

Radiation Safety Training
Sealed Source Orientation
Lab Assignment

University of Manitoba
Last revised June 1, 2018

Name of Student completing the assignment: _____
(Please underline your family name)

Name of Person mentoring this assignment: _____

The original completed assignment must be mailed to:
Environmental Health & Safety
P310 Pathology Building

Keep a copy in your Radiation Safety Manual behind the last tab!

May be sent electronically – Hard copy must follow!
Scan and e-mail to: radsafety@umanitoba.ca or Fax to: 789-3906

INSTRUCTIONS:

1. Prior to completing the lab assignment, complete the [Self Study Assignment](#)
Read or review the individual documents linked under “Self Study Assignment” on the web at:
http://umanitoba.ca/admin/vp_admin/risk_management/ehso/rad_safety/rad_orient_ss.html
2. An appropriate person will be assigned to you as a mentor. Complete the lab assignment in a radioisotope lab with the mentor physically present to supervise actions related to completing the activities described herein (see who can be a mentor below).
3. Print or write clearly all responses to the questions in the “objectives and student’s responses” sections. Answer the questions in a manner to demonstrate your understanding of radiation safety. This assignment will be used to assess competency in order to be listed as a designated worker on an Internal Radioisotope Permit.

WHO can be a mentor: Any Permit Holder or Laboratory Radiation Supervisor (LRS) listed on a valid and current University of Manitoba Internal Radioisotope Permit may voluntarily assume responsibility to physically supervise the student while completing this assignment and complete the ‘mentor’s observations’ section. If the permit holder or LRS are not available a staff member of EHS will be appointed. Please contact Leona Page at 204 789-3613 or Alison Yarmill at 204 789-3654 to have an EHS mentor assigned.

To the Mentor: Thank you for agreeing to mentor this new student. We hope you will recognize this as an opportunity to orient the student to your lab and departmental procedures and equipment. If you have any questions about the process please let us know.

Sincerely,

Leona Page and Alison Yarmill

Radiation Safety, Environmental Health and Safety
P310 Pathology Building, 770 Bannatyne Avenue, Winnipeg, MB R3E 0W3

1 - Hazard Identification, Risk Assessment and Control Principles

Learning Objectives:

- LO1 Identify hazards of planned use of radioactive materials.
- LO2 Evaluate the risk associated with the hazards.
- LO3 Identify ways to control the risks.
- LO4 Value the control of risks.

Situations:

- S1 Consider an experiment that uses radioactive material

Mentor Preparation:

Identify a laboratory experiment that uses radioactive material and provide access to the related hazard information resources:

Your lab's standard operating procedures

Radiation Safety Data Sheets may be found at:

<http://nuclearsafety.gc.ca/eng/resources/radiation/radiation-safety-data-sheets/index.cfm>

Student Evaluation Criterion

Objectives and student's responses: Answer the questions below. Print or write clearly!

IDENTIFYING AND ASSESSING HEALTH HAZARDS A health hazard is any agent, situation, or condition that can cause an occupational illness. After each heading brainstorm the possible hazards related to your experiment using radioactive sealed source:

1. **Physical hazards** such as electric currents, heat, light, vibration, noise including ultraviolet radiation and lasers. Will the student be working with any physical hazards associated with the use of radioactive material?
 - There are no physical hazards associated with the planned work, or
 - The mentor has reviewed the physical hazards associated with the planned work or the related safe work procedure. If there is no documented safe work procedure, list the hazard and the related safety rules here:
2. **Radiation:** For each radioisotope, list the energy, half-life and the type of emission (beta particle or gamma/ X-ray):

Radioisotope	Type of emission	Energy of emission	Half-life

Review the internal radioisotope permit to ensure the isotope, limit, rooms, and usage are covered: yes or no

3. **Work space design (ergonomic)** such as work requiring lifting, awkward posture, repetitive motions, excessive muscular force, or computer use:
 - Use a cart to transport items between labs.
 - If shielding will be used or does work need to be done in a fume hood? Does work set up fit the student?
 - If there is repetitive work (keyboarding), the need to take breaks and change position was discussed.
4. **Chemical hazard** such as gas cylinders:

WHAT CONTROLS ARE IN PLACE TO MINIMIZE THE RISK:

A. List any engineering controls you will use (tongs, cart, shielding)

B. In your opinion: what are the most important work practices that will reduce the hazard and why?

Mentor's Observations –Indicate if you agree each objective has been accomplished by the student. Add your comments as well:

2 - Radiation Safety Compliance Activity (check your lab for compliance)

Learning Objective:

LO1 Identify a location and explain why the location is appropriate to either use or store radioactive sealed sources or devices containing sealed sources.

Situation:

S1 Sealed source storage/manipulation location

Mentor Preparation:

Identify space to use for the exercise.

Student Evaluation Criterion

Objectives and student's responses Include a "Y" in the <input type="checkbox"/> to indicate you have completed this action. Add your responses to the questions in the objectives below. Print or write clearly!	Mentor's Observations – use a "Y" to indicate each objective has been accomplished by the student. Add your comments as well.
A. The student should identify a location where manipulating the sealed source or using a radiation device is appropriate. Describe: Explain the advantages of the location: Explain the disadvantages of the location:	

B. What isotopes are in use? _____
For the isotopes that are used in the lab, explain the techniques used to minimize exposure to ionizing radiation – give at least one example for each.

Shielding:

Time:

Distance:

C. Review Quick Step Compliance Checklist in the Radiation Safety Records Binder and question your mentor regarding local procedures (check off all the items or answer questions reviewed with your mentor).

In the lab can you find:

- Radiation Safety Manual?
- Radiation Safety Records Binder?
- Radioactive Source Inventory Log Form (green sheet)?
- Serial number from green sheet recorded on source or source container?
- Leak test certificates?
- Sampling certificates?

Are sources listed on the Radioisotope Permit that require leak testing? Yes or No

- Locked storage for radioactive source or ECD?

Is the key securely stored from anyone that is not trained in Radiation Safety? Yes or No
Explain the advantages of the storage location _____

- Radioisotope classification posted at all entrances of permitted rooms (WHIP)?
- Internal Radioisotope Permit – prominently posted?
- Radiation Warning labels on areas and equipment used with > 1EQ radioactive materials? (refer to RSP-4 section 4. Posting and Labelling)
- Source labeled with the isotope, date and activity?
- What type of dosimeter do you require? N/A Badge both Badge & Ring

Who do you get your dosimeter from? _____

Where should you store your dosimeter? _____

Any other local safety procedures? _____

Summary of student's observations: Is your lab in compliance? Yes or No
List any shortcomings (Things to do):

3. Radiation Detection Equipment Activity

Learning Objectives:

LO1 Demonstrate ability to use a contamination monitoring meter.

Situations:

S1 Any location in the lab suitable for the table exercise.

(You will need to get a 'yellow card' from EHS Radiation Safety to complete this exercise.)

For the purposes of The University of Manitoba, Radiation Safety Manual, "contamination monitoring meter" is the common term for a hand-held meter used to measure the presence of radioactive material. Contamination monitoring meters at the University of Manitoba are typically Ludlums. There are four types of probes (radiation detectors) commonly used with the contamination monitoring meters, each with different capabilities.

Typical probes for contamination monitoring meters:

Ludlum 44-9: Gieger-Mueller, thin window 12cm², gas chamber ideal for measuring mid energy beta emitters. Also known as a 'pancake probe'.

Ludlum 44-3: Scintillation detector using a sodium iodine crystal ideal for measuring low energy gamma or X-ray emitters. Designed specifically to detect I-125.

Ludlum 44-21 and 44-7 are the other two less common probes.

Activity – Measure the radiation from the prepared Sealed Sources using various probes and shielding material:

To use a contamination monitoring meter to measure radiation:

1. Check the meter to ensure there is a verification sticker for the 44-9 probe/meter combination that is dated less than one year ago.
2. Check the battery
3. Measure and record the background radiation by setting the meter:
 - a. To the most sensitive scale "x 0.1" (except for 44-21 – use "x 1")
 - b. AUDIO to "on"
 - c. Response rate to "s" for slow
 - d. Moving the probe 1-2 meters away from any source of ionizing radiation and record the background in the table below (include the units of measure)
4. Measure and record the radiation on contact with each sealed source
 - a. First, change the Response rate to 'f' for fast
 - b. If the meter reads off scale:
 - i. Decrease the sensitivity by turning the scale knob to a higher scale (x1, 10, 100)
 - ii. Use the reset button ("res") to 'zero' the meter quickly
 - iii. Record the measurement in the table below (include the units)

Source	Beta reading (cpm) 44-9	Gamma reading (cpm) 44-3	Predict type of emission from probe readings? (circle one)	Try shielding with the 44-9 probe		Type of emission from effect of shielding? (circle one)
				Plastic (cpm)	Lead (cpm)	
Background						
A			beta or gamma?			beta or gamma?
B			beta or gamma?			beta or gamma?
C			beta or gamma?			beta or gamma?

Use the meter to evaluate radiation field in your lab or during activities when you are using the sealed source in the field. Describe how you are planning to minimize your exposure:

Declaration: By signing below I have acknowledged that I personally have completed all the submitted answers to the questions.

Signature of Student: _____

Date of Signature: _____

Mentor's Declaration: By signing below I have acknowledged that I personally have completed all the submitted 'mentor's observations'.

Any additional comments:

Signature of Mentor: _____

Date of Signature: _____