



I) LICENCE NUMBER: 01495-2-25.10

II) LICENSEE

Pursuant to section 24 of the Nuclear Safety and Control Act, this licence is issued to:

McMaster University
1280 Main Street West
Hamilton, ON
L8S 4K1
Canada

This licence replaces licence 01495-2-25.9.

III) LICENCE PERIOD

This licence is valid from: July 12, 2019 to August 31, 2025 unless otherwise suspended, amended, revoked or replaced.

IV) LICENSED ACTIVITIES

This licence authorizes the licensee to:

(a) possess, transfer, import, export, use and store the nuclear substances and the prescribed equipment listed in the Appendix: Nuclear Substances and Radiation Devices of this licence.

(b) conduct licensed activities in the location(s) specified in the Appendix: Locations of Licensed Activities of this licence.

This licence is issued for: consolidated uses of nuclear substances (815).

V) CONDITIONS

The contents of the appendices attached to this licence form part of the licence.

1. Prohibition of Human Use

This licence does not authorize the use of nuclear substances in or on human beings.
(2696-0)

2. List of Areas, Rooms and Enclosures

The licensee shall maintain a list of all areas, rooms and enclosures in which more than one exemption quantity of a nuclear substance is used or stored.
(2569-2)

3. Posting of Safety Poster(s)

The licensee shall post and keep posted, in a readily visible location in areas, rooms or enclosures where nuclear substances are handled, a radioisotope safety poster approved by the Commission or a person authorized by the



Commission, which corresponds to the classification of the area, room or enclosure.
(2570-4)

4. Storage

The licensee shall:

- (a) ensure that when in storage radioactive nuclear substances or radiation devices are accessible only to persons authorized by the licensee;
- (b) ensure that the dose rate at any occupied location outside the storage area, room or enclosure resulting from the substances or devices in storage does not exceed 2.5 microSv/h; and
- (c) have measures in place to ensure that the dose limits in the Radiation Protection Regulations are not exceeded as a result of the substances or devices in storage.

(2575-2)

5. Area Classification

The licensee shall classify each room, area or enclosure where more than one exemption quantity of an unsealed nuclear substance is used at a single time as:

- (a) basic-level if the quantity does not exceed 5 ALI,
- (b) intermediate-level if the quantity used does not exceed 50 ALI,
- (c) high-level if the quantity does not exceed 500 ALI; or,
- (d) containment-level if the quantity exceeds 500 ALI.

Except for the basic-level classification, the licensee shall not use unsealed nuclear substances in these rooms, areas or enclosures without written approval of the Commission or a person authorized by the Commission.

(2108-4)

6. Contamination Meter Requirements

The licensee shall make available to workers at all times at the site of the licensed activity a properly functioning portable contamination meter.

(2572-1)

7. Survey Meter Requirements

The licensee shall provide at all times where nuclear substances, except for Hydrogen-3 and Nickel-63, are handled or stored a radiation survey meter.

(2058-1)

8. Contamination Criteria

The licensee shall ensure that for nuclear substances listed in the Appendix: Classes of Radionuclides, attached to this licence:

- (a) non-fixed contamination in all areas, rooms or enclosures where unsealed nuclear substances are used or stored does not exceed:

- (i) 3 becquerels per square centimetre for all Class A radionuclides;
- (ii) 30 becquerels per square centimetre for all Class B radionuclides; or
- (iii) 300 becquerels per square centimetre for all Class C radionuclides; averaged over an area not exceeding 100 square centimetres; and

- (b) non-fixed contamination in all other areas does not exceed:

- (i) 0.3 becquerels per square centimetre for all Class A radionuclides;
- (ii) 3 becquerels per square centimetre for all Class B radionuclides; or
- (iii) 30 becquerels per square centimetre for all Class C radionuclides; averaged over an area not exceeding



100 square centimetres.

(2642-10)

9. Thyroid Monitoring

(a) Every person who in any 24-hour period uses a total quantity of Iodine 124, Iodine-125 or Iodine-131 exceeding:

(i) 2 MBq in an open room;

(ii) 200 MBq in a fume hood;

(iii) 20 000 MBq in a glove box; or

(iv) any approved quantity in any room, area or enclosure authorized in writing by the CNSC

shall undergo thyroid screening within a period more than 24 hours after the last use that resulted in any of the above limits being exceeded and less than 5 days after the limit was exceeded.

(b) Every person who in any 24-hour period uses a total quantity of Iodine-123 exceeding:

(i) 200 MBq in an open room;

(ii) 20,000 MBq in a fume hood;

(iii) 2,000,000 MBq in a glove box; or

(iv) any approved quantity in any room, area or enclosure authorized in writing by the CNSC

shall undergo thyroid screening within a period more than 8 hours after the last use that resulted in any of the above limits being exceeded and less than 48 hours after the limit was exceeded.

(c) Every person who is involved in a spill greater than 2 MBq of Iodine-124, Iodine-125 or Iodine-131 or on whom external contamination is detected, shall undergo thyroid screening within a period more than 24 hours after the spill and less than 5 days after the spill or contamination.

(d) Every person who is involved in a spill of greater than 200 MBq of Iodine-123 or on whom external contamination is detected, shall undergo thyroid screening within a period more than 8 hours after the spill and less than 48 hours after the spill or contamination.

(2046-17)

10. Thyroid Screening

Screening for internal Iodine-123, Iodine 124, Iodine-125 and Iodine-131 shall be performed using:

(a) a direct measurement of the thyroid with an instrument that can detect 1 kBq of Iodine-124, Iodine-125 or Iodine-131, or 10 kBq of Iodine-123; or

(b) a bioassay procedure approved by the Commission or a person authorized by the Commission.

(2600-4)

11. Thyroid Bioassay

If thyroid screening detects more than 10 kBq of Iodine-124, Iodine-125, Iodine-131 or 100 kBq of Iodine-123 in the thyroid, the licensee shall immediately make a preliminary report to the Commission or a person authorized by the Commission and have bioassay performed within 24 hours by a person approved by the Commission to provide internal dosimetry.

(2601-7)

12. Extremity Dosimetry - Beta Emitters

The licensee shall ensure that any person who handles a container which contains more than 50 MBq of phosphorus 32, strontium 89, yttrium 90, samarium 153 or rhenium 186 wears a ring dosimeter. The dosimeters must be supplied and read by a dosimetry service licensed by the Commission.

(2578-1)

13. Internal Authorization

The licensee shall ensure that:



- (a) internal authorizations are issued in accordance with the licensee's internal authorization policies and procedures approved by the Commission or a person authorized by the Commission; and
 - (b) internal authorization forms are posted in a readily visible location in or near each room, area or enclosure where nuclear substances and radiation devices are used or stored.
 - (c) the licensed activity is conducted in accordance with the terms and conditions of the internal authorization.
- (2215-4)

14. Project Approval

The licensee shall obtain written approval from the Commission or a person authorized by the Commission before starting any work requiring the use of more than 10,000 exemption quantities of a nuclear substance at a single time.

(2214-0)

15. Disposal (General)

When disposing of unsealed nuclear substances set out in column 1 of the Appendix: Disposal Limits to municipal waste, to sewer systems or to atmosphere, the licensee shall ensure that the concentration limit set out for each nuclear substance is not exceeded.

(a) The concentration limits set out in column 2 apply to quantities of solid waste of less than three tonnes per building per year. Nuclear substances released to the municipal garbage system must be in solid form and uniformly distributed in the waste with a concentration that is less than the limits in column 2. Where more than one nuclear substance is disposed of at one time, the sum of the quotients obtained by dividing the quantity of each substance by its corresponding limit in column 2 shall not exceed one.

(b) The limits set out in Column 3 apply to the water soluble liquid form of each nuclear substance which may be disposed of per building per year. Where more than one nuclear substance is disposed of at one time, the sum of the quotients obtained by dividing the quantity of each substance by its corresponding limit in column 3 shall not exceed one.

(c) The concentration limits set out in Column 4 may be averaged over a one-week period and apply to releases of less than 3 million cubic metres per year. Where more than one nuclear substance is disposed of at one time, the sum of the quotients obtained by dividing the quantity of each substance by its corresponding limit in column 4 shall not exceed one.

(2160-12)

16. Decommissioning

The licensee shall ensure that prior to decommissioning any area, room or enclosure where the licensed activity has been conducted:

(a) the total surface contamination (non-fixed plus fixed) for nuclear substances listed in the table titled "Classes of Nuclear Substances" found in Appendix Y of REGDOC-1.6.1 Licence Application Guide does not exceed:

- (i) 0.3 becquerels per square centimetre (0.3 Bq/cm²) for all Class A radionuclides;
- (ii) 3 becquerels per square centimetre (3 Bq/cm²) for all Class B radionuclides; and
- (iii) 30 becquerels per square centimetre (30 Bq/cm²) for all Class C radionuclides; averaged over an area not exceeding 100 square centimetres;

(b) the release of any area, room or enclosure containing fixed surface contamination in excess of the values listed in paragraph (a), is approved in writing by the Commission or person authorized by the Commission;

(c) all nuclear substances and radiation devices have been transferred in accordance with the conditions of this licence; and



(d) all radiation warning signs have been removed or defaced.
(2571-6)

17. Sealed Source Tracking (General)

Unless otherwise permitted by the prior written approval of the Commission or a person authorized by the Commission the licensee shall, in respect of a radioactive nuclear substance set out in column 1 of the table below, report in writing to the Commission or a person authorized by the Commission any transfer, receipt, export or import of a sealed source whose corresponding activity is equal to or greater than the value set out in column 2 of the table:

- (A) at least 7 days before any transfer or export, and
- (B) within 48 hours of any receipt of a transfer or import.

Column 1 Nuclear Substance	Column 2 (TBq)
Americium 241	0.6
Americium 241/Beryllium	0.6
Californium 252	0.2
Curium 244	0.5
Cobalt 60	0.3
Cesium 137	1
Gadolinium 153	10
Iridium 192	0.8
Promethium 147	400
Plutonium 238	0.6
Plutonium 239/Beryllium	0.6
Radium 226	0.4
Selenium 75	2
Strontium 90 (Yttrium 90)	10
Thulium 170	200
Ytterbium 169	3

The written report shall be in a form acceptable to the Commission that includes:

- (a) on transfer or export of a sealed source(s),
 - (i) the date of transfer or export,
 - (ii) the export licence number (where applicable),
 - (iii) the name of the recipient and licence number or the name of the importer,
 - (iv) the address of the recipient's or importer's authorized location,
 - (v) the nuclear substance (radionuclide),
 - (vi) activity (radioactivity) (Bq) per sealed source on the reference date,
 - (vii) the reference date,
 - (viii) the number of sealed source(s),
 - (ix) the aggregate activity (Bq),
 - (x) the sealed source unique identifiers (if available), and
 - (xi) where the sealed source is incorporated in a prescribed equipment,
 - (1) the name and model number of the equipment, and
 - (2) the equipment serial number (if available)
- (b) on receipt or import of a sealed source(s),
 - (i) the date of receipt of a transfer or import,
 - (ii) the name of the shipper and licence number or the name of the exporter,



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- (iii) the address of the shipper's or exporter's authorized location,
 - (iv) the nuclear substance (radionuclide),
 - (v) activity (radioactivity) (Bq) per sealed source on the reference date,
 - (vi) the reference date,
 - (vii) the number of sealed source(s),
 - (viii) the aggregate activity (Bq),
 - (ix) sealed source unique identifiers (if available), and
 - (x) where the sealed source is incorporated in a prescribed equipment,
 - (1) the name and model number of the equipment, and
 - (2) the equipment serial number (if available)
- (2406-16)

18. Financial Guarantee

The licensee shall maintain, at all times, a financial guarantee in respect of the activities authorized by this licence of a value set by the Commission and in a form acceptable to the Commission.

(2020-2)

19. Sealed Source Security Requirements

The licensee shall meet the security measures for sealed sources as set out in Regulatory Document REGDOC-2.12.3, Security of Nuclear Substances: Sealed Sources, as amended from time to time. The sealed source categories are specified in REGDOC-2.12.3.

(2490-3)

20. Operation Limitations

Subject to any other condition of this licence and unless otherwise permitted by the prior written approval of the Commission or a person authorized by the Commission, the licensee shall carry out the licensed activities in accordance with the documents or parts thereof referred to in the Appendix: Licence Document(s).

(2917-7)

21. Inaccuracies Notification

The licensee shall report to the Commission or a person authorized by the Commission, as soon as is practicable, the discovery of any inaccuracy or incompleteness in the documents referred to in the Appendix: Licence Document(s).

(2920-6)

22. Import and Export Restrictions

This licence does not authorize the licensee to import or export the following items as described in the schedule, Parts A and B, to the Nuclear Non-proliferation Import and Export Control Regulations, subject to any restrictions or exemptions as noted in each paragraph of the schedule:

- (1) Special fissionable material, as described in paragraph A.1.1:
 - (i) Plutonium;
 - (ii) Uranium 233;
 - (iii) Uranium enriched in Uranium 233 or Uranium 235.
- (2) Source material, as described in paragraph A.1.2:
 - (i) Uranium, containing the mixture of isotopes that occurs in nature;
 - (ii) Uranium, depleted in the isotope Uranium 235;
 - (iii) Thorium.
- (3) Deuterium and heavy water, as described in paragraph A.1.3.
- (4) Tritium, as described in paragraph A.1.5.



(5) Alpha-emitting nuclear substances, as described in paragraph B.1.1.1, including but not limited to:

- (i) Actinium 225, 227;
- (ii) Californium 248, 250, 252, 253, 254;
- (iii) Curium 240, 241, 242, 243, 244;
- (iv) Einsteinium 252, 253, 254, 255;
- (v) Fermium 257;
- (vi) Gadolinium 148;
- (vii) Mendelevium 258, 260;
- (viii) Neptunium 235;
- (ix) Polonium 208, 209, 210;
- (x) Radium 223.

(6) Radium-226, as described in paragraph B.1.1.16.
(2480-11)

23. Export Limitations - Sealed Sources

This licence does not authorize the licensee, in respect of a radioactive nuclear substance set out in column 1 of the table below, to export a sealed source whose activity is equal to or greater than the value set out in column 2 of the table:

Column 1 Nuclear Substance	Column 2 (TBq)
Americium 241	0.6
Americium 241/Beryllium	0.6
Californium 252	0.2
Curium 244	0.5
Cobalt 60	0.3
Cesium 137	1
Gadolinium 153	10
Iridium 192	0.8
Promethium 147	400
Plutonium 238	0.6
Plutonium 239/Beryllium	0.6
Radium 226	0.4
Selenium 75	2
Strontium 90 (Yttrium 90)	10
Thulium 170	200
Ytterbium 169 (2408-9)	3

24. Safeguards

The licensee shall:

- (a) Take all necessary measures to facilitate Canada's compliance with any applicable safeguards agreement;
- (b) Provide the International Atomic Energy Agency, an International Atomic Energy Agency inspector, or a person acting on behalf of the International Atomic Energy Agency with such reasonable services and assistance as are required to enable the International Atomic Energy Agency to carry out its duties and functions pursuant to a safeguards agreement;
- (c) Grant prompt access at all reasonable times to all locations at the facility to an International Atomic Energy Agency inspector, or to a person acting on behalf of the International Atomic Energy Agency, where such access is



required for the purposes of carrying on an activity pursuant to a safeguards agreement. In granting access, the licensee shall provide health and safety services and escorts as required in order to facilitate activities pursuant to a safeguards agreement;

(d) Disclose to the Commission, to the International Atomic Energy Agency or to an International Atomic Energy Agency inspector, any records that are required to be kept or any reports that are required to be made under a safeguards agreement;

(e) Provide such reasonable assistance to an International Atomic Energy Agency inspector or to a person acting on behalf of the International Atomic Energy Agency, as is required to enable sampling and removal or shipment of samples required pursuant to a safeguards agreement;

(f) Provide such reasonable assistance to an International Atomic Energy Agency inspector or to a person acting on behalf of the International Atomic Energy Agency, as is required to enable measurements, tests and removal or shipment of equipment required pursuant to a safeguards agreement;

(g) Not alter, deface or break a safeguards seal, except pursuant to a safeguards agreement;

(h) Implement measures to prevent damage to or the theft, loss or sabotage of samples collected pursuant to a safeguards agreement or the illegal use, possession or removal of such samples;

(i) Make such reports and provide such information to the Commission as are required to facilitate Canada's compliance with any applicable safeguards agreement; and

(j) Make and submit reports to the Commission in accordance with the RD-336, Accounting and Reporting of Nuclear Material, on the inventory and transfer of fissionable and fertile substances, or as otherwise stipulated in any regulatory document that replaces RD-336.

(2410-0)

25. Annual Compliance Report

The licensee shall, by March 31 of each year, submit to the Commission a written annual compliance report in the form specified at www.nuclearsafety.gc.ca/acr.

(2912-3)

Designated Officer pursuant to paragraph 37(2)(c) of the Nuclear
Safety and Control Act