



University
of Regina

RADIATION SAFETY PROGRAM

2023/07/24 Revision 1.2

Health & Safety

Human Resources Department

Radiation Safety for Education, Research, and Community

This Radiation Safety for Education, Research, and Community Program has been created in accordance with the Canadian Nuclear Safety Commission's corresponding *Act* and *Regulations*, Health Canada's *Canadian Guideline for the Management of Naturally Occurring Radioactive Materials*, and Ministry of Labour and Workplace Safety's *Occupational Health and Safety Act* and *Regulations*.

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Radiation Safety for Education, Research, and Community

1. Radiation Safety Administration

1.1 Introduction

The University of Regina is committed to providing a safe and healthy work, learning, and living environment for all members of the University community. To meet this commitment the **Radiation Safety for Education, Research, and Community Program** (Radiation Safety Program) administered by Health & Safety, Human Resources, provides resources and guidance for the safe and responsible use and management of radioactive materials and devices, and naturally occurring radioactive materials on campus. The University of Regina [Radiation Safety Policy \(GOV-100-020\)](#) provides the guidance and authority to this Program and forms part of the Health and Safety Management System.

This Program manual consists of two sections. The first section, *Radiation Safety for Education and Research* is intended for use and reference by Academic Staff Members, Staff, Students, and others with responsibility for radiation safety related to research and teaching activities. The second section, *Radiation Safety for Community* is intended for use and reference by the community regarding radiation safety as it relates to community health on campus.

Various Federal, Provincial, and Municipal regulations exist for controlling the acquisition, use, storage, transfer, and disposal of radioactive materials. The University is responsible for ensuring that these regulations are being enforced to protect the safety of staff, students and the public, while at the same time, supporting and encouraging the use of the radioactive material for the benefit of the public and the furtherance of the aims of the University.

1.2. Definitions, Acronyms, and Abbreviations

Academic Staff Members are Faculty, Librarians, Laboratory Instructors, Instructors, and Sessionals at the University of Regina.

Administrator means senior administration of the university, including the President, Vice-President (Administration), Deans, Directors, or designates.

ALARA (As Low As Reasonably Achievable) Principle means to keep all exposures as low as reasonably achievable taking into account social and economic factors.

Canadian Nuclear Safety Commission (CNSC) is the Federal regulator of nuclear power and materials in Canada.

Community Health refers to health, safety, and wellness initiatives directed towards all University Students, Faculty, Staff, and Community (Public) Members regardless of relationship with the University. This definition includes activities related to living, working, and learning on campus.

Exporting is the activity of transferring or transporting regulated items from Canada to another country.

Hazard is any activity, situation, or substance that can cause or has the potential to cause illness or injury.

Health & Safety is the unit within Human Resources, that is available to assist faculty, staff, students, and visitors in making the University a safe place to live, work, and learn.

Importing is the activity of transferring or transporting regulated items into Canada from another country.

Incident is an event or occurrence involving radioactive materials including a spill, exposure, release of materials, personnel injury or illness, missing radioactive materials, unauthorized entry into the containment zone, power failure, fire, explosion, flood, or other crisis situations (e.g., earthquake, hurricane).

Laboratory (Lab) is an area within a facility or the facility itself where radioactive material is handled and/or stored.

Laboratory (Lab) Work Area is an area within a containment zone designed and equipped for research, diagnostics, and teaching.

Laboratory Instructor (LI) is an academic staff member whose primary focus is the teaching and development of the laboratory component of undergraduate courses.

Laboratory (Lab) Manager is the person most responsible for the daily/routine activities being conducted and/ or person who most regularly oversees personnel conducting activities in the lab work area.

Local Risk Assessment (LRA) is the site-specific risk assessment used to identify hazards based on the radioactive materials in use and the activities being performed. This analysis provides risk mitigation and risk management strategies to be incorporated into the physical containment design and operational practices of the facility.

Local Safety Committee (LSC) is a committee in the Faculties and/or Departments that have been identified as a higher-risk to establish a process where health and safety concerns can be addressed at a local level.

Member of the Community/Community Member/University Community Member is all persons associated with the University of Regina, including, but not limited to, the Board of Governors, President, VP's, AVP's, Deans, Directors, employees, students, contractors, visitors, and volunteers.

Personal Protective Equipment (PPE) is equipment and/or clothing worn by personnel to provide a barrier from radioactive materials, thereby minimizing the risk of exposure. PPE may include, but is not limited to, lab coats, gowns, full-body suits, gloves, protective footwear, safety glasses, safety goggles, masks, and respirators.

President's Advisory Committee on Radiation Safety (PACRS) is responsible for the oversight and administration of the University's Radiation Safety Policy. It functions to ensure the safe use of and to minimize exposure to potentially hazardous radiation and radioactive material at the University of Regina.

Principal Investigator (PI) is the holder of an independent grant administered by a university and the lead researcher for the grant project, which in the sciences usually involves activities, such as a laboratory study or a clinical trial. The phrase is also often used as a synonym for head of the laboratory, academic staff member/faculty member, or research group leader.

Radiation Safety Committee (RSC) is delegated by PACRS to formulate and implement University of Regina policies, regulations and procedures governing the use of radioactive materials and radiation to ensure the safe use of radiation at the University of Regina in accordance with the University's Radiation Safety Policy.

Radiation Safety Officer (RSO; Alternate RSO) reporting to the AVP Human Resources, is appointed by the President of the University of Regina to give professional advice and assistance in all matters related to radiation and radioactive material safety, and to coordinate administration of the radiation safety program.

Research Staff Member is an APT member for whom research is a requirement of their appointment.

Risk is the probability of an undesirable event occurring and the consequences of that event.

Risk Assessment is a thorough review of all the risks based on the probability, severity, and frequency with which we are exposed to the hazard/ event.

Standard Operating Procedures (SOPs) are specific safe operating procedures developed by the Principle Investigator, Laboratory Instructor, or individual responsible for the purchase, use, collection, storage, maintenance, and disposal of radiation.

Supervisor means a person who is authorized by the University to oversee or direct the work of employees or students, including, but not limited to, Deans, Directors, Department and Unit Heads, Academic Staff Members, and Managers.

Transportation is the action of transporting radioactive material to a building or another location, within Canada or abroad.

1.3. Radiation Safety Policy

The U of R [Radiation Safety Policy \(GOV-100-020\)](#) can be accessed on the U of R Policy webpage.

1.4. President's Advisory Committee on Radiation Safety (PACRS)

Terms of Reference

The President's Advisory Committee on Radiation Safety (PACRS) is responsible for the approval, oversight, and administration of the University's *Radiation Safety Policy* and Radiation Safety Program, to ensure the safe use of and to minimize exposure to potentially hazardous radiation and radioactive materials at the University of Regina. This includes the authority to establish and oversee a Radiation Safety Committee mandated to formulate and implement policies, regulations and procedures governing the use of all types of radioactive materials and radiation.

The committee consists of members who are familiar with the critical importance of adhering to all regulations and prescribed procedures for the safe use of radioactive material and radiation, including Canadian Nuclear Safety Commission (CNSC) regulations and the ALARA (As Low As Reasonably Achievable) Principle. Committee members may represent various areas of expertise but will be concerned with regulations concerning all types of radiation.

All members are voting members. Quorum will be met when half of the PACRS membership attends meeting. Membership will be decided at each annual meeting and membership list will be coordinated by RSO.

Constitution of PACRS

The committee may consist of the following members:

- a. The President of the University or designate
- b. Academic Staff, Research Staff, and Staff Members for their expertise in the safe use of radiation and radioactive materials
- c. Members from the following: Student, Post-Doctorate, Research Associate, and/or Research Assistant
- d. Representatives from University administrative body
- e. The Radiation Safety Officer
- f. The Alternate Radiation Safety Officer

Duties of PACRS

This committee is authorized and responsible to:

- a. Approve, have oversight, and administer the University's Radiation Safety Policy and Program.
- b. Establish a Radiation Safety Committee (RSC) to formulate and lead University of Regina policies and procedures governing the safe management of radioactive materials and radiation in accordance with the University's *Radiation Safety Policy*;
- c. Formulating, developing, and advising on all matters related to radiation safety in education, research, and community health;
- d. Reviewing incident and accident trends on a regular basis to make University recommendations;
- e. Monitor, review and when it considers advisory, amend or rescind the policies, procedures and decisions (including Permits issued) made by the RSC and RSO; and

- f. Review all reports and license applications made to the CNSC.

Frequency of Meetings

The Committee meets at least once per year.

Chair of the Committee

The Chair and Vice-Chair of the Committee are elected from Academic and Research Staff Members on the Committee. The Chair is responsible for calling meetings, for correspondence with the committee members, and sitting on the Committee. In the absence of the Chair, the Vice-Chair will assume the duties of the Chair.

1.5. Radiation Safety Committee (RSC)

Terms of Reference

The Radiation Safety Committee is delegated by PACRS to formulate and implement University of Regina policies and procedures governing the use of radiation and radioactive materials to ensure the safe use of radiation at the University of Regina in accordance with the University's Radiation Safety Policy. Policies, procedures and decisions made by the RSC or the RSO are subject to review and amendment by PACRS.

Constitution of RSC

The RSC consists of the following members:

- a. The Chair of the President's Advisory Committee on Radiation Safety
- b. The Radiation Safety Officer/Alternate Radiation Safety Officer

Duties of the Radiation Safety Committee

The RSC is subject to the direction of the PACRS, acts on behalf of, and is responsible for:

- a. Formulating and implementing University of Regina policies, and procedures governing the use of radiation and radioactive materials to ensure the safe use of radiation at the University of Regina in accordance with the University's Radiation Safety Policy and Radiation Safety Program;
- b. Evaluating the qualifications of those who apply to work with radioactive material or radiation and issue written authorization to those who qualify;
- c. In accordance with the Radiation Safety Program, issuing Permits for the Use of Radioactive Materials (Permits) to qualified faculty members to use Radioactive Material;
- d. Suspending Permits where in the opinion of the RSC the Permit Holder has failed to comply with Permit requirements or where the suspension is otherwise in the best interests of the University. When a Permit is suspended, the RSC shall advise the Permit Holder that it may appeal the suspension to PACRS;
- e. Reporting its activities to PACRS at such times and to such extent as PACRS directs;
- f. Review all reports and license applications made to the CNSC.
- g. Reviewing requests for and authorize the commissioning of new radioisotope labs and decommissioning old facilities in consultation with Facilities Management; and
- h. Responding to radiation safety situations, which require immediate action.

1.6. Radiation Safety Officer (RSO)/ Alternate Radiation Safety Officer (ARSO)

The Radiation Safety Officer (RSO), is appointed by the President of the University of Regina to give professional advice and assistance in all matters related to radiation and radioactive material safety, and to coordinate administration of the radiation safety program. The RSO is responsible for keeping procedures and practices for the use of radiation and radioactive material up to date, and for identifying improvements and opportunities to keep radiation exposures As Low As Reasonably Achievable (ALARA). The Alternate Radiation Safety Officer provides support to the RSO and serves as a back-up to the RSO in their absence.

Among other duties, the RSO and ARSO:

- a. Maintain contact as necessary with the Canadian Nuclear Safety Commission (CNSC) and with the Radiation Protection Unit of the Department of Labour of the Government of Saskatchewan, and ensure all information and reports required by legislation are submitted;
- b. Make evaluations concerning the applications for permits, suitability of space, equipment, etc., and make recommendations regarding these to the RSC;
- c. Immediately suspend the use of radioactive material by any person when, in the judgment of the RSO, the safety of any person is in jeopardy. Such suspension will be reported to the PACRS Chair as soon as possible. The RSC may rescind, extend or amend the suspension. Where the RSC extends the suspension, the RSO will inform the Permit Holder that the decision of the RSC may be appealed to PACRS;
- d. Investigate and, where necessary, supervise after accidents or incidents involving radioactive materials, and report the event to the CNSC and to the chair of the PACRS;
- e. Investigate any exposures over background levels recorded on dosimeters;
- f. Arrange to provide radiation safety training for staff and students who wish to use radiation or radioactive materials at the University of Regina;
- g. Prepare Annual Reports and Radioisotope Licence renewal applications and ensure the approved reports and applications are sent to CNSC;
- h. Ensure radiation detection equipment is obtained, maintained and calibrated as required.
- i. Submit a report on radiation and radioactive materials use and safety activities to the annual meeting of the PACRS, and submit other reports as requested;
- j. Evaluate the knowledge, training and experience of those who apply to work with radiation and radioactive materials, and make appropriate recommendations to the RSC;
- k. Maintain an inventory of all radioactive material;
- l. Manage the ordering, receipt, distribution, storage and disposal of all radioactive material at the University;
- m. Oversee the dosimetry program and report all exposures as required;
- n. Ensure wipe testing is conducted in accordance with license requirements and that leak testing is conducted according to licence requirements and manufacturer specification;
- o. Provide on-going advice and technical assistance to persons using radiation at the University;
- p. Provide recommendations for the radiation budget;
- q. Maintain records required by the Canadian Nuclear Safety Commission and the Radiation Protection Unit of the Department of Labour of the Government of Saskatchewan;
- r. Inspect/Audit Permit Holder records regularly;

- s. Inspect radioisotope laboratories and wipe test to confirm compliance at a frequency determined by the RSO.

Section 1 – Radiation Safety for Education and Research

2. Radioactive Material Hazard Identification and Risk Assessment

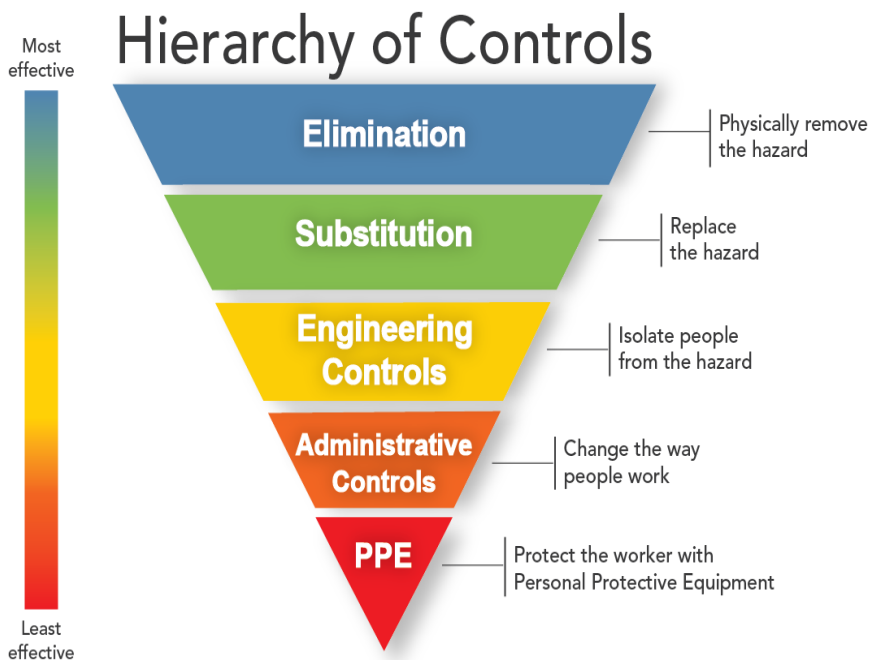
“Risk” is the probability of an undesirable event occurring and the consequences of the event (Canadian Biosafety Standards, 2015). To ensure the safety of the University community, radiation risk (in addition to all other types of risk (e.g. chemical, mechanical, ergonomic, etc.)) must be assessed and mitigated through various mechanisms.

Prior to starting a new project, activity, or experiment, you should take a step back and identify the hazards present. Once the hazards are identified, you use a risk assessment process to determine which risks are higher and require the greatest mitigation effort.

The Radiation Safety Committee (RSC) welcomes the opportunity to conduct this assessment process with you, please contact health.safety@uregina.ca for assistance and guidance.

3. Radioactive Material Risk Management

Once you have identified hazards and determined the level of risk, the accepted mechanisms to control a hazard are:



Elimination (Substitution): Is there a radionuclide or process that poses less of a risk than the one selected that will provide the same result? For example, can you use fluorescent tagging instead of using radioactive tagging?

Engineering Controls: This includes the selection and use of primary containment devices (e.g. Fume hoods, shielding, etc.). Another example includes handling materials in specialized labs that have increased physical infrastructure safety requirements (e.g. sealed benches, lip on benches, hands-free handwashing sinks, etc.)

Administrative Controls: These are the controls that can alter the way in which the tasks are done and can include procedures and practices. For example, detailed procedures, on-site posters, and training regarding how waste is disposed of.

PPE: The PPE selected and worn by individuals can reduce or minimize the potential exposure to radioactive materials. This is the last and least reliable line of defense.

These strategies should be developed, implemented, and regularly assessed and updated. This review process should be documented. The following pages will identify mitigation controls for some of the higher-risk radiation hazards known on campus. Please contact health.safety@uregina.ca for assistance and guidance.

3.1. Radiation Safety Data Sheets

Canadian Nuclear Safety Commission has developed a [Radionuclide Information Booklet](#) that provides information on various nuclear substances: their radiation characteristics, detection methods, preventative measures, and annual limits on intake. This material can be used to mitigate potential safety hazards and plan experimentation.

3.2. Radiation Safety Posters

Canadian Nuclear Safety Commission has developed a variety of [Safety Posters](#) available for use. The RSO can provide colour copies to post in all applicable facilities and rooms, please contact health.safety@uregina.ca for more information.

4. Radioactive Material Leadership

4.1 Duties of Permit Holders

Permit Holders are ultimately responsible for meeting all regulatory requirements for the radiation and radioactive materials used by themselves and the persons under their direction. They are responsible for acting in accordance with the UofR [Radiation Safety Policy](#) and the [Health and Safety Policy](#) and for ensuring that they and the persons under their direction follow all regulations and procedures of government agencies and of the U of R.

They are also responsible for keeping their experimental procedures and practices using radioactive material up to date, and for identifying improvements and opportunities to keep

radiation exposures As Low As Reasonably Achievable (ALARA). **Failure to comply with these requirements may result in suspension of the Permit by the RSC.**

It is the duty of Permit Holders:

- a. To keep exposure levels and contamination levels to an ALARA standard and in any event below the monitoring detection limit (less than twice background levels).
- b. To ensure that persons working under their direction are properly trained, both through classroom training and through task/site-specific instruction. No person may use radioactive material at the UofR without an appropriate level of training. Successful completion of the UofR Radiation Safety Course will generally be the minimum level of training acceptable.
- c. To ensure that inexperienced laboratory persons working under their Permit are supervised by competent persons who have completed the appropriate training.
- d. To ensure that persons working with radioisotopes are registered with the RSO.
- e. To determine if any workers under their direction require TLD badge dosimeters or other dose monitoring, and to contact the RSO to arrange for dosimeters or monitoring as required.
- f. To adhere to the regulations listed in the CNSC Radioisotope Safety Poster that applies to their level of laboratory.
- g. To ensure that their laboratories are properly commissioned and decommissioned.
- h. To ensure that radioisotope inventory records are maintained.
- i. To ensure that radioisotope laboratories and storage areas are secure at all times. This includes ensuring that all areas are locked at all times when not in use, and that keys to the areas are limited to those issued by the RSO and are not copied.
- j. To ensure that all radioactive waste is properly labeled, handled and disposed of.
- k. To ensure that laboratories are monitored weekly by persons using isotopes.
- l. To ensure that radiation detection equipment is working properly, and that all persons working under their Permit are properly instructed in its use.
- m. To ensure all persons working under their Permit are properly trained in emergency procedures regarding the use of radioactive materials.
- n. To immediately report all accidents and incidents involving radioactive materials to the RSO. This includes loss, theft and unauthorized use of materials.
- o. When away for a period of time, Permit Holders must arrange for a qualified person to supervise their research and radiation sources during their absence to ensure compliance with permit holder duties. If said absence is less than 14 days, email notification to the RSO indicating who will take over their duties is sufficient, but if said absence is to be in excess of 14 days than formal approval in writing must be obtained by the RSC.

5. Radiation Safety Training

5.1. Introduction

No person may use or handle radioactive material or work in a laboratory or area containing radioactive material or a device unless they have been trained in accordance with this Section.

5.2. Radiation Safety Awareness Training

All persons who do not work on or with radioactive material, but work in an area where radioactive material is present, must have completed, within the last three years, Radiation Safety Awareness Training. Radiation Safety Awareness Training is facilitated by Health & Safety, HR and is comprised of a course of instruction on the following elements:

- University of Regina's Radiation Safety Administration
- Basic Principles and practices of Radiation protection
- Emergency procedures and contact information

5.3. Radiation Safety Training

All Permit Holders and all persons working with radioactive material are required to successfully complete Radiation Safety Training.

Radiation Safety Training is facilitated by Health & Safety, HR and is comprised of a course of instruction on the following elements:

- University of Regina's Radiation Safety Administration (Policy, Procedures, Manual, and Roles and Responsibilities)
- Radiation Physics
- Units of Measure
- Biological Effects of Radiation
- ALARA and Radiation Exposure
- Instrumentation
- Operating Procedures
- Emergency Procedures
- Transportation
- A demonstration of a small spill clean up
- Hands on laboratory training in contamination monitoring
- Successful completion of a written exam

5.4. Permit Holder Orientation

All new Permit Holders complete, in addition to Radiation Safety Training, Permit Holder Orientation. This orientation is facilitated by the RSO and is provided to Permit Holders upon the issuance of new permits. It provides regulatory information to and supervisor requirements for Permit Holders.

5.5. Transportation/Receipt Training

All persons who receive radioactive material delivered to the University, distribute radioactive material to Permit Holders, or ship radioactive materials complete the following training:

- Certified training in the *Transportation of Dangerous Goods Class 7* (refresher training required every 3 years)
- Instruction on the University's Detailed procedures on Ordering and Receiving of Radioactive Materials contained in this Program

5.6. Sealed Source Training

All persons who work with sealed sources or sealed sources in devices must successfully complete this training course. It provides basic safety and awareness training for individuals whose use of radioactivity is limited to sealed sources and sealed sources in devices, as well as to those who work not with but near sealed sources.

5.7. Training Certificate

All radiation safety training provided by the University is valid for three years. All persons who have successfully completed radiation safety training are issued a radiation training certificate by Health & Safety, HR which indicates the category of training received and the date the training expires. Training records are maintained by Health & Safety, HR.

5.8. Exemptions

The RSC may grant an exemption to the training requirements where the committee is satisfied that the person will either be working under the direct and constant supervision of a Permit Holder for a short or temporary period, or the person has demonstrated a full and complete understanding of radiation safety principles and procedures.

5.9 RSO Training

Anyone required to serve as a Radiation Safety Officer, or Alternate Radiation Safety Officer must complete initial RSO training as soon as possible when assuming an RSO/ARSO role for the first time. RSO Refresher training must be completed every 5 years.

6. Permit for the Use of Radioactive Material Procedures

6.1. Application for a Permit for the Use of Radioactive Material

Those looking to obtain a [Permit for the Use of Radioactive Material](#) for research and teaching activities will require a detailed hazard identification and risk assessment process conducted prior to obtaining a Permit. The RSO and RSC is available to assist with the process and any activities necessary to meet any applicable commissioning and certification requirements. Please contact health.safety@uregina.ca for guidance and assistance.

The Permit for the Use of Radioactive Material allows general use of radioactive material including sealed sources, for research and teaching at the University of Regina, within the limits specified in the Permit.

6.1.1. General Conditions for a Permit at the University of Regina

1. The President's Advisory Committee on Radiation Safety (PACRS) only issues a Permit to permanent-University employees that have appropriate knowledge of radiation theory and well-defined authority to control and supervise activities. This could be Faculty members and Lab Instructors in a tenured or a tenure-track position, Research Associates, or Staff Members. Permits are not issued to retired, emeritus, or adjunct professors or non-permanent Staff members.
2. To obtain a Permit, the applicant must meet this Program's training requirements (see **Section 5 – Radiation Safety Training**) and demonstrate that he/she has sufficient knowledge about radioactivity and the procedures for handling radioactive materials to safely deal with the level of activity requested. No person may use radioactive material at the University of Regina without an appropriate level of training.
3. The Permit Applicant must show that he/she is sufficiently aware of the contents of the *Canadian Nuclear Safety Commission Regulations* and the radiation safety procedures and regulations described in this Program.
4. The space in which the material is to be used must be commissioned in accordance with CNSC requirements. It must also meet any other requirements that may be specified by the PACRS.
5. The Permit will be valid for:
 - Possession and use of the specified isotope(s) only
 - A specified maximum possession limit of activity for each isotope
 - A specified type of procedure or procedures.
 - A specified work area or areas.
 - A specified time period, after which a renewal must be applied for.
6. A Permit Holder may direct research assistants or associates, post-doctoral fellows, student assistants, etc. who also work with radioactive isotopes. It is the Permit Holder's responsibility to ensure that all such persons have sufficient knowledge and training to ensure that they can use radioactive material safely. It is also the Permit Holder's responsibility to ensure that all such persons are registered in writing with the RSO before their work with radioisotopes begins. Registration of all persons working with radioisotopes will also be required twice each year, to ensure that persons no longer working with isotopes are removed from the user list.
7. All students who work with radioactivity as part of a class or training program must be trained and supervised to a level appropriate to the type of work carried out by the student.

6.2. Applying for a Permit/ New Project

The Radiation Safety Committee (RSC) issues Permits in accordance with the Radiation Safety Program. Permit Application Forms may be obtained from the Radiation Safety Officer (RSO),

[University of Regina webpage](#) or in **Appendix 2**. Applicants should follow the appropriate application procedure described in **Appendix 1**.

The completed forms are submitted to the RSO for consideration by the RSC. To ensure that the persons responsible for radioisotope use have sufficient knowledge of the properties of individual radioisotopes to use them safely, the RSC requires each permit applicant to fill out their own application forms. Sources of the information required are given in **Appendix 1** which are included with the permit application forms.

Application for a Permit is made as follows:

1. The person wishing to use radioisotopes at the University of Regina informs the RSO, and receives a copy of this *Radiation Program* and an *Application for a Permit for the Use of Radioactive Materials* form. The RSO informs the PACRS Chair of the applicant's intent.
2. The person wishing to use radioisotopes reads the *Radiation Program* and fills out all applicable parts of the *Application for a Permit for the Use of Radioactive Material* (**Appendix 2**), following the *Permit Application Instructions* (**Appendix 1**) included with the forms. Performing a detailed hazard identification and risk assessment will help with this process. The completed forms are returned to the RSO.
3. The RSO checks the application for completeness. If all necessary information has been included, the application is forwarded to the PACRS Chair. Otherwise, it is returned to the applicant for more information.
4. The RSO checks all locations listed in the application for radioisotope storage or use. If any of these locations are not already commissioned and registered for the storage or use of the radioisotopes and activities requested, the RSO informs the applicant that he/she must follow the procedure for *Radiation Laboratory Commissioning and Decommissioning Procedures* (**Section 7**) of this Program.
5. The RSO meets with the applicant, and reviews all procedures for the ordering, receiving, inventory control, safe use, and disposal of the radioisotopes to be used. If the standard University of Regina procedures in this Program are not practical under the experimental conditions to be used, alternate procedures of equal effectiveness and safety are devised. These written alternate procedures will be attached to the Permit as Permit Conditions.
6. The RSC meets to evaluate the application to ensure it meets the requirements of this Program.
7. Should the RSC decline to issue a permit, it shall inform the Applicant what if any additional action is required on the part of the Applicant before the application will be reconsidered by the RSC, and that it may appeal the decision to PACRS.

6.3. Amendment of Permits

An amendment to a permit must be obtained before any of the conditions required by the permit may be changed.

6.3.1. Permanent Amendment

Procedure for Application for a Permanent Amendment of a Permit:

1. All parts of a completed standard *Application for a Permit for the Use of Radioactive Material Form (Appendix 2)* must be submitted. In sections that would be identical to the permit holder's original application, a simple reference to that application may be made.
2. The procedure followed will be the same as the procedure for an *Application for a Permit for the Use of Radioactive Material, (Section 6)* in this Program for a new Permit application.
3. Upon approval of the application, an amended permit will be issued by the RSC.

6.3.2. Temporary Amendment

Permit holders may apply for a temporary amendment of their permits for specific projects of a strictly limited duration. Temporary amendments such as the following will be considered:

- a. an additional location for isotope use;
- b. use of an isotope not specified in the permit; and/or
- c. a temporary increase in the maximum activity of an isotope which may be possessed or used.

Application is made as described in **Section 6.2**, including a description of the time frame for which the amendment is required.

6.4. Renewal of Permits

Permits are renewed every five years or immediately after the University of Regina consolidated Radioisotope Licence is renewed by the CNSC, whichever comes first. In cases where no significant change is requested for a renewed Permit, the following procedure may be used:

Procedure for Application for Renewal of a Permit is as follows:

1. The RSO informs Permit Holders that a renewal is required.
2. The Application for a Permit for the Use of Radioactive Material is obtained from the RSO and completed by the Permit Applicant (Appendix 2).
3. The RSC reviews the applications and issues a new Permit or informs the Permit Applicant that more information is required.
4. Should the RSC decline to renew a Permit it shall inform the Permit Applicant that it may appeal the decision to PACRS.

7. Radiation Laboratory Commissioning and Decommissioning Procedures

7.1. General

At the U of R, building space design is developed, reviewed, and completed according to the National Building Code of Canada, National Fire Code of Canada, and other applicable codes and standards. Lab space can only be assigned by Facilities Management.

Radioisotope labs at the U of R must meet additional engineering, operational, technical, and physical requirements set by the U of R and Canadian Nuclear Safety Commission (CNSC).

7.2. Commissioning

The *Canadian Nuclear Safety Act* and *Regulations* require that all labs in which radioisotopes are to be used must meet their standards. The CNSC must be given ample time and information in order to authorize the commissioning or decommissioning of a laboratory, and must be given an appropriate period in which they may inspect the facility if they wish. Radiation Laboratory Classification information can be found in **Appendix 4**.

Please contact health.safety@uregina.ca for assistance and guidance.

7.3. Radiation Laboratory Decommissioning Procedures

All Permit Holders who wish to terminate or relocate their radioisotopes activities at the U of R must contact the RSO (health.safety@uregina.ca) for assistance before starting the decommissioning process.

The procedure for decommissioning a Radioisotope Laboratory is as follows:

1. The Permit Holder or other person responsible for space should give the RSO as much notice as possible of their plan to decommission a radioisotope laboratory. The Permit Holder requests a permanent amendment to their Permit deleting the location in question, and follows the procedure for *Application for a Permanent Amendment of a Permit (Section 6)* in this Program.
2. The RSO checks all Radiation Safety Office and Permit Holder records to determine all radioisotopes that have been used in this laboratory, their maximum activity, and the conditions under which they were used.
3. The RSO and Permit Holder meet and develop a plan for cleaning and monitoring the laboratory.
4. The CNSC is informed of the decommissioning in writing by the RSO and must grant approval before activities can start.
5. The Permit Holder is responsible for the following:
 - a) All radioactive material that the Permit Holder wishes to retain under their Permit is moved to another authorized location. All other radioactive material is disposed of, following the procedure for *The Disposal of Radioactive Material* in this Manual.
 - b) The laboratory is cleaned, following the plan developed in step 3 above.
 - c) The laboratory is monitored, following the plan developed in step 3 above. All monitoring is recorded. If any contamination is found, the area is decontaminated and monitoring is repeated. Decontamination to below the monitoring detection limit is required.
 - d) When this process is complete, the RSO monitors the laboratory extensively and records the results. If any contamination is found, step c) above and this step are repeated.

6. When this process is complete, RSC inspects the laboratory and the monitoring records. The committee may recommend any additional action it considers is warranted. These actions must be completed to the committee's satisfaction before the next step is taken.
7. The CNSC is informed of the completed decommissioning in writing by the RSO.
8. If, after two weeks, the CNSC has not informed the University that they wish to inspect the laboratory, the RSO removes or defaces all radiation and radioactive material signs from the area. The RSO removes the room from the list of authorized locations at which radioisotopes may be used, and issues a new Permit to the Permit holder with this location deleted. The laboratory is then released for general use.

7.4. Worker Authorization & Signage Procedures

Only authorized personnel are allowed to enter radioisotope lab working areas. Visitors, maintenance staff, custodial staff and others, as deemed appropriate, must be provided with training and/or supervision commensurate with their anticipated activities in the containment area. All such individuals must have the permission of the Permit Holder and/or RSO to enter the containment area. Up-to-date campus-wide signage provides contact information for entry.

If entry into these areas is essential to maintain the building, the RSO is available to provide the necessary orientation for staff or contractors required to enter these restricted laboratories.

8. Radioactive Material Incident Reporting and Emergency Response Procedures

8.1. Incident Reporting

An incident is an event that results in or may result in the loss of **control of** the radiation materials, injury or exposure to persons, or damage to property. Minor spills, unacceptable exposures to radiation, potential for the spread of radioactive contamination, the loss, theft or unauthorized use of isotope are examples of incidents. An incident regardless of how minor must be reported to the RSO as incidents. Initial reporting may be done verbally (phone) or via email to the RSO, but a formal written report from the person(s) and/or PI involved may be required.

In some instances, the RSO may be required to immediately report the incident to the CNSC and to the Saskatchewan Ministry of Labour Relations and Workplace Safety (Radiation Safety Unit). This initial report by the RSO must be followed by a complete written report of the incident investigation, including root cause analysis and remedial action taken.

8.1.1. Incident Reporting Procedure

1. All incidents involving radiation or radioactive material must be reported to the RSO, or in their absence the ARSO, or in their absence the PACRS Chair as soon as reasonably possible. Contact Campus Security (306-585-4999) to help notify responsible personnel.

2. The RSO, or in their absence the ARSO, or in their absence the PACRS Chair, will investigate all incidents involving radiation or radioactive material. Any incident that may have exceeded the CNSC criterion will be reported to the CNSC immediately.
3. The RSO will produce a written investigation report which will be forwarded to the CNSC and to PACRS.

8.2. Emergency Response

It is the responsibility of all Permit Holders to develop Emergency Procedures for responding to emergencies involving radioisotopes or radiation exposure for each of their labs. It is also their responsibility to ensure that all persons working in those labs are familiar with these procedures and know what to do in case of emergency.

These procedures must be approved by the RSO and posted in a suitable place in the lab.

The following material contains generic emergency procedures for dealing with some types of radioisotope and radiation exposure emergencies. These may be modified to suit individual laboratories. Special procedures should be written for and situation not covered by the general procedures.

8.2.1. Emergency Contact Information

24 Hour Emergency (Fire, Police, Medical):	911
24 Hour Saskatchewan Health Hotline:	811
Campus Security:	306-585-4999

Radiation Safety Officer (RSO):	306-585-4776/ 306-550-8358
Alternate Radiation Safety Officer (ARSO):	306-337-3184/ 306-421-6846
Health & Safety, Human Resources:	306-337-2370
PACRS Chair:	Contact Campus Security for contact #
Hazardous Material Response Team:	306-585-4999

8.2.2. Medical Emergency

1. Phone 911 – Direct them to the scene of the occurrence.
2. Call Campus Security: 306-585-4999
3. Give First Aid, if you are qualified to do so, or get help from Campus Security.
4. Stay with victim.

8.2.3 Needle Stick Poke, Puncture Wound, or Percutaneous Injury

1. Remove gloves and allow the wound to bleed.
2. Immediately wash the affected area for 15 minutes with soap and warm water.
3. Notify Supervisor (if available) to obtain assistance.

4. Seek **medical assistance immediately** (within **1-2 hours**) from a health care professional. The cause of the wound and materials involved should be reported.
5. Details of the incident must be reported to the Radiation Safety Officer immediately. The RSO will help you complete all required paperwork. The **Incident Report Form** should be completed and forwarded to Health & Safety within 24 hours. Forms can be found online at www.uregina.ca/hr/hs or by contacting health.safety@uregina.ca or 306-585-4776. Please include the following details:
 - a) What was the method of contact (e.g. needle stick, broken glass)?
 - b) How did the exposure occur?
 - c) What known radioisotopes were you in contact with?
 - d) What action was taken in response to the exposure to remove the contamination (e.g. hand washing)?
 - e) What personal protective equipment was being used at the time of exposure?

8.2.4. Eyes or Mucous Membrane Exposure (e.g. Splash)

1. Immediately flush the affected area for 15 minutes using an eyewash or shower.
2. Notify Supervisor (if available) to obtain assistance.
3. Seek **medical assistance immediately** (within **1-2 hours**) from a health care professional. The radioisotopes and chemicals involved should be reported.
4. Details of the incident must be reported to the Radiation Safety Officer immediately. The RSO will help you complete all required paperwork. The **Incident Report Form** should be completed and forwarded to Health& Safety within 24 hours. Forms can be found online at www.uregina.ca/hr/hs or by contacting health.safety@uregina.ca or 306-585-4776. Please include details as listed above.

8.2.5. Ingestion

1. Protective clothing should be removed.
2. Notify Supervisor (if available) to obtain assistance.
3. Seek **medical assistance immediately** (within **1-2 hours**) from a health care professional.
4. Identification of the material ingested and circumstances of the incident should be reported. Details of the incident must be reported to the Radiation Safety Officer immediately. The RSO will help you complete all required paperwork. The **Incident Report Form** should be completed and forwarded to Health& Safety within 24 hours. Forms can be found online at www.uregina.ca/hr/hs or by contacting health.safety@uregina.ca or 306-585-4776. Please include details as listed above.

8.2.6. Exposure or Suspected Exposure Procedures

Any event where a person could receive a dose of radiation greater than the yearly allowed maximum must be reported to the RSO and CNSC immediately. Since it is not always immediately apparent what dose may have been received in an incident, the RSC requires all Permit Holders and persons under their direction to report all incidents involving radiation and radioactive material.

8.2.6.1. Possible Over-Exposure from External Sources

1. Remove yourself from the situation causing exposure.
2. Take action, e.g., place warning signs or shielding to prevent exposure to anyone else.
3. Notify the RSO and the Permit Holder immediately. Contact Campus Security (306-585-4999) to help notify responsible personnel.
4. Write down the circumstances of the exposure. This will include the type of radioactive material involved and the time and distance of the exposure.
5. The RSO will investigate and notify the CNSC.

8.2.7. Post-Exposure Procedures

If a student or employee has been exposed to radioactive substances at the U of R, the University will, with the consent of the student/employee, during the student/employee's normal working hours, arrange for immediate medical evaluation, medical intervention, and confidential post-exposure counselling.

If a student/employee cannot receive medical evaluation, medical intervention, or post-exposure counselling during the student/employee's normal working hours, the U of R will credit the student/employee's attendance for evaluation, intervention, or counselling as time at work and shall ensure that the student/employee does not lose any pay or other benefits.

The U of R H&S Unit investigates and documents any occurrence of an exposure to radioactive materials to identify the route of exposure. All investigations and documentation concerning personal information of any work-related exposure incident, including the route of exposure and the circumstances in which the exposure occurred, are held in complete confidentiality.

9. Radioactive Material Spill Procedures

The most immediate concern following a spill of radioactive material is to contain the spill and treat any exposed persons. See **Section 7 - Radioactive Material Emergency Response Procedures** above for step-by-step medical treatment procedures.

After this occurs, properly trained personnel can begin the clean up and decontamination process.

Every consumable source lab must have basic supplies to assist with radioactive material spill cleanup. The kit must contain:

- Personal protective equipment
- Forceps and sharps waste disposal container
- Concentrated radioisotope cleanup solution
- Paper towels
- Garbage bags

Some members of the Hazardous Material Spill Response Team (contacted via Campus Security: 306-585-4999) can assist with radioactive material spill cleanup.

9.1. Spill of Radioactive Material (Not Involving Personnel)

1. If the occurrence is in the laboratory, take steps to prevent spread; e.g. if it is a liquid on the bench or floor, use paper towels, etc., to absorb the liquid and prevent spread.
2. Use the monitor to check the clothes and skin of the persons involved or who by some long chance could be contaminated. If contamination is found go to Spill of Radioactive Material Involving Personnel. If personnel are “not contaminated” proceed to step 3.
3. Notify the Permit Holder and the Radiation Safety Officer, who will direct the clean-up. If neither of these persons can be contacted, and if the material is safely confined, put up appropriate warning signs, leave and lock the lab until one of those persons can be notified. Contact Campus Security (306-585-4999) to help notify responsible personnel.
4. If the occurrence is not in a radiation lab, e.g. in a hallway or another lab, first take steps to confine the material as in step 1. Then block access to the contaminated area using ropes, chairs, etc. and place radiation warning signs. Notify a responsible person as in step 3 and maintain a watch on the area. Contact Campus Security to help notify responsible personnel.
5. As soon as possible write down the circumstances of the occurrence, the amount and type of activity involved and the actions taken.

9.2. Spill of Radioactive Material Involving Personnel

1. If on clothing only, remove items known to be contaminated. Use the monitor to check other clothing and skin beneath contaminated clothing for possible contamination.
2. If skin is contaminated, wash the contaminated areas immediately using an excess of water. Use the monitor to check skin and continue to clean by careful washing until the activity is zero. Do not use harsh soap or abrade the skin by vigorous rubbing as this may permit the isotope to enter the body.
3. Contact Campus Security (306-585-4999) to help notify responsible personnel.
4. If area contamination is present take steps as in **Section 9.1**.
5. If the occurrence was in a public place have another worker prevent the spread and resulting public hazard by taking steps as in **Section 9.1**.
6. If ingestion or splash of material may be involved, follow steps outlined in **Section 8.2**.
7. The possible radiation exposure must be estimated to allow evaluation of the necessary medical procedures. Make an estimate of the type and amount of activity involved and write it down. Record the approximate amount of time spent near the source.
8. As soon as convenient write down all the circumstances of the occurrence.

10. Ordering and Receiving Radioactive Materials Procedures

10.1. General Procedures

Permit Holders may order any permitted radioactive material from any supplier and in any form consistent with the Permit, if and only if they follow and meet the requirements of the procedures for ordering and receiving radioactive materials. It is the Permit Holder's responsibility to ensure that the activity of radioisotope ordered, when added to the amount currently possessed, does not exceed their Permit maximum. **Failure to follow these procedures can result in automatic cancellation of or delays in receiving an order. Repeated failure to follow these procedures is grounds for revocation of a Permit.**

Unless approval has been given in writing by the RSO, only Permit Holders may order radioactive material. A Permit Holder may apply to designate another suitably trained person to order radioisotopes by using the procedure for *Designating an Alternate Person to Order Radioactive Material* included in this section below.

Arrangements for and receipt of gifts or donations of radioactive materials or devices containing radioactive sources must follow the same procedures, and must receive prior approval by the RSO.

10.2. Ordering Radioactive Materials

Prior to any radioactive material order being placed, the RSO must be contacted. Additional importation, exportation, and transport permits may be required. To ensure no delays at Customs or receiving facilities on campus, please contact health.safety@uregina.ca immediately.

1. Prior to any order being placed, the RSO must approve the purchase order in writing and create a *Radioactive Material Purchase Requisition Form*. A written request via email is sufficient. The information that that RSO requires includes:
 - a) the name of the Permit Holder
 - b) the name of the supplier
 - c) the radioisotope(s) being ordered
 - d) the total activity of each radioisotope being ordered
 - e) the expected arrival date
2. If the RSO approves the order, the RSO will authorize the purchase requisition, and send the complete Radioactive Material Purchase Requisition Form to the Permit Holder and appropriate Purchasing Department. **The Purchasing Department will be informed that this is a radioactive material before purchase is made.**
3. The delivery address on the Purchase Order must be:

Radiation Safety Officer
c/o UR Stores
Research & Innovation Centre, Room 110
University of Regina

3737 Wascana Parkway
Regina SK S4S 0A2

This is the only address radioisotope suppliers will be authorized to make shipments to.

10.2.1. Designating Alternate Person to Order Radioactive Materials

Unless approval has been given in writing by the RSC, only Permit Holders may order radioactive material. A Permit Holder may apply to designate another suitably trained person to order radioisotopes by using the following procedure:

1. The Permit Holder obtains a copy of the Designation of Signing Authority form from the RSO. A copy of this form is shown in **Appendix 3** of this Program.
2. The Permit Holder fills out the form, and it is signed by both the Permit Holder and designated person. The designation may be either open-ended or conditional, as specified by the Permit Holder.
3. The completed form is returned to the RSO.
4. The RSC considers the application. Upon acceptance, the chair of PACRS signs a copy of the designation form and returns it to the Permit Holder. A second signed copy is given to the RSO.

10.2.2. Receiving Radioactive Materials

Radioactive materials can *only* be received through the University Stores. Do not ever sign for and receive materials in your lab or office space.

The following procedures apply to the receipt of radioactive material at the University:

1. The RSO checks each purchase order to ensure the Permit Holder has not exceeded the Permitted maximum activity. Orders exceeding this maximum will have to be modified or cancelled.
2. Only the RSO or ARSO may receive shipments of radioactive material.
3. Upon receipt of the shipment, the RSO or ARSO:
 - a) checks the outside of the package for leakage or contamination.
 - b) opens the package and checks the inner packaging material for leakage or contamination.
 - c) checks the primary container for leakage or contamination.
 - d) confirms that the order has been filled correctly.
4. If no contamination is found, a University of Regina inventory control number is assigned to the container and recorded. The radioisotope is then released to the ordering Permit Holder, along with a University of Regina *Radioisotope Inventory Sheet* (**Appendix 4**) if it is an open source.
5. If contamination is found, arrangements will be made with the supplier to return or dispose of the radioactive material.

6. After ensuring the purchase order is closed out, the RSO keeps the packing slip with other order receipt documents.

11. Records and Inventory of Radioactive Material Procedures

CNSC Regulations require that records be kept of all radioactive material from the time the material is obtained until final disposal. No records can be disposed of without written approval from the CNSC. Please contact the RSO immediately before disposal of any records.

It is the Permit Holder's responsibility to ensure that inventory records for all the radioactive material in their possession are kept current, using the appropriate procedure listed below. These records must be available to the RSO, ARSO and CNSC Inspectors. The inventory of radioactive materials is maintained by the RSO and is verified at least once per year.

11.1. Maintenance of Inventory Records for Open Sources in Use

An inventory record of open sources of radioactive material in use must be maintained as follows:

1. When open sources of radioactive material are received from the RSO they are delivered to the Permit Holder accompanied by a *University of Regina Radioisotope Inventory Sheet*. A copy of this sheet is shown in **Appendix 4** of this Program. This sheet will have the University of Regina Inventory Control Number already written on it.
2. This sheet is used for keeping a running total of the amount of material still remaining, and also has space to record the amount of waste disposed and how it was disposed.
3. For short half-life radioisotopes, a calculation of the current remaining activity should be done at least every two half-lives, and included on the inventory sheet.
4. When the radioactive material has been used up or decayed to an unusable activity, the stock bottle and the inventory sheet must be returned promptly to the RSO as part of the radioactive waste disposal process. The RSO retains the record sheet as long as is required by CNSC regulations. See the procedure for *The Disposal of Radioactive Material* in **Section 14** for full details.

11.2. Maintenance of Inventory Records for Open Sources in Storage

An Inventory Record of Open Sources of Radiation Material in Storage is maintained in accordance with the following procedures:

1. A copy of the current University of Regina Inventory of Radioactive Material for the storage location is kept at that storage location at all times.
2. It is the Permit Holder's responsibility to check sources in storage on a regular basis, to ensure that they are accounted for and undamaged.
3. If the Permit Holder decides to use a source in storage at any time, he/she must immediately update the *University of Regina Radioisotope Inventory Sheet*, and inform the

RSO that the source is now in use. The procedure for *The Maintenance of Inventory Records for Open Sources in Use* now applies and must be used thereafter.

11.3. Maintenance of Inventory Records for Sealed Sources not in Devices

A Radioactive Source Signout Sheet is maintained in accordance with the following procedures:

1. A copy of the current University of Regina Inventory of Radioactive Material for the storage location is kept at that location at all times.
2. A log book is maintained at each location containing sealed sources. This book is used to record all use of the sealed sources, using the *Radioactive Source Signout Sheet (Appendix 10)*.
3. It is the Permit Holder's responsibility to check this log book regularly, and to ensure that removed sources are returned in a timely manner.

12. Dosimetry and Exposure Monitoring Procedures

Based on a hazard identification and risk assessment process, dosimetry and thyroid monitoring may be used to measure the radiation exposure of persons who work with radioactive materials. Options include personal (i.e., body, ring, etc.) and/or area dosimetry. Baseline thyroid screening before work using iodine is strongly recommended. More information is available from the RSO, and from CNSC Publication G-58 "Thyroid Screening for Radioiodine".

In all cases, the ALARA principle will be applied to keep exposures to a minimum.

12.1. Personal Dosimetry Procedures

Personal dosimeters are issued by the RSO to Faculty, Staff, Students or Community Members who are identified during the project/task risk assessment process. The dosimeters are worn in the radioisotope laboratories, and must be kept clean, out of direct sunlight, and away from radioactive sources when not in use. On a frequency identified by the risk assessment, the RSO replaces the dosimeter and sends the old dosimeter to National Dosimetry Services.

12.2. Personal Dosimetry Results Reporting Procedures

When the dosimetry or thyroid monitoring report is received, the RSO advises each person using dosimetry of his or her result if detection levels have been exceeded.

No one at the University of Regina is designated as a Nuclear Energy Worker, therefore no exposures greater than 1 mSv per year are anticipated. The detection limit for the badges is 0.1 mSv, and exposures at or near this level are not normally investigated.

If a dosimeter reading exceeds 0.3 mSv in a three month period, the RSO investigates the cause of the reading, and if necessary instigates procedures to reduce the wearer's future exposures.

If a dosimeter reading exceeds 0.5 mSv in a three month period, the TLD Badge wearer will cease work with radioactive materials until procedures are in place to reduce any further exposures.

In all cases, dosimetry records are maintained by the RSO and made available to individual badge wearers and to CNSC inspectors.

13. Monitoring and Inspections of Isotope Laboratory Procedures

13.1. Monitoring Introduction

It is the responsibility of the Permit Holder to ensure that any area under their control where open sources of radioisotopes are being used is monitored at least once per week by those using the isotopes, and that the monitoring results are recorded. Records of this monitoring must be kept, and must be available to the RSO and CNSC Inspector. Forms for keeping such records are available from the RSO, and an example is included in **Appendix 5** of this Program. Monitoring should be done following the procedure below unless special permission has been obtained from the RSO to use another procedure.

It is the responsibility of the Permit Holder to ensure that any contamination disclosed by routine monitoring is cleaned up promptly. The contamination limits allowable under CNSC regulations are available in **Appendix 6** of this Program, and any time these numbers are met or exceeded the RSO must be immediately notified. Any contamination detected which exceeds twice background levels must be immediately cleaned up. The counter readings equivalent to the CNSC allowable limits for the available scintillation counters are also included in **Appendix 7** these are the numbers which, when obtained in a wipe test, indicate immediate action is required under CNSC regulations.

13.2. Monitoring Procedure

The procedure for Monitoring Radioisotope Laboratories is as follows:

1. Any laboratory where any open source radioisotope, other than tritium and certain quantities of carbon, is being used is surveyed with a calibrated survey meter at least once per day in the active area, and generally this survey takes place at the end of the day.
2. At least once per week, a general survey of the laboratory is done and the results recorded. The battery level of the counter should be checked and the counter tested with a check source to ensure it is operating properly before each survey.
3. Any laboratory where any open source radioisotope is being used is monitored by extensive wipe tests and the results recorded, at least once per week or within 7 days using the open source radioisotope. A schematic floor plan of the laboratory must be available to assist in recording and interpreting (by users, RSO, CNSC inspectors) wipe test results. The estimated area of each wipe is included in the record.

13.3. RSO Monitoring and Inspection Procedures

The RSO conducts regular monitoring and inspections of all actively used radioisotope laboratories (including all sealed source and open source use) and specific sources. Any deficiencies and contamination detected by the RSO is reported to the Permit Holder. It is the responsibility of the Permit Holder to ensure that such contamination is cleaned up promptly and deficiencies are rectified.

14. Disposal of Radioactive Materials Procedures

Radioactive material is disposed of using the following procedure. Permit Holders are responsible for ensuring that they and all persons working under their direction use this procedure. The RSO takes responsibility for the final disposal of most radioactive material, provided this procedure is followed. Radioactive material may not be disposed of by any other means unless an alternate written procedure has been developed and approved by the RSC.

14.2. Disposal of Open Source Radioactive Material

The procedure for disposal of open source radioactive material is as follows:

1. Each different radioisotope is disposed of in a separate radioactive waste container, unless mixing of radioisotopes within an experiment makes this impossible. Liquids and solids are stored separately. Wastes are appropriately shielded.
2. Each radioactive waste container is labeled as follows:
 - Isotope
 - Estimate of quantity of isotope
 - Chemical name and estimate of quantity of chemical
 - Biological name and estimate of quantity of biological material (if applicable)
 - Date
 - Permit Holder Name
3. Appropriate solid radioactive waste containers consist of an inner 6 mil polyethylene bag and an impervious outer container - cardboard and wooden outer containers may not be used. Any other waste container system must have the prior approval of the RSO. Nothing inside the bag should identify the material as radioactive, and no liquids such as liquid scintillation fluid can be inside the bags. When the bags are full they must be sealed.
4. Liquid scintillation vials are collected in cardboard “flats” and returned to the RSO for disposal without being opened. The flat must be labeled with the isotope, estimated quantity of isotope, date and Permit Holder Name.
5. Empty or unwanted radioisotope stock containers with inventory sheets are not disposed of in these radioactive waste packages. The stock container and completed inventory sheet are given separately to the RSO for recording and disposal.

6. When the radioactive waste is properly packaged, the RSO must be informed. The RSO removes the waste and stores it for disposal. Full records of all disposals are maintained by the RSO.

14.3. Disposal of Sealed Source Radioactive Material

Radioactive sealed sources which are to be disposed of are given to the RSO, who arranges for appropriate disposal. They are never disposed of by the Permit Holder.

15. Lasers and X-Rays

15.1. Definition

For the purpose of this Program, Lasers and X-rays are:

- an operable device whose principal purpose and function is the production of X-rays (electromagnetic radiation of a wave length shorter than 0.25 nanometers).
- Class 3b lasers.
- Class 4 lasers.

15.2. Laser and X-Ray Registration

All employees or any other person intending to either:

- a) bring a Laser or X-Ray to the University, or
- b) dispose of a Laser or X-Ray at the University

must obtain approval from the RSO. Prior to issuing an approval, a completed Laser/X-Ray Registration form (**Appendix 11**) must be sent to the RSO. The RSO will meet with the applicant to discuss the requirements of the proposed research activities. There will be a subsequent inspection of the specific equipment where the research will be conducted.

Contact the RSO for more information.

Section 2 – Community

16. Naturally Occurring Radioactive Materials (NORMs)

16.1. Introduction

Naturally occurring radioactive materials (NORMs), which include radioactive elements found in the environment, have always been present in the Earth's crust and within the tissues of all living beings. A common example is radon gas, which comes from uranium in the soil and can accumulate in buildings. Health Canada NORM Guidelines indicate that the same radiation exposure criteria (as outlined in University of Regina Radiation Safety Program – Section 1) should be applied where workers or the public are exposed to NORMs. This applies to cases where NORMs are in their natural state and to cases in which the concentration of NORM material has been increased by processing.

16.2. NORM Exposure Control

A major principle in radiation dose control is that if doses can be reduced by reasonable actions, those actions should be taken. This can be achieved through implementation of: management control over work practices, personnel qualification and training, control of occupational and public exposure to radiation, and planning for unusual situations.

Contact the RSO for more information.

Appendices

Appendix 1

Instructions for an Application for a Permit for the Use of Radioactive Material

Section 1 – Identification

This is general information about the applicant, including contact information.

Section 2 – Program Intent

Include a very brief summary of your research program intent.

Section 3 – Sources Required and Location

Only fill out the appropriate sections. Use the appropriate Radioisotope Safety Data Sheets (available here: <http://nuclearsafety.gc.ca/eng/resources/radiation/radionuclide-information.cfm>) to help complete these sections:

Items to consider:

- Radioisotope – specify all radioisotopes required
- Maximum vial size required - indicate the maximum amount of radioactive material (in MBq) which would be contained in a single vial. Normally, this is the contents of the stock vial.
- Possession Limit – this is the maximum amount of isotope (in MBq) which would be required. Its value should include waste as well as unused isotope.
- Exemption Quantity – the exemption quantities for each isotope can be found on the CNSC website
- Annual Limit of Intake – This number can generally be found in the Radioactive Safety Data Sheet (RSDS).
- Type of radioactive emission – This can also be found in the RSDS.
- Energy of Radioactive Emission – RSDS
- Half-Life – RSDS
- Critical Organ – RSDS
- A description of the premises in which the prescribed substance is to be located and of any equipment in connection with which it is to be used.

The description of the premises will include the room number(s) and building as well as a description of how this room is related to or connected to other spaces such as student laboratories. Any special renovations or facilities designed for the handling of radioactive materials should be included. Handling and measuring equipment will also be described. A description of the design requirements for radioisotope laboratories, as issued by CNSC, is available from the Radiation Safety Office. For low levels of isotopes all of the special facilities or modifications may not be necessary, so discuss your needs with the Radiation Safety Officer.

- A description of the measures to be taken to prevent theft, loss or any unauthorized use of the prescribed substance.

This regulation requires that the radioactive material be stored in a locked place such as a cupboard, fridge or safe, and that the laboratory itself be kept locked when not in use. The keys to the laboratory should be restricted to authorized persons only. Describe the precautions to be taken to meet these requirements.

Section 4 - Security

Only fill out the appropriate sections if additional security strategies are required. For example, actively using sources in a shared teaching lab.

Section 5a – Hazard Identification

Identify any hazards present and how you plan to mitigate them. Identify how equipment will be maintained. Please attach appropriate equipment SOPs to this application.

Items to consider:

- The nature and quantity of the prescribed substance and the purpose for which it is required.

This involves a description of the proposed project, the isotope to be used and the physical and chemical form of the isotope. This information is necessary for the determination of the facilities and the nature of the laboratory space required as well as the hazards involved. There must be enough detail to allow those evaluations.

- The maximum quantity of the prescribed substance likely to be required at any one time for the purpose set out in the application.

This will show the results of a calculation starting with the initial activity of the system and resulting in the activity remaining in the material to be counted. It is done to justify the possession limit requested and to show that the end product will be measured satisfactorily by the equipment to be used. The maximum possession limit may be based on the results of these calculations as well as on the nature of the laboratory facilities. Estimates should be made of the maximum number of experiments likely to be done at one time, and allowance made for reordering isotopes while old stock is still on hand. A proposed ordering plan should be presented and any cost benefits which may be realized by ordering larger than the minimum requirement should be described.

- A description of the qualifications, training and experience of any person who is to use the prescribed substance. Formal training in the theory or radioactivity and in safe use of radioactive material should be listed. Experience with the use of radioisotopes should be outlined.

Section 5b – Emergency Response

A description of the measures to be taken, including any plan in case of accident, to prevent the receipt by any person of a dose of ionizing radiation in excess of any dose specified in respect of such a person in Schedule II.

Shielding and special handling equipment directed to dose reduction should be described here. Rules for working with radioisotopes must be posted in the laboratory. These are available from the CNSC, through the Radiation Safety Officer, in poster form. It is also advisable to have charts posted in the laboratory giving the characteristics, special hazards and special precautions to be used with each isotope in that laboratory. Some of these are available from the Radiation Safety Officer.

A summary of general procedures to be followed in case of an incident or emergency are outlined in Section 8 and Section 9 of the Radiation Safety Program. These should be modified for your particular facilities as necessary and developed as a concise Emergency Procedure to be posted in the working area.

Section 6 – Dosimetry

Based on dose calculations, will dosimetry be required?

Section 7 – Waste Disposal

A description of the method of disposing of the prescribed substance.

The disposed material falls into two broad categories, the radioactive material itself which may be in solid or in liquid form, and the contaminated materials such as pipettes, paper wiping material or bench coverings. The latter may be of large volume. Before the permit is issued you must describe disposal procedures that have been worked out with the Radiation Safety Officer. If some radioactive material must be disposed to the sewage system during the course of experiments, the amount and concentration must be estimated.

Appendix 2

Application for a Permit for the Use of Radioactive Material

Section 1 Identification

Principal Investigator

Name: _____
Faculty/ Department: _____
Office Phone: _____
After Hours Phone: _____
Email: _____
Office Room Number: _____

Authorized User List

Please list all your current laboratory staff, students and volunteers.

Name	Faculty, Staff, Student, or Volunteer
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Section 2 Program Intent

Please include a brief summary of your research program intent:

Section 3 Sources Required and Location

List open source radioactive materials which be required:

Radio-isotope	Max. vial size required (MBq)	Possession limit required (MBq)	Exemption Quantity (MBq)	Annual Limit of Intake (MBq)	Type of Radioactive Emission	Energy of Radioactive Emission	Half Life	Critical Organ

Has the laboratory been commissioned for radioactivity use? What Laboratory Level is the lab?

List sealed sources which will be required. If source is to be used for calibration of a device or is to be incorporated into a device, provide make, model and serial number of device.

Radioisotope	Activity	Exemption Quantity	Type of Radioactive Emission	Energy of Radioactive Emission	Half Life	Make, Model, S/N of Device (if applicable)

List any sealed sources/sealed sources in devices that need to be leaked tested? What is the frequency?

Please indicate where the project activities will be located; please include storage (e.g. fridge, freezer, cabinet, and vault locations), shared equipment rooms (e.g. teaching labs, etc.), and if appropriate how security will be maintained:

Building	Room	Room Use (e.g. storage, manipulations, waste disposal, etc.)	Security Considerations

** Please attach additional pages if necessary*

Section 4 Security

Indicate below if additional mitigation strategies are required to manage security of your materials:

Security Risk	Mitigation Strategies Required
Physical Security	
Personnel Suitability and Reliability	
Material Accountability	
Incident and Emergency Response	
Information Security	

** Please attach additional pages if necessary*

Section 5a Hazard Identification

Describe proposed use of radioactive materials, include dose calculations where they can be evaluated. Identify any hazards present and how you plan to mitigate them. This includes any hazards in addition to radioisotopes (e.g., physical, electrical, chemical, etc.). Attach extra pages as required. Please attach appropriate equipment SOPs to this application. Please include operation, training requirements, preventative maintenance, etc.

Include make, model and serial numbers of radiation detection equipment which will be used in the course of this research (i.e., survey meters, contamination monitors, wipe tests, etc.).

How will equipment be maintained? Attach applicable SOPs.

Section 5b Emergency Response

Please identify what incidents and emergencies have the potential to occur (e.g., theft, spills, exposure, loss, etc.) Attach applicable emergency response SOPs .

Section 6 Dosimetry

Will dosimetry be required? What specific types of dosimeters (personal, area, TLDs, neutron) are required?

Section 7 Waste Disposal

Radiation Safety Program

Last updated: 2023/07/24 Revision 1.2

What type of radioactive waste will you create (e.g., liquid, solid, radioisotope + chemicals, etc.)? What frequency of disposal will you require? Will waste be stored for decay or require third-party Disposal Company?



As the Principal Investigator on this project, I declare that I am familiar with the contents of the University of Regina Radiation Safety Program, and that the above describes my research with regards to the use of radioactive materials, in its entirety.

As the legally responsible individual I will ensure that all research and/ or teaching conducted under my direction in the above laboratories and by the personnel listed, conforms to the standards set out in the University of Regina Radiation Safety Program and all applicable Canadian Nuclear Safety Commission Acts and Regulations. Any major deviation from the project, as originally approved, will be submitted to the Radiation Safety Committee via the Radiation Safety Officer for approval prior to its implementation.

Principal Investigator's Signature

Name _____

Signature _____ Date _____

Dean of Faculty's Signature

Name _____

Signature _____ Date _____

Radiation Safety Committee Approval

Approved Yes No

Radiation Safety Chair Name _____

Radiation Safety Chair Signature _____ Date _____

RSO Name _____

RSO Signature _____ Date _____

Appendix 3

Designation of Signing Authority

I, _____ authorize

Radiation Safety Program

Last updated: 2023/07/24 Revision 1.2

_____ to sign orders for radioactive
material under my permit number _____, subject to the
conditions listed below.

Permit Holder Signature

Person Designated Signature

Conditions:

Date

Appendix 4
Radioisotope Inventory Sheet

Permit Holder _____
Isotope / Initial Activity / Initial Volume _____
Calibration Date / Activity on Calibration _____
Chemical Form _____
Inventory Identification Number _____
Date Received _____
Pages _____

Date Used	Experiment	Name of User	Amount available on date of use		Amount Used		Activity of Waste Disposed to garbage/liquid waste/sewer/other				Balance	
			Volume	Activity	Volume	Activity	Liquid	Solid	Scint vials	Other	Volume	Activity

Appendix 5

Weekly Wipe Test Records for the Year: _____

Room #: _____ Permit Holder: _____

If there were no isotopes used for a particular week, indicate this in the log for that week. Attach a sketch of the lab, indicating areas to be wiped. Include background counts and calculate the contamination level for every wipe test which reads twice background or higher. If contamination is found, decontaminate the area, re-test and include results here. Sign your name for each week you wipe test.

REMEMBER:

$$\frac{\text{counts}}{\text{min}} \times \frac{1 \text{ min}}{60 \text{ sec}} \times \frac{1}{\text{wipe area}} \times \frac{1}{\text{Counter Efficiency}} \times \frac{1}{0.1} = \text{Bq/cm}^2$$

where

wipe area is less than 100 cm²

Counter Efficiency is 0.83 for carbon and 0.57 for tritium

JANUARY										
Vial #	Week 1 Cpm	Week 1 Bq/cm ²	Week 2 Cpm	Week 2 Bq/cm ²	Week 3 Cpm	Week 3 Bq/cm ²	Week 4 Cpm	Week 4 Bq/cm ²	Week 5 Cpm	Week 5 Bq/cm ²
Background										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Re-test #1										
Re-test #2										
Re-test #3										
Signed										
Date										

Room #: _____

Permit Holder: _____

FEBRUARY										
Vial #	Week 1 Cpm	Week 1 Bq/cm ²	Week 2 Cpm	Week 2 Bq/cm ²	Week 3 Cpm	Week 3 Bq/cm ²	Week 4 Cpm	Week 4 Bq/cm ²	Week 5 Cpm	Week 5 Bq/cm ²
Background										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Re-test #1										
Re-test #2										
Re-test #3										
Signed										
Date										

MARCH										
Vial #	Week 1 Cpm	Week 1 Bq/cm ²	Week 2 Cpm	Week 2 Bq/cm ²	Week 3 Cpm	Week 3 Bq/cm ²	Week 4 Cpm	Week 4 Bq/cm ²	Week 5 Cpm	Week 5 Bq/cm ²
Background										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Re-test #1										
Re-test #2										
Re-test #3										
Signed										
Date										

Room #: _____

Permit Holder: _____

APRIL										
Vial #	Week 1 Cpm	Week 1 Bq/cm ²	Week 2 Cpm	Week 2 Bq/cm ²	Week 3 Cpm	Week 3 Bq/cm ²	Week 4 Cpm	Week 4 Bq/cm ²	Week 5 Cpm	Week 5 Bq/cm ²
Background										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Re-test #1										
Re-test #2										
Re-test #3										
Signed										
Date										

MAY										
Vial #	Week 1 Cpm	Week 1 Bq/cm ²	Week 2 Cpm	Week 2 Bq/cm ²	Week 3 Cpm	Week 3 Bq/cm ²	Week 4 Cpm	Week 4 Bq/cm ²	Week 5 Cpm	Week 5 Bq/cm ²
Background										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Re-test #1										
Re-test #2										
Re-test #3										
Signed										
Date										

Room #: _____

Permit Holder: _____

JUNE										
Vial #	Week 1 Cpm	Week 1 Bq/cm ²	Week 2 Cpm	Week 2 Bq/cm ²	Week 3 Cpm	Week 3 Bq/cm ²	Week 4 Cpm	Week 4 Bq/cm ²	Week 5 Cpm	Week 5 Bq/cm ²
Background										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Re-test #1										
Re-test #2										
Re-test #3										
Signed										
Date										

JULY										
Vial #	Week 1 Cpm	Week 1 Bq/cm ²	Week 2 Cpm	Week 2 Bq/cm ²	Week 3 Cpm	Week 3 Bq/cm ²	Week 4 Cpm	Week 4 Bq/cm ²	Week 5 Cpm	Week 5 Bq/cm ²
Background										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Re-test #1										
Re-test #2										
Re-test #3										
Signed										
Date										

Room #: _____

Permit Holder: _____

AUGUST										
Vial #	Week 1 Cpm	Week 1 Bq/cm ²	Week 2 Cpm	Week 2 Bq/cm ²	Week 3 Cpm	Week 3 Bq/cm ²	Week 4 Cpm	Week 4 Bq/cm ²	Week 5 Cpm	Week 5 Bq/cm ²
Background										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Re-test #1										
Re-test #2										
Re-test #3										
Signed										
Date										

SEPTEMBER										
Vial #	Week 1 Cpm	Week 1 Bq/cm ²	Week 2 Cpm	Week 2 Bq/cm ²	Week 3 Cpm	Week 3 Bq/cm ²	Week 4 Cpm	Week 4 Bq/cm ²	Week 5 Cpm	Week 5 Bq/cm ²
Background										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Re-test #1										
Re-test #2										
Re-test #3										
Signed										
Date										

Room #: _____

Permit Holder: _____

OCTOBER										
Vial #	Week 1 Cpm	Week 1 Bq/cm ²	Week 2 Cpm	Week 2 Bq/cm ²	Week 3 Cpm	Week 3 Bq/cm ²	Week 4 Cpm	Week 4 Bq/cm ²	Week 5 Cpm	Week 5 Bq/cm ²
Background										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Re-test #1										
Re-test #2										
Re-test #3										
Signed										
Date										

NOVEMBER										
Vial #	Week 1 Cpm	Week 1 Bq/cm ²	Week 2 Cpm	Week 2 Bq/cm ²	Week 3 Cpm	Week 3 Bq/cm ²	Week 4 Cpm	Week 4 Bq/cm ²	Week 5 Cpm	Week 5 Bq/cm ²
Background										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Re-test #1										
Re-test #2										
Re-test #3										
Signed										
Date										

Room #: _____

Permit Holder: _____

DECEMBER										
Vial #	Week 1 Cpm	Week 1 Bq/cm²	Week 2 Cpm	Week 2 Bq/cm²	Week 3 Cpm	Week 3 Bq/cm²	Week 4 Cpm	Week 4 Bq/cm²	Week 5 Cpm	Week 5 Bq/cm²
Background										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
Re-test #1										
Re-test #2										
Re-test #3										
Signed										
Date										

Appendix 6

Contamination Limits

The amount of removable contamination permitted in occupational and public areas is regulated through the conditions of a CNSC licence.

A licence may require that removable contamination not exceed the following typical limits for all areas, averaged over not more than 100 cm².

For controlled areas:

- 3 Bq/cm² of Class A radionuclides, which are long-lived and emit alpha radiation
- 30 Bq/cm² of Class B radionuclides, which are long-lived and emit beta or gamma radiation
- 300 Bq/cm² of Class C radionuclides, which are short-lived and emit beta or gamma

For supervised public areas and for decommissioning:

- 0.3 Bq/cm² of Class A radionuclides, which are long-lived and emit alpha radiation
- 3 Bq/cm² of Class B radionuclides, which are long-lived and emit beta or gamma radiation
- 30 Bq/cm² of Class C radionuclides, which are short-lived and emit beta or gamma

Contamination detected at or above the following levels must be reported immediately to the RSO, who reports this information to the CNSC.

Appendix 7

Contamination Criteria for Scintillation Counters

When using the Perkin-Elmer Scintillation Counter

The limit of 30 Bq/cm² of removable contamination of ¹⁴C is reached when a wipe test result of **3024** counts per minute is obtained.

$$\frac{\text{counts}}{\text{min}} \times \frac{1 \text{ min}}{60 \text{ sec}} \times \frac{1}{20 \text{ cm}^2} \times \frac{1}{0.83} \times \frac{1}{0.1} = 30 \text{ Bq/cm}^2$$

For a wipe area of 20 cm²

Counter efficiency measured 10 Nov 2017 (Standard 127000 dpm 20 Oct 2009)

$$\frac{105321}{127000} = 0.83$$

The limit of 30 Bq/cm² of removable contamination of ³H is reached when a wipe test result of **2196** counts per minute is obtained.

Appendix 8

Radiation Laboratory Classification

Classification	Purpose of the Room
Storage Room	A room, where any supplies of sealed or unsealed nuclear substances are kept without being handled. Examples include storage of waste and/or decaying radioactive material and supplies held for future use.
Basic-Level Room	A room, in which an unsealed nuclear substance is used which is larger than one “exemption quantity” as defined in section 1 of the <i>Nuclear Substances and Radiation Devices Regulations</i> , and where the largest quantity of each unsealed nuclear substance in one container does not exceed five (5) times its corresponding Annual Limit of Intake (ALI), as defined in section 12(1) of the <i>Radiation Protection Regulations</i> .
Intermediate-Level Room	A room, where the largest quantity of each unsealed nuclear substance in one container does not exceed 50 times its corresponding ALI.
High-Level Room	A room, where the largest quantity of each unsealed nuclear substance in one container does not exceed 500 times its corresponding ALI.
Containment-Level Room	A room, where the largest quantity of each unsealed nuclear substance in one container exceeds 500 times its corresponding ALI.

- The Annual Limit of Intake (ALI) is the intake in any year of a radionuclide which will result in a committed effective dose of 20 mSv during the 50 years after taking it into the body.
- Refer to CNSC for Radioisotope Laboratories, for the construction or renovation of rooms designated for the use of unsealed nuclear substances.

Appendix 9

Effective Dose Limits

13.(1) Every licensee shall ensure that the effective dose received by and committed to a person described in column 1 or an item of the table to this subsection, during the period set out in column 2 of that item, does not exceed the effective dose set out in column 3 of that item.

TABLE

	Column 1	Column 2	Column 3
Item	Person	Period	Effective Dose (mSv)
1.	Nuclear energy worker, including a pregnant nuclear energy worker	(a) One-year dosimetry period	50
		(b) Five-year dosimetry period	100
2.	Pregnant nuclear energy worker	Balance of the pregnancy	4
3.	A person who is not a nuclear energy worker	One calendar year	1

Equivalent Dose Limits

14.(1) Every licensee shall ensure that the equivalent dose received by and committed to an organ or tissue set out in column 1 of an item of the table to this subsection, of a person described in column 2 of that item, during the period set out in column 3 of that item, does not exceed the equivalent dose set out in column 4 of that item.

TABLE

	Column 1	Column 2	Column 3	Column 4
Item	Organ or Tissue	Person	Period	Equivalent Dose (mSv)
1.	Lens of an eye	(a) Nuclear Energy worker	One-year dosimetry period	50
		(b) Any other person	One calendar year	15
2.	Skin	(c) Nuclear Energy worker	One-year dosimetry period	500
		(d) Any other person	One calendar year	50
3.	Hands and feet	(e) Nuclear Energy worker	One-year dosimetry period	500
		(f) Any other person	One calendar year	50

Appendix 11

Laser and X-Ray Registration Form

Laser Information:

Departmental Contact Person _____

Telephone Number _____

Fax Number _____

Email _____

Academic Staff Member _____

Faculty _____

Department/Unit _____

Location of Laser (Building and Room #) _____

Manufacturer and Model _____

Serial Number _____

Hazard Class (IIIB or IV) _____

Use Medical Purposes Research Purposes

Type (lasing media)

Wavelength(s) (nm)

Output Power (W)

Pulsed? Yes No

Pulse Energy (j)

Pulse Length (s)

Repetition Rate (Hz)

Frequency of Use Often Occasionally Seldom

Laboratory Personnel Training Date (if trained)

Safety Related Information:

Manufacturers manual available Yes No

Written SOP available Yes No

Warning labels visible on control panel Yes No

Warning signs indicating type and class Yes No

Warning labels on beam path enclosure Yes No

Warning system Audible Light Verbal

On/Off key control for class IV Yes No

Housing interlocks intact and tested Yes No

