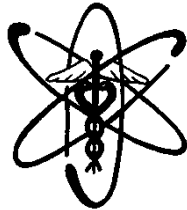




**Nova Scotia Health
Radiation Safety
(Cyclotron)
Public Disclosure Program Report
2021**



Period January 1, 2021 to December 31, 2021

Radiation Safety Office
QEII Bethune Building, Room 244
1276 South Park Street,
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Table of Contents

Section 1 - General	3
1.1 Cyclotron Licence	3
1.2 Radiation Safety Committee.....	4
1.3 Radiation Safety Administration and Operations Group.....	4
1.4 Cyclotron Radiation Safety Group	4
1.5 Authorized Users and Training	4
1.6 Incidents	5
1.7 Disclosures	5
1.8 Waste Management	5
1.9 Inspections.....	5
Section 2 - Personnel Dosimetry	6
Section 3 – Cyclotron Facility.....	7
3.1 Operations	7
3.2 Audits	7
3.3 Annual Compliance Report.....	7
3.4 Facility & Policy Modifications	7
Section 4 – Public Disclosure Program	8
4.1 Program Review	8
4.2 Program Communications	8
4.3 Website Data	8
4.4 Public Feedback & Response	9
APPENDIX A – Public Disclosure Protocol.....	10
APPENDIX B – Public Disclosure Summary 2021	11
APPENDIX C – Additional Resources	12

Section 1 - General

1.1 Cyclotron Licence

The cyclotron is a federally regulated Class II device that produces radioactive isotopes for diagnostic imaging purposes. The federal regulator, Canadian Nuclear Safety Commission (CNSC), issue licences for regulatory use to those who successfully complete the application process.

Licence Specifics

<u>Licence #</u>	<u>Licence Type</u>	<u>Use Type</u>
15395-16	Isotope Production Accelerator (Cyclotron)	616

Radiation Safety Program Organization

Applicant Authority:	Colin Stevenson	VP Quality & System Performance
Signing Authority:	Brandon Hardy	NSH Corporate Radiation Safety Officer
Class II Radiation Safety Officer	Dr George Mawko	Medical Physicist
Radiation Safety Committee Chairperson	Chris Connolly	Director DI Western Zone

Cyclotron Department Organization

Brian Martell – Director - Diagnostic Imaging (Central Zone)

Michael Kivell - Manager

Antoun Boulaouz - Team Lead

Public Disclosure Program

The CNSC requires NSH to have a public information and disclosure program for the cyclotron licence. The purpose of the program is to provide transparency to stakeholders of the cyclotron facility with regards to radiation safety to staff, public and the environment.

1.2 Radiation Safety Committee

The Radiation Safety Committee acts on behalf of Executive Management in the oversight of the Radiation Safety Program.

The NSH Radiation Safety Committee met twice in 2021 to discuss radiation safety issues along with approving recommended radiation safety program changes. The committee consists of a variety of stakeholders whom work with ionizing radiation within NSH.

1.3 Radiation Safety Administration and Operations Group

The Radiation Safety Administration and Operations Group, consisting of the Radiation Safety Officers throughout NSH, work collaboratively to manage the administration and operations of the Radiation Safety Program.

In total, four meetings were held online via Skype during the calendar year. The meetings are chaired by the NSH Corporate Radiation Safety Officer.

1.4 Cyclotron Radiation Safety Group

The Cyclotron Radiation Safety Group, consisting of the cyclotrons Class II Radiation Safety Officer and the employees of the cyclotron, work to improve the radiation safety culture in the department.

In total, two meetings were held in person and chaired by the Class II Radiation Safety Officer.

1.5 Authorized Users and Training

Authorized users are those who are required to be registered to use nuclear substances and radiation emitting devices under federal regulations. Authorized users include technologists and support staff whom work directly with ionizing radiation.

General Summary of Authorized Users	
Authorized users – Cyclotron Staff	5
Authorized users – Porters	4
Authorized users – Physicist	1

Training is available to all authorized users through the hospital's e-learning system.

- Radiation safety training
 - All training is audited by the corporate RSO on a quarterly basis. It is the responsibility of the managers to ensure training is completed.
 - All required training for authorized users in the cyclotron department was up to date during the 2021 calendar year.
- A new course, Radiation Safety – Porter Services was launched for porters who transfer radioactive materials in 2021.

1.6 Incidents

There were no reportable incidents from the cyclotron licence to regulatory authorities in 2021.

1.7 Disclosures

Annual disclosures of the *Annual Compliance Report* and the *Cyclotron Public Disclosure Program Report* were made available via the Engage4Health website within the targeted disclosure times.

1.8 Waste Management

The primary disposal method for radioisotopes is to store them onsite until radioactive decay reaches background levels. They are then able to be disposed through normal hospital waste systems. There were no amounts released to the environment that exceeded the regulatory limits. Trace amounts released were from one isotope related to clinical procedures. This release was well under regulatory limits. (Co-57)

1.9 Inspections

The cyclotron facility was not inspected by regulatory authorities in 2021.

Section 2 - Personnel Dosimetry

Radiation exposures to all workers are kept well below the regulatory limits. Regulatory limits for nuclear energy workers and the non-nuclear energy workers (general public) can be found in the tables below. Regulatory limits vary between whole body radiation monitoring and extremity (hand) radiation monitoring.

The organization has a policy of setting investigation levels that trigger an investigation if a reading exceeds the normal values expected for a group. These investigation levels are still well below the regulated limits but allow the program to monitor work practices and workload changes that may require revisions. No investigation levels were triggered by authorized users in the cyclotron in the 2021 calendar year.

DISCLAIMER

Due to issues stemming from the pandemic and the badging provider, complete annual badge readings are not available at the time of this report. Radiation dose exposures listed below are for the nine-month period between January 1st, 2021 and September 30th, 2021.

NSH Whole Body TLD Readings January to December 2021									
Upper Regulatory Limits:			Nuclear Energy Workers = 50 mSv/yr			Non-Nuclear Energy Worker/ General Public = 1 mSv/yr			
Department/Work Group	# of Non-Nuclear Energy Workers	# of NEW's or Radiation Workers	Number of Workers in Each Dose Category					Maximum Individual Dose (mSv)	Average Dose (mSv)
			Below Detectable Limits	0.1 and ≤0.5 (mSv)	>0.5 and ≤1 (mSv)	>1.0 and ≤5.0 (mSv)			
Others (Porters/Physicist)	2	1	2	1	-	-	0.24	0.08	
Operators (Cyclotron)	0	5	5	-	-	-	0.19	0.06	

NSH Extremity TLD Readings January to December 2021								
Upper Regulatory Limits:			Nuclear Energy Workers = 500 mSv/yr			Non-Nuclear Energy Worker/ General Public = 50 mSv/yr		
Department/Work Group	# of Non-Nuclear Energy Workers	# of NEW's or Radiation Workers	Number of Workers in Each Dose Category (mSv)				Maximum Individual Dose (mSv)	Average Dose (mSv)
			0 and ≤10 (mSv)	>10 and ≤50 (mSv)	>50 and ≤100 (mSv)	>100 (mSv)		
Operators (Cyclotron)	0	5	5	-	-	-	9.07	2.24

Section 3 – Cyclotron Facility

3.1 Operations

The facility is fully operational and supplies the QEII Health Sciences Centre with F-18 for the Positron Emission Tomography (PET) Centre. Due to covid restrictions, the facility also provided Eastern Health's Health Science Centre in St. John's, Newfoundland with F-18 on rare occasions.

The cyclotron workload was within the regulated operating parameters for the facility during the calendar year.

Cyclotron Workload 2021					
Reaction	Product	Typical yield, EOB, GBq	Number of targets used for production	Total operation, (hours)	Total yield, (GBq)
$H_2^{18}O (p,n) ^{18}F^-$	$^{18}F^-$ (fluoride ion)	120	2	275.2	26,173
$^{16}O (p,\alpha) ^{13}N$	$^{13}NH_3$	1.16	2	3.2	282

3.2 Audits

The NSH Radiation Safety Officer works with the department to ensure compliance with established regulations and policy. Audits were completed on the Cyclotron licence with no major issues.

Minor items included:

1. Ensuring communication of new authorized users and completed department training to the Radiation Safety Office

The annual radiation monitoring survey of the facilities shielding was completed with no issues identified.

3.3 Annual Compliance Report

The annual compliance report for 2021 was submitted to the CNSC in March 2022.

A copy of the annual compliance report can be found on the public disclosure programs website.

3.4 Facility & Policy Modifications

There were two updates to the cyclotron licence in 2021 which included:

1. The addition of a section to the cyclotron radiation safety manual outlining procedures for opening the hot cell interlock (as requested by the federal regulator).
2. A correction to the target disclosure time for the annual compliance report, located in the public disclosure protocol.

Section 4 – Public Disclosure Program

4.1 Program Review

The public disclosure program will be changing from an annual publication to a publication every three years. This is in keeping with other public disclosure programs across the country and fits with the level of engagement being received from the program. The next report will be published in 2025 and will contain information and data from years 2022-2024.

The location of the public disclosure program is moving from the current Engage4Health website to the Nova Scotia Health, Diagnostic Imaging website.

- The Engage4Health site will expire on April 30th, 2022
<https://www.engage4health.ca/cyclotron-radiation-safety-public-information-disclosure-program>
- The new site location went live in January 2022.
<https://www.nshealth.ca/cyclotron-radiation-safety-public-information-disclosure-program>

A summary of the public disclosure protocol can be found in Appendix A: Public Disclosure Protocol.

4.2 Program Communications

Communications for program information, website updates and public disclosures included:

Communication	Audience	Date
NSH Radiation Safety Committee	Staff	May 2021
NSH Radiation Safety Operations and Administration Group	Staff	
Radiation Safety Distribution List	Staff	
Halifax Regional Police, Halifax Regional Fire & Emergency, NS RCMP	First Responders	
NSHA Patient, Family & Public Advisory Committee	Public	
Halifax - Councillor, Member of Parliament, Member of Legislative Assembly	Government	
Native Council of Nova Scotia	Public	
NSH Joint Occupational Health Committees	Staff	
Asked regional councillor to share with constituents	Public in Vicinity	
Canadian Nuclear Safety Commission (Class II) Licencing Officer	Regulator	
Summary poster postings around NSH	Public, Staff, Patients	

4.3 Website Data

The following chart represents website traffic following program communications.

Visitors Summary



Data Highlights:

- 137 total site visits
- 92 visitors explored at least one page
- 12 downloads of the 2020 report
- 0 Surveys completed
- 0 Comments in the Q/A Section

4.4 Public Feedback & Response

The public information and disclosure program is committed to public evaluation and program improvement. Any questions, concerns, views or suggestions from the media or public are directed to the Radiation Safety Committee. All feedback is used to improve the public disclosure program. All changes to the program will be made with the public's views and interests in mind.

No feedback was received in 2021.

APPENDIX A – Public Disclosure Protocol



Radiation Safety Program Cyclotron Public Disclosure Protocol

The Radiation Safety Programs, Public Information Program for the isotope production accelerator facility (Cyclotron) ensures that information related to the health, safety and security of persons and the environment are effectively communicated to the public.

The Nova Scotia Health Radiation Safety Office shall:

- Promote open and transparent public relations in a timely manner.
- Maintain documents and records of the public information program and disclosure protocol.
- Ensure that the public disclosure protocol does not prescribe the release of sensitive information.
- Inform the CNSC of disclosures made under the public disclosure protocol at the time of, or before such disclosure.
- Submit to the CNSC any amendments to this document based off internal review or public feedback

The Radiation Safety Office invites feedback from the public which will be used to improve this document.

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Information to be Disclosed	Target Disclosure Time	Medium for Disclosure	Target Audiences
Annual Compliance Report (ACR)	Annually <ul style="list-style-type: none"> • Within 1 month of CNSC submission 	NSH Public Website	All audiences*
Annual Radiation Safety Program Report (Cyclotron)	Every three years <ul style="list-style-type: none"> • Within 1 month of Radiation Safety Committee Approval 	NSH Public Website	
Unplanned radiological events exceeding regulatory limits	Within 48hrs of occurrence	NSH Public Website	
Non-routine release of radioactive material	Within 48hrs of occurrence	NSH Public Website	
Events likely to attract public and media interest	Within 48hrs of occurrence	NSH Public Website	
Events where there could be perceived risk to public or the environment	Within 48hrs of occurrence	NSH Public Website	

*Includes:

1. Staff, patients and friends of the QEII Health Sciences Centre
2. Residents within the immediate vicinity of the cyclotron unit (South Street, Wellington Street, etc.)
3. First Responders
4. Media
5. Members of Parliament, Halifax Councilor, and Members of the Legislative Assembly for the area of the Cyclotron.

APPENDIX B – Public Disclosure Summary 2021



Nova Scotia Health

2021 Radiation Safety - Cyclotron Public Disclosure Program

Summary Report

The NSH Radiation Safety Program provides information to the public about radiation safety in the cyclotron department, located at the VG site of the QEII Health Sciences Centre, as a requirement of the organization's licence.

Section 1: General

- There were no reportable radiation safety incidents in 2021.

Section 2: Personnel Dosimetry

- No staff member reached a radiation dose exposure limit.

Section 3: Cyclotron Facility

- The facility is operating within the licenced parameters.
- The annual radiation safety audit found no major issues of compliance.
- Annual radiation monitoring surveys were completed with no issues identified.
- The annual compliance report was submitted to the regulators.

For more information, please visit the following link or contact the Radiation Safety Office.
<https://www.nshealth.ca/cyclotron-radiation-safety-public-information-disclosure-program>

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APPENDIX C – Additional Resources

For more information on the following topics, please visit the resources listed below.

Topic	Resource
Introduction to Radiation	<p>Canadian Nuclear Safety Commission</p> <p>http://nuclearsafety.gc.ca/eng/resources/radiation/index.cfm</p>
Radiation Doses	<p>Canadian Nuclear Safety Commission</p> <p>http://nuclearsafety.gc.ca/eng/resources/radiation/introduction-to-radiation/radiation-doses.cfm</p>
Isotope Disposal Limits	<p>Canadian Nuclear Safety Commission</p> <p>REGDOC 1.6.1 Appendix R</p> <p>http://www.nuclearsafety.gc.ca/pubs_catalogue/uploads/REGDOC-1-6-1-Licence-Application-Guide-Nuclear-substances-and-Radiation-Devices-version2-eng.pdf</p>
Public Information Program	<p>Canadian Nuclear Safety Commission</p> <p>REGDOG 3.2.1</p> <p>https://nuclearsafety.gc.ca/eng/acts-and-regulations/regulatory-documents/published/html/regdoc3-2-1/index.cfm</p>
Federal Radiation Safety Oversight	<p>Canadian Nuclear Safety Commission</p> <p>Oversight Report</p> <p>http://www.nuclearsafety.gc.ca/eng/the-commission/meetings/cmd/pdf/CMD18/CMD18-M32.pdf</p>

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