potential Hazard from Lasers - High-powered lasers (Class 3B or Class 4) may be hazardous under direct or reflected viewing and may cause eye injury, skin damage or fire conditions. Careful attention to follow warning signs on doors, activated area warning devices and asking questions of the laser operators will reduce the risk.

Please do your part by following the instructions in this training, your site-specific training and observe all signs/labels.



Lab Signage

- Workplace Hazard Information Placard - WHIP
- Red bordered signs: RESTRICTED ACCESS
- Other legislated signs: X-ray and Laser
(all the signs contain contact information for lab personnel and security services)
- Hazard Labels
- Area Warning Devices

Environmental Safety Bldg.(ESB): 009			
		<div style="background-color: orange; padding: 5px; text-align: center;"> Caution Hazardous Materials Storage </div>	
DATE: 08-19-2019		If the information on this sign is out of date email CHEMSAFE@UMANITOBA.CA	
NAME: Allison Yarmill William Grierson	OFFICE NUMBER P310 Pathology Building P310 Pathology Building	Work Phone (204)789-3654 (204)789-3613	After Hours Available in Fire Safety Lock Box
After normal working hours: call security services at "555" or "#555" (using Rogers Wireless or MTS cell phone) or dial 474-9341.			
Chemical Hazards:  Toxic Materials		Biosafety Permit: None	
Physical Hazards: <div style="display: flex; justify-content: space-around;">   </div>		Radioisotope Permit:  Basic Level Sealed Source Radiation Safety Staff at 789-3654 or 789-3613	



Lab Rules

- Always close the door. If you are the last person to leave, lock the lab door to maintain security.
- Never consume food or drink in a lab and never place food or beverage related garbage in waste containers in the lab
- Do not let people in the lab if you do not know them
- Keep personal items out (where do you keep your backpack or coat?)
- No participating in activity that may endanger the health and safety of anyone
- Wash your hands when you leave lab areas



Radioactive Materials at the University

The Canadian Nuclear Safety Commission (CNSC) issues a Licence to the University based on the University's Radiation Protection Program. Environmental Health and Safety (EHS) provides resources to oversee the Radiation Safety Program which consists of:

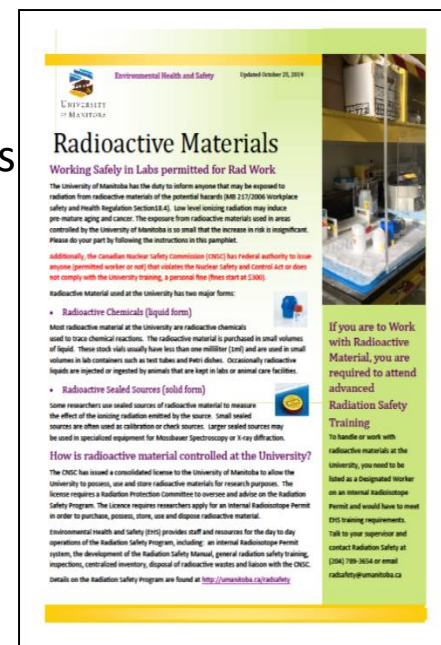
- Radiation Protection Committee
- Internal Radioisotope Permit System
- Radiation Safety Manual
- Radiation Safety Training to become a Designated Worker
- radioactive material tracked from order to waste by EHS

Research labs must have an Internal Radioisotope Permit in order to purchase, possess, store and use radioactive material.

http://umanitoba.ca/admin/vp_admin/risk_management/ehso/rad_safety/index.html

Radioactive Materials information pamphlet can be found at the link below.

http://umanitoba.ca/admin/vp_admin/risk_management/ehso/media/DutyRAM_20191025.pdf



What kinds of Radioactive Material are used at the University?

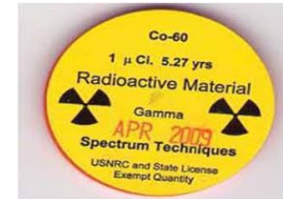
RADIOLABELLED CHEMICALS (“open source”, liquid form)

- Usually have less than one milliliter (cubic centimeter)
- Larger volumes (waste) usually very dilute
- Occasionally radioactive liquids are injected or ingested by animals that are kept in labs or animal care facilities



RADIOACTIVE SEALED SOURCE (solid form)

- Radioactive material is encapsulated, like a tin can.
- Small sealed sources are often used as calibration or check sources.
- Radiation Devices contain a sealed source, an example is a liquid scintillation counter or an electron capture detector (ECD) in a gas chromatograph.

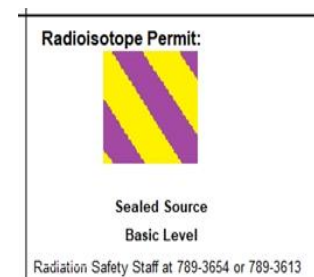
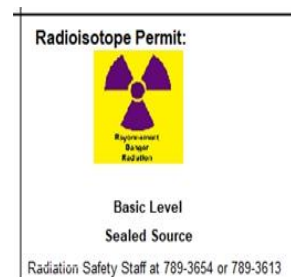


Lab Signage and Contact Information

Workplace Hazard Information Placard:

Rooms permitted to use radioactive material will have one of these symbols posted on a sign at the entrance.

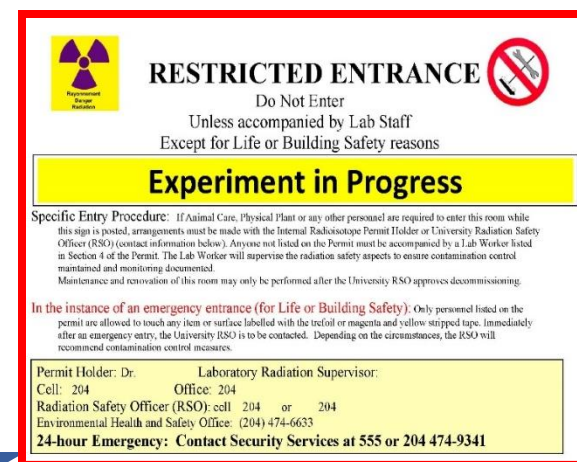
As long as the door sign says CAUTION, you may enter.



Red Bordered Sign Restricted Entrance:

Special entry procedures. Do not enter unescorted except for Life Safety or Building Safety reasons.

These signs will be posted at the entrance will list the lab contacts for the room plus emergency contact information for Radiation Safety and 24 hour Security Services.



How is Radioactive Material Labelled?

Never touch anything labelled:

- “RADIOACTIVE”
- with the radiation warning symbol (also called a trefoil), could be red, black or magenta.
- with the striped red/yellow tape



- Avoid contact with benches, items or equipment labelled with the radiation warning symbol or striped tape
- Stay out of locked fridges, freezers, storage cabinets or the locked box inside containing the radioactive material that are labelled with the Radiation Warning Symbol or striped tape
- Never touch waste labelled with the radioactive waste tag



UNIVERSITY OF MANITOBA Radioactive Waste Tag	
Tag May Be Removed ONLY by EHISO	
EHISO use only Material Source: <input type="checkbox"/> TDA <input type="checkbox"/> RCHWZ <input type="checkbox"/> Other: _____	
Material Location: <input type="checkbox"/> Bench <input type="checkbox"/> B1 <input type="checkbox"/> B2 <input type="checkbox"/> B3 <input type="checkbox"/> B4 <input type="checkbox"/> B5 <input type="checkbox"/> B6 <input type="checkbox"/> B7 <input type="checkbox"/> B8 <input type="checkbox"/> B9 <input type="checkbox"/> B10 <input type="checkbox"/> B11 <input type="checkbox"/> B12 <input type="checkbox"/> B13 <input type="checkbox"/> B14 <input type="checkbox"/> B15 <input type="checkbox"/> B16 <input type="checkbox"/> B17 <input type="checkbox"/> B18 <input type="checkbox"/> B19 <input type="checkbox"/> B20 <input type="checkbox"/> B21 <input type="checkbox"/> B22 <input type="checkbox"/> B23 <input type="checkbox"/> B24 <input type="checkbox"/> B25 <input type="checkbox"/> B26 <input type="checkbox"/> B27 <input type="checkbox"/> B28 <input type="checkbox"/> B29 <input type="checkbox"/> B30 <input type="checkbox"/> B31 <input type="checkbox"/> B32 <input type="checkbox"/> B33 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How to Stay Safe

Stay out if **RESTRICTED ACCESS** is posted.

If the lab sign at the entrance says **CAUTION**, remember these four rules to reduce your risk:

1. Do not remove **shielding** (lead or plastic).
2. Limit the **time** you spend in these areas marked with the radiation warning symbol or trefoil and when designated workers are handling radioactive material.
3. Maximize the **distance** between you and the radioactive material.
4. Use good lab hygiene – lab coats and disposable gloves if you are working with other lab hazards; wash your hands when leaving research areas and always wash your hands before eating or drinking.



Is there anything else to know about Radioisotope work areas?

- Radioactive material is never to be left unsecured unless under direct supervision of designated workers (listed on the radioisotope permit).
- Room security - lock and close the room door if you are the last to leave the permitted area.
- No food or drink or 'evidence of food or drink consumption' in lab garbage/waste containers
- Designated workers have been trained to monitor for contamination.
- Decommissioning and Lab Hazard Clearance **Radioisotope permitted Labs:**
If the area is dedicated for radioactive material use or the equipment is used with radioactive material, only designated workers can clean the area or equipment.



What to do in case of a Suspected Radioactive Spill



Radioactive spills are cleaned up by the Designated Workers listed on a radioisotope permit (permitted lab staff).

Spill clean up is NOT a job for caretakers, trades, security or non-designated workers.

You can:

- Secure area to warn unsuspecting people from potential harm.
- Notify the Permit Holder and/or Environmental Health and Safety at 474-6633 during business hours or Security Services at 555 or 474-9341 after hours.
- First responders and potentially contaminated people or items should remain on scene at a safe distance until cleared by Radiation Safety personnel.

X-ray Safety Program

X-ray Committee is a sub committee of the University Of Manitoba **Radiation Protection Committee** and oversees the development of the X-ray safety program

At the entrance to a room where OPEN BEAM X-ray Equipment is used, there must be an X-ray area/room warning sign posted

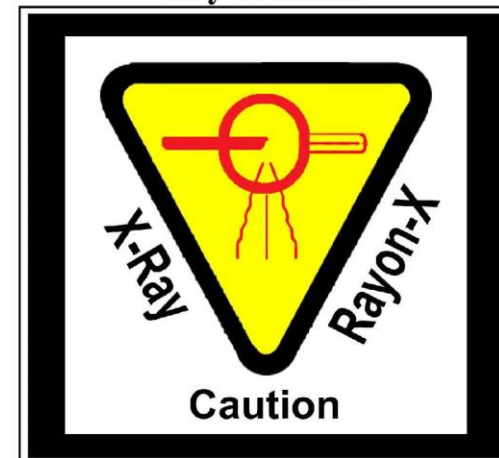
X-ray equipment used at the University has three major forms:

- Dental X-ray Equipment (open beam) - Used for training dental students and for providing dental healthcare in the dental clinics.
- Cabinet X-ray Equipment (enclosed beam) - The X-ray beam is enclosed. The equipment is used to study various inanimate materials (e.g. diffraction, spectroscopy).
- Other Open Beam X-ray Equipment - Used on human and animal subjects for research purposes (e.g. DXA, fluoroscope, CT scanner).

DENTISTRY | D122

CAUTION:

X-ray equipment
may be in use



EMERGENCY CONTACTS

Name	TELEPHONE ¹	OFFICE NUMBER
Dr. Stephen Ahing	789-3572	D338B
Lorraine Reinfort	789-3687	D120
Dr. Lawrence Stockton	789-3581	D126C

¹ - After normal working hours, call Security Services at "555", "#555"
(using cell phone with Rogers Wireless or MTS) or dial 474-9341.

[X-ray Safety webpage](http://umanitoba.ca/xray)

umanitoba.ca



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How are X-ray Equipment Labelled?

To identify X-ray equipment, all manufacturers must label the equipment with this symbol.

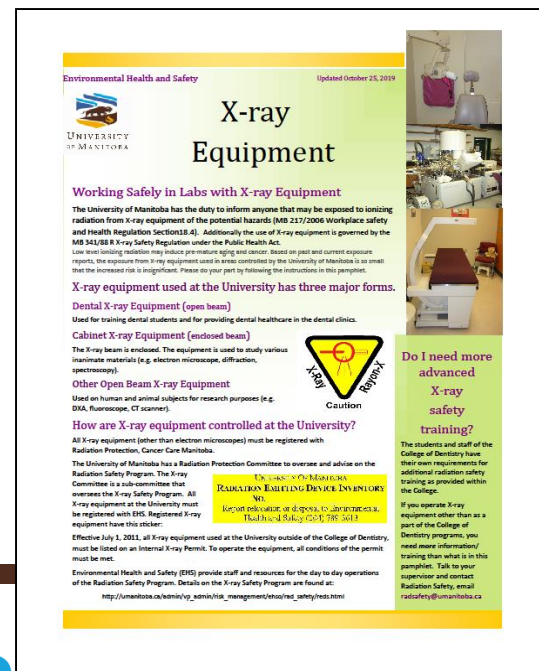
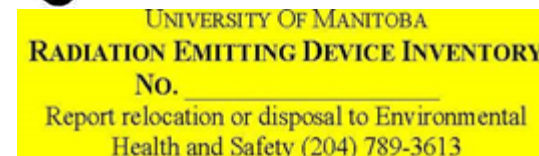


All X-ray equipment must be registered with the University. Upon registration, the equipment will receive this label.

Additionally, all X-ray equipment in Manitoba must be registered with Radiation Protection Services, Cancer Care Manitoba before it can be operated. EHS will send Cancer Care the completed registration form and will receive a label from Cancer Care to apply to the equipment.

The X-ray Committee has developed an X-ray permit system for all research X-ray equipment used at the University, outside of the College of Dentistry clinics. This system has established conditions of use for the various research X-ray equipment.

Before personnel operate research X-ray equipment, an X-ray Safety Information power point is available for training lab personnel.



X-ray Equipment Awareness Pamphlet

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X-ray Restricted Access and Staying Safe

OPEN BEAM X-ray equipment releases radiation that may reach the eye or skin.

- When OPEN BEAM X-ray equipment is in use and the operator needs to control access to the room, the entrance shall be posted:

DANGER—DO NOT ENTER-

- When a room has this posted, special entry procedures are required. Do not enter unescorted except for Life Safety or Building Safety reasons.

Never operate anything labelled or marked “X-ray” unless you are authorized.

When electricity is the source of producing the X-ray radiation in equipment – when the power is off, no X-rays are produced.

MB 341/88R X-ray Safety Regulation regulates X-ray equipment under the Public Health Act.

Laser Safety Program

What kinds of Lasers are used at the University

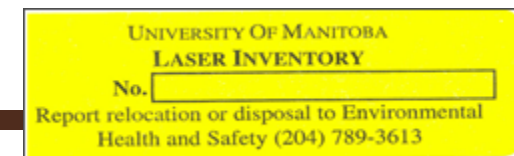
Open Beam lasers - are used in research, for medical treatment and teaching purposes and will have a laser sign posted at the entrance.

Embedded Laser systems - are enclosed in such a way that the laser radiation is not assessable during normal operation. Hazardous laser radiation may be generated only during servicing. To be safe, do not enter a room when a Notice sign is posted.

Open beam and embedded class 3B or 4 lasers are registered with the University and will receive a Laser Inventory label.

Laser Safety Resources on the webpage:

- * Laser exposure/injury protocol
- * Laser Safety Information power point for training lab personnel
- * Control measures for class 3B and 4 lasers
- * Laser area/room warning sign must be posted at the entrance to a room containing an open beam class 3B or 4 laser



[Laser Safety Program Webpage](http://umanitoba.ca)

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Labelling and Signage

Area Warning Device Posted at Entrance

- Indicates when the laser is operating. The device may be a lighted or a flashing sign or a strobe light. DO NOT ENTER when the device is activated



Lasers are Labelled to Identify the Hazard



What are the Hazards

High - powered lasers (Class 3B or Class 4) produce damaging beams that may by direct or reflected exposure may cause eye injury (corneal or retinal injury), skin damage (burns) or fire conditions.



How to stay safe

When assessing the risk to work in the laser room, it is important to differentiate between open beam and embedded systems.

- **DIRECT VIEWING OF LASER BEAMS IS PROHIBITED.**
- **Beware and heed warning signs at entrances.**
- Only trained operators should use Class 3B or 4 Lasers.
- Only required personnel should be in the laser controlled area. Do not be a spectator.
- Class 3B and 4 lasers should be used in sole use laboratories or enclosures within the room and access controlled.
- Be certain scattered laser radiation is not escaping through windows or openings to outside the laser controlled area.

ASK!

Environmental Health and Safety Updated October 25, 2019

UNIVERSITY of MANITOBA **LASERS** and Laser Systems

Working Safely in Labs operating lasers

Lasers are used throughout the University community in research and teaching. Since the use of this technology constitutes a potential hazard to health, the possession and use of lasers is governed in the workplace by Manitoba Workplace Safety and Health. Effective February 1, 2007, the University of Manitoba has the duty to inform anyone that may be exposed to radiation from lasers at the University of the potential hazards (M.B. 217/2006 Workplace Safety and Health Regulation section 13.4). Additionally, section 16.28 of the regulation states, lasers must be installed, used and maintained in accordance with ANSI Z39.1 (latest version) American National Standard for Safe Use of Lasers.

"LASER" stands for Light Amplification by Stimulated Emission of Radiation

High-powered lasers (Class 3B or Class 4) may be hazardous under direct or reflected viewing and may cause eye injury, skin damage or fire conditions. Careful attention to follow warning signs on doors and activated area warning devices, and asking questions of the laser operators will reduce the risk.

What kinds of lasers are used at the University?

Open Beam
Open beam lasers are used in research, for medical treatment and teaching purposes. Some other common open beam lasers are laser pointers and laser levels.

Embedded
Laser systems are enclosed in such a way that the laser radiation is not assessable during normal operation. Embedded lasers are found in laser printers and lab equipment. Hazardous laser radiation may be generated only during servicing. To be safe, do not enter a room when a Notice sign like this is posted.

Do I need more advanced Laser Training?

If you work in a room where Enclosed/Embedded lasers are used, no further laser training is required.

Open beam Class 3B or Class 4 lasers are used, you may need more information. Talk to your supervisor or the Departmental laser contacts.

If you plan to operate a laser or laser system containing a class 3B or 4 laser, then you require additional training.

Contact Radiation Safety at 789-3654 or 789-3359
E-mail: radisafety@umanitoba.ca

How are Lasers controlled at the University?

A Laser Committee advises on the Laser Safety Program. The University has developed a web page to apprise owners of high powered lasers of the legal requirements and some resources to assist with this duty.

Environmental Health and Safety (EHS) provides staff and resources for the day to day operations of the Laser Safety Program including: registering the high powered lasers (Class 3B or Class 4) used or stored at locations controlled by the University of Manitoba.

Details on the Laser Safety Program are found at <http://www.umanitoba.ca/radisafety>

Registered lasers have this label:

UNIVERSITY OF MANITOBA
LASER INVENTORY
No. []
Location: []
Laser: []
Laser: []
Laser: []

Environmental Health and Safety
Bannatyne Office
9001 Medical Services Building
750 Bannatyne Avenue
Winnipeg, MB R3E 9W3
Fort Garry (main) Office
191 Extended Education Complex
406 University Crescent
Winnipeg, MB R3T 2N2
Phone: 204-474-6653
Fax: 204-789-3906
E-mail: radisafety@umanitoba.ca

[Laser and Laser Systems pamphlet](#)

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Laser Pointers

- *These pointers are not dangerous when used with care for their intended use, but the brightness of laser light can damage the eyes of anyone who looks directly into the beam for more than a minute and a half.
- *Do not purchase a high powered class 3B or 4 laser pointer (high power is $\geq 5\text{mW}$)
- *Make sure it has a warning label.
- *Never point the laser beam at anyone or aim at reflective surfaces.



[Laser Pointer Pamphlet](#)

[Laser Pointer Hazard Alert](#)

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Acknowledgement

**This completes the Basic Radiation Safety Training portion of
Basic Lab Safety.**

(Please read and complete the following, print a copy and forward it to the Permit Holder and EHS)

I acknowledge having completed the Basic Radiation Safety Training. I have read and understood the information presented.

In particular, I understand my rights and responsibilities as an individual working around radioactive material, X-ray Equipment and Lasers at the University of Manitoba.

If I have questions on any matter, I may contact my supervisor or Environmental Health & Safety for clarification.

EMPLOYEE NAME (Please PRINT)

EMPLOYEE SIGNATURE

DATE

Permit Holder SIGNATURE

DATE

Permit Holder NAME (Please PRINT)

Permit Number

Version May 1, 2009

