

Agile Regulatory Oversight: Adapting Regulations To Accommodate Rapidly Changing Accelerator Technology

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INTERNATIONAL CONFERENCE ON

ACCELERATORS FOR RESEARCH AND SUSTAINABLE DEVELOPMENT

From good practices towards socioeconomic impact



Outline

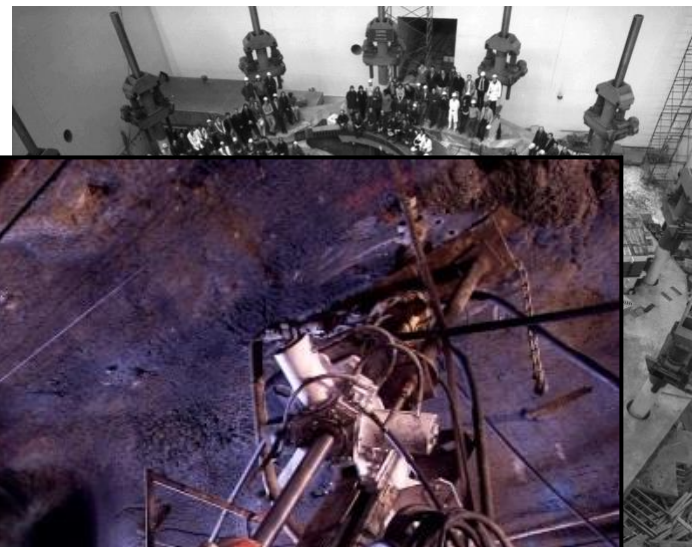
- How we classify nuclear facilities in Canada
- Expansion of the use of accelerators since 2000
- Goals followed while proposing changes to our regulations
- High-level description of some proposed regulatory changes
- Stakeholder engagement
- Examples of novel/unusual applications of accelerators in Canada
 - The reason why we need to adapt

Classification of Nuclear Facilities in Canada

- **Class I:** Nuclear power plants, uranium mines and mills, etc.
- **Class IB:** Particle accelerators ≥ 50 MeV



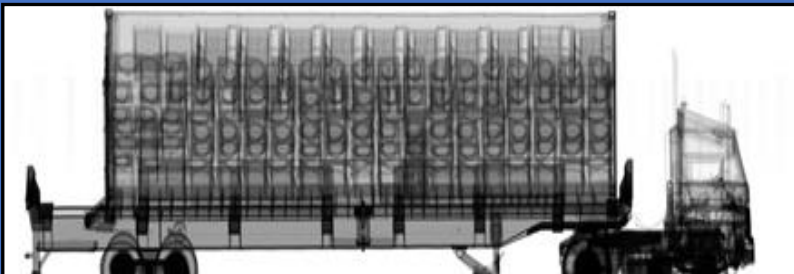
UMF,
MeV
MeV,



Expansion of the Class II Portfolio

The impetus for updating the Class II Regulations...

Shift from Nuclear Substances (NS) to Accelerators



New/Novel designs to perform the same tasks more efficiently or effectively



Mobile/Portable Class II Equipment



Adapting the Class II Regulations

- Regulatory review project initiated in late 2019
- High level goals:
 - Modernize to reflect the latest technological changes
 - Where possible, create “technology neutral” regulations
 - Incorporate operational experience gained while performing licensing and inspections over the last ~20 years
 - Regulations should be logical, align with existing good practices
 - Allow for flexibility while still ensuring safety
 - Reduce regulatory burden
 - Make the Regulations easier to understand and use

Proposed Changes to Class II Regulations (1)

Regulate all particle accelerators (including ≥ 50 MeV) under the Class II umbrella

Class I

NPP

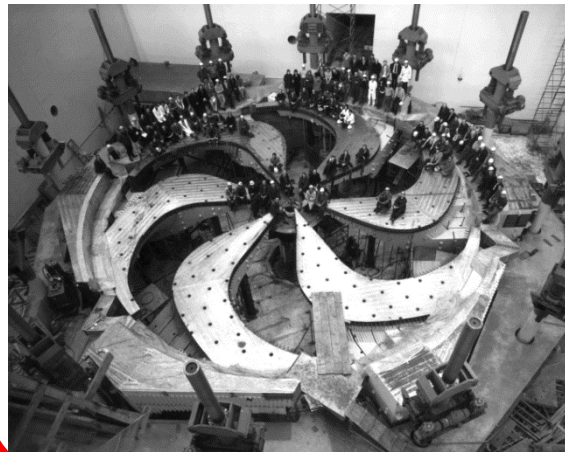


UMM



Time to licence =
weeks/months

≥ 50 MeV



Class II

Time to licence =
days/weeks

< 50 MeV



Proposed Changes to Class II Regulations (2)

Introduction of a "two-stream" approach to licensing

Stream 1:
Mass-Produced
(Standard)
equipment/facilities

Prescriptive
Requirements

***“Facility must
do/have/include XYZ
to be safe”***

CNSC Licence

CLASS II NUCLEAR FACILITIES AND PRESCRIBED EQUIPMENT LICENCE 13403-3-28.2

PERMIS PORTANT SUR LES INSTALLATIONS NUCLEAIRES ET L'EQUIPEMENT REGLEMENTE DE CATEGORIE II

I) **LICENCE NUMBER:** 13403-3-28.2

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

University of Ottawa Heart Institute/
L'Institut de cardiologie de l'université d'Ottawa
40 Ruskin Street
Ottawa, ON
K1Y 4W7
Canada
Corporate No.: 1401499 (Ontario)

This licence replaces licence 13403-3-28.1.

III) **LICENCE PERIOD**
This licence is valid from: January 22, 2020 to August 31, 2028 unless otherwise suspended, amended, revoked or replaced.

IV) **LICENSED ACTIVITIES**
This licence authorizes the licensee to:

(a) Operate and service an isotope production accelerator facility (616) listed in the Appendix: Nuclear Substances and Class II Prescribed Equipment of this licence, at the location(s) specified in the Appendix: Locations of Licensed Activities of this licence; and

(b) possess, transfer, import, use, store and process the nuclear substances that are associated with or arise from the activity described in (a).

V) **CONDITIONS**
The contents of the appendices attached to this licence form part of the licence.

1. **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)

2. **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)

Stream 2:
Unique
(Non-standard)
equipment/facilities

Outcome-based
Requirements

***“Facility must
propose how they
will be safe”***

Proposed Changes to Class II Regulations (3)

Where possible, shift towards generic, outcome-based regulations

- Current:

“Each entrance door to a room in which Class II equipment is located shall be equipped with a device that prevents the equipment from being used until a person activates the device from inside the room, leaves the room and closes the door within a preset time”



- Proposed:

“Irradiation must be prevented until someone enters the defined area where the Class II equipment is located, and ensures the controlled area is clear of other people, and the equipment is safe to operate”

Proposed Changes to Class II Regulations (4)

Regulation of Class II equipment which is intended to be operated outside of a shielded facility (mobile/portable accelerators)



Proposed Changes to Class II Regulations (5)

“Ease of use” changes to many sections of the Regulations, such as re-ordering and grouping

- To better reflect how the Regulations are actually used by stakeholders

- (a) the proposed name and location of the nuclear facility;
- (b) evidence that the applicant is the owner of the proposed site or has authority from the owner of the site to construct the nuclear facility;
- (c) a description of the Class II prescribed equipment that is proposed to be used, including its design and operating conditions;
- (d) the proposed measures to control access within the nuclear facility and any other safety-related features, including the schematics of the devices involved and their wiring;
- (e) the proposed plans, elevations and drawings of the nuclear facility, showing its layout, location, the location of its components and the location of adjacent areas that may be occupied by persons;
- (f) the proposed purpose of the adjacent areas, including a description of their uses and the estimated levels of occupancy;
- (g) the proposed location, type, composition, thickness and density of shielding material, including the method that will be used to verify the composition and density and the calculations that will be used to determine the adequacy of the shielding;
- (h) the proposed location and dimensions of voids in the shielding, including access ways and service ducts;
- (i) a description of the proposed ventilation system, including the ventilation flow rate, air circulation and location of intake and discharge points in respect of any irradiator or particle accelerator;
- (j) the proposed quality assurance program for the design and construction of the nuclear facility;
- (k) the type and energy of radiation produced by any particle accelerator to be encompassed by the licence;
- (l) the anticipated maximum dose of radiation that may be received by any person as a result of the commissioning of and during the operation of the nuclear facility;
- (m) the direction of the direct beam of any teletherapy machine to be encompassed by the licence and a description of the physical means that may be used to limit the direction of that beam;
- (n) the expected and maximum radiological workloads during the commissioning and operation of the nuclear facility, per week in grays at 1 m, for any teletherapy machine to be encompassed by the licence;
- (o) the anticipated number of hours per week that the Class II prescribed equipment in the nuclear facility will be operated for the purpose of treatment, dosimetry, servicing or research;
- (p) the effects on the environment and the health and safety of persons that may result from the activity to be licensed;
- (q) the proposed responsibilities of and qualification requirements and training program for workers during the operation of the nuclear facility;
- (r) the program to inform persons living in the vicinity of the site of the general nature and characteristics of the anticipated effects on the environment and the health and safety of persons that may result from the nuclear facility; and
- (s) the proposed plan for the decommissioning of the nuclear facility.



- (a) the proposed name and location of the nuclear facility;
- (b) evidence that the applicant is the owner of the proposed site or has authority from the owner of the site to construct the nuclear facility;
- (c) a description of the Class II prescribed equipment that is proposed to be used, including its design and operating conditions;
- (e) the proposed plans, elevations and drawings of the nuclear facility, showing its layout, location, the location of its components and the location of adjacent areas that may be occupied by persons;
- (h) the proposed location and dimensions of voids in the shielding, including access ways and service ducts;
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- Management system
- Physical design
- Security
- Radiation protection
- Conventional H & S
- Fitness for service
- Waste and decomm
- Environmental protection

Changing the Regulations – Legislative Process

YOU
ARE
HERE

THE REGULATORY PROCESS

Regulations provide support to the new laws and are enforceable by law.

Unlike legislation, regulations are not made by Parliament but rather by persons or bodies that Parliament has given the authority to make them in an Act, such as the Governor in Council or a Minister. This is why regulations are developed under a separate process from Acts.

8



The Minister or the Governor in Council, on Treasury Board's advice, as appropriate, reviews and approves the making of the final regulations. The regulations are made once the Minister signs the regulations' covering order, or once the Governor General signs the regulations' Order in Council, as the case may be. The final regulations are then published in the Canada Gazette, Part II, and come into force on the day or days set out in the regulations.

7



Comments are taken into consideration and the draft regulations are updated and finalized.

6



The approved draft regulations are published in the Canada Gazette, Part I.

↳ The Canada Gazette is the official newspaper of the Government of Canada. It contains information such as formal public notices, official appointments, proposed regulations and more. It is also a consultative tool, providing Canadians with the opportunity to provide their comments on the proposed regulations.

5



The Minister, for Ministerial regulations, or the Treasury Board, for Governor in Council regulations, reviews and approves the draft regulations for publication, with or without changes.

4



Draft regulations are then developed by the Department of Justice in accordance with the written instructions provided by the relevant organizations.

3



After consideration of comments received, the regulatory proposals are further refined. Stakeholders are invited to provide further comments.

2



The relevant organizations conduct stakeholder engagement to seek views on possible policy approaches.

1



The relevant organizations conduct an analysis for the development of regulatory proposals.



Department of Justice
Canada

Ministère de la Justice
Canada

Canada

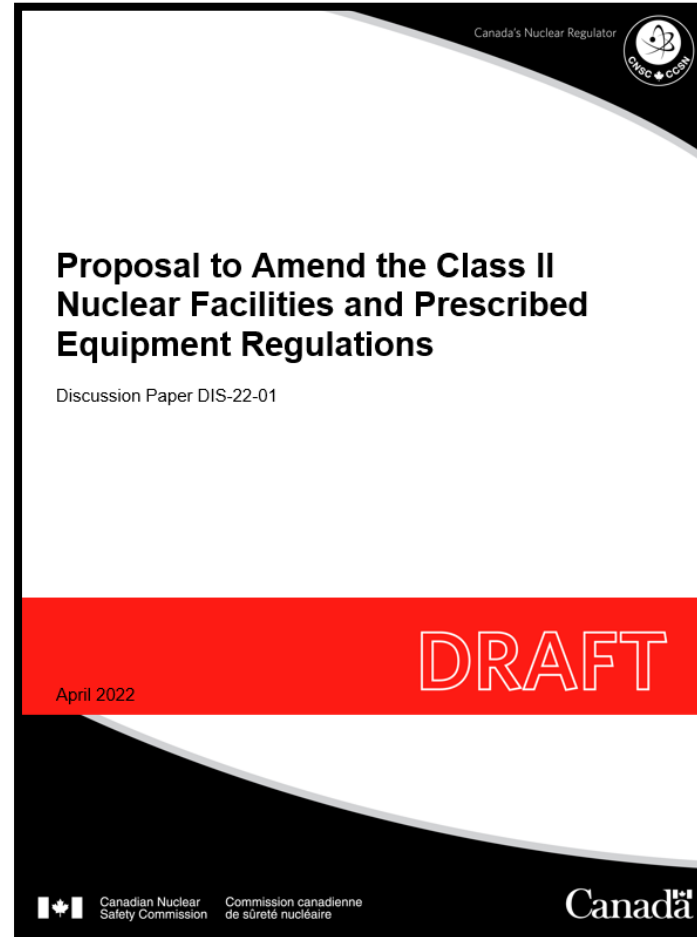
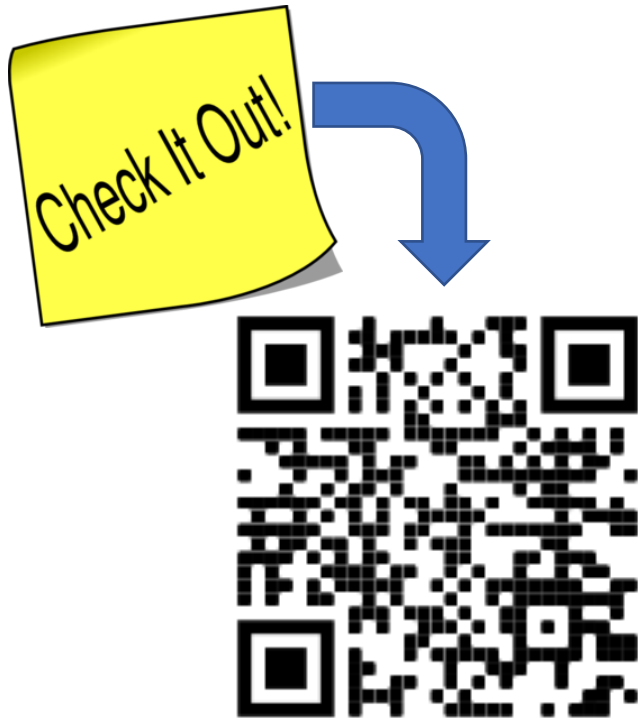


Canada



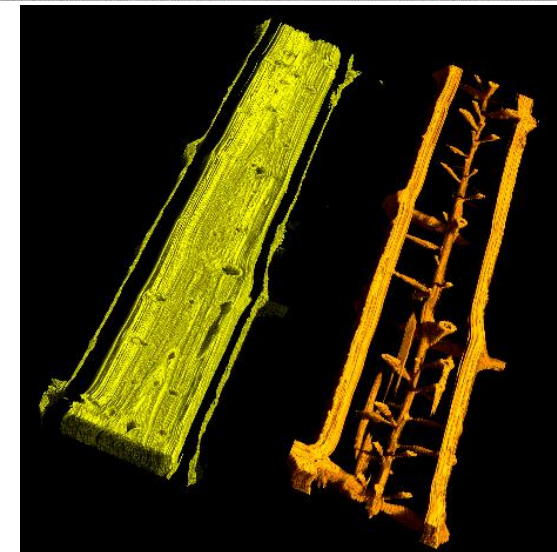
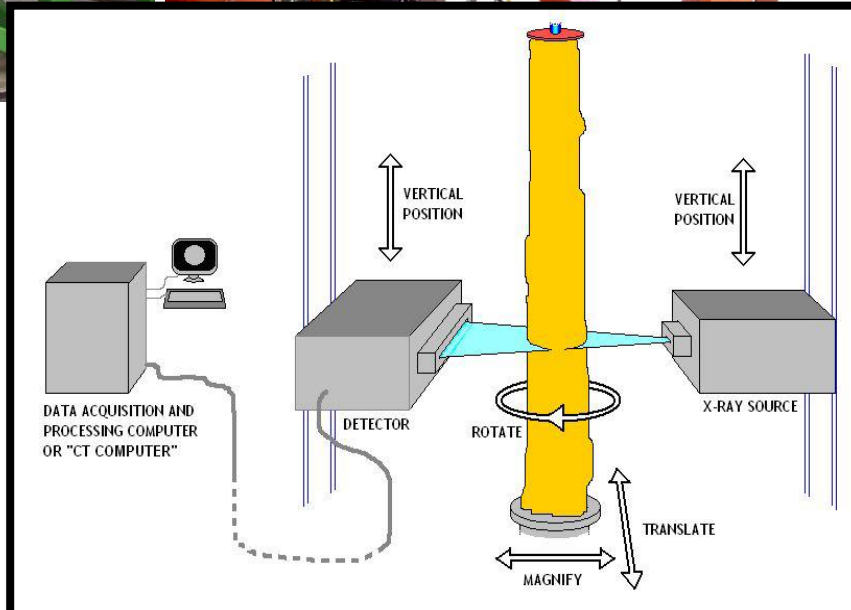
Stakeholder Engagement

- Discussion Paper “DIS-22-01” to be published this summer
- Interested parties can provide comments on CNSC’s e-consultation website
- Comment period: 90 days



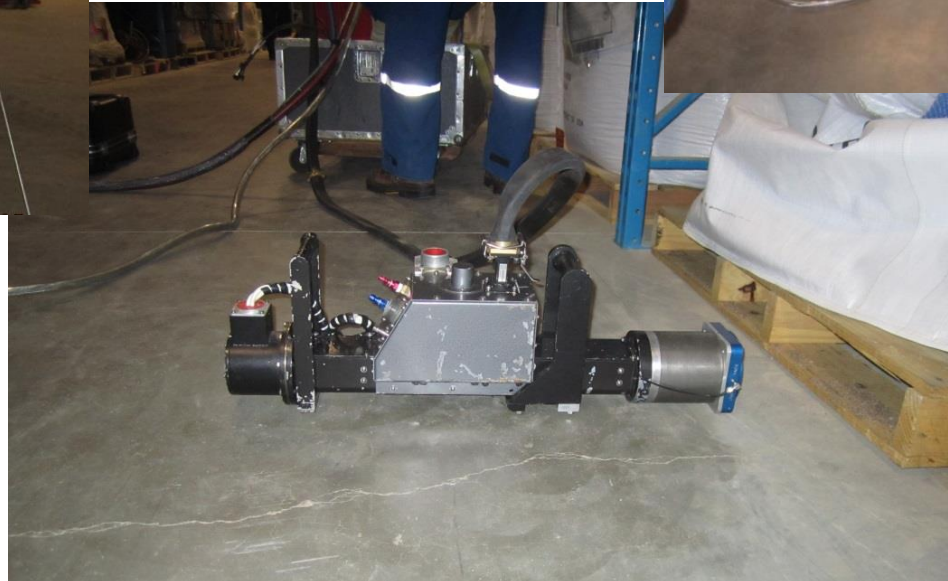
Examples of Novel/Unusual Accelerators in Canada

- Large-scale Computed Tomography (CT)



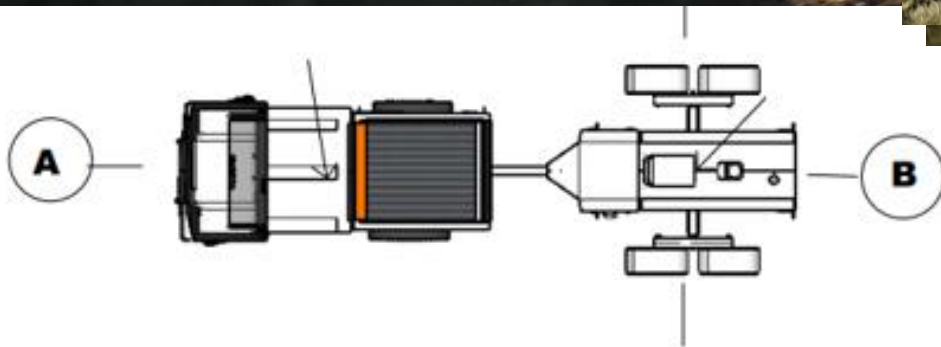
Examples of Novel/Unusual Accelerators in Canada

- Man-portable linear accelerator - Radiography



Examples of Novel/Unusual Accelerators in Canada

- Towed neutron generator - carbon characterization of soil (carbon credits)



Images/Video courtesy Carbon Assets Solutions, Inc.

Thank you!



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