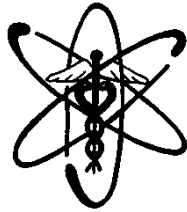




**Nova Scotia Health
Radiation Safety
(Cyclotron)
Public Disclosure Program Report
2020**



Period January 1, 2020 to December 31, 2020

Radiation Safety Office
QEII Bethune Building, Room 244
1276 South Park Street,
Halifax, NS, B3H 2Y9

Table of Content

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	8
Section 4 – Public Disclosure Program	9
4.1 Program Review	9
4.2 Program Communications	9
4.3 Engage4Health Website Data.....	9
4.4 Public Feedback & Response	10
APPENDIX A – Public Disclosure Protocol.....	11
APPENDIX B – Public Disclosure Summary 2020.....	12
APPENDIX C – Additional Resources	13

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	NSHA 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

Sharon Hartling - 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 of 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 NSHA Radiation Safety Committee met twice in 2020 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 from around the NSHA.

1.3 Radiation Safety Administration and Operations Group

The Radiation Safety Administration and Operations Group, consisting of the Radiation Safety Officers throughout the NSHA, 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 were chaired by the NSHA Radiation Safety Officer.

1.4 Cyclotron Radiation Safety Group

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

In total, four 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 which include technologists and support staff such as porters whom work directly with ionizing radiation.

General Summary of Authorized Users	
Authorized users – Cyclotron Staff	5
Authorized users – Porters	2
Authorized users – Physicist	1

Training is available to all authorized users in a variety of formats.

- Radiation safety orientation training is available through the hospital's e-learning system.
 - Refresher training is required every three years and is monitored by the radiation safety office 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 2020 calendar year.
- Department specific training is provided by booklets and presentations that cyclotron department request through the radiation safety office.

- Classroom and/or e-learning training is provided for those requiring Transport of Dangerous Goods for shipping and receiving of Class 7 Radioactive Material.

1.6 Incidents

There were no reportable incidents from the cyclotron licence to regulatory authorities in 2020.

1.7 Disclosures

Annual disclosure of the *Annual Compliance Report* and *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 2020.

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 2020 calendar year.

NSH Whole Body TLD Readings January to December 2020								
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					
			Below Detectable Limits	0.1 and ≤0.5 (mSv)	>0.5 and ≤1 (mSv)	>1.0 and ≤5.0 (mSv)	Maximum Individual Dose (mSv)	Average Dose (mSv)
Others (Porters/Physicist)	2	1	2	1	-	-	0.42	0.14
Operators (Cyclotron)	0	5	3	2	-	-	0.15	0.06

NSH Extremity TLD Readings January to December 2020								
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)					
			0 and ≤10 (mSv)	>10 and ≤50 (mSv)	>50 and ≤100 (mSv)	>100 (mSv)	Maximum Individual Dose (mSv)	Average Dose (mSv)
Operators (Cyclotron)	0	5	2	3	-	-	19.87	11.86

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.

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

Cyclotron Workload 2020					
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)	134.2	2	299	30,468
$^{16}O (p,\alpha) ^{13}N$	$^{13}NH_3$	13.4	2	4.4	376

3.2 Audits

The NSHA 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 completed department training to the Radiation Safety Office
2. Ensuring personnel monitoring records are complete,
3. Ensuring area monitoring records are complete.

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 February 2021. The details of the annual compliance report in its entirety are located throughout this document.

The annual compliance report requires a list of licenced locations for the facility.

Address	City	Province	Room Type	Total Rooms
5805 South Street	Halifax	NS	High Level	4
5805 South Street	Halifax	NS	Fixed Radiograph Bunker	1

The annual compliance report requires a list of inventory for sealed and unsealed radioactive sources for one day during the calendar year. An inventory example can be found below:

Sealed Sources

Manufacturer	Model	Serial #	Nuclear Substance	Current Activity	Date
Eckert & Ziegler	RV-137-200U	1461-68-11	Cs-137	5877 kBq	2020-12-01
Eckert & Ziegler	Ø	1975-82-1	Cs-137	33.69 kBq	2020-12-01

Unsealed Sources

<u>Nuclear Substance</u>	<u>Current Activity</u>	<u>Date</u>
FDG-18	125 GBq	2020-12-01

3.4 Facility & Policy Modifications

There was one update to the cyclotron licence in 2020 which included:

1. Amended Radiation Safety Manual Part 3: Cyclotron
 - a. Revised Section 302.5: Emergency Stop Buttons with manufacturer recommendations
 - b. Addition of Section 304.2: Minimum Staffing Requirements to ensure safe operation of equipment after recommendations from the regulator.

Section 4 – Public Disclosure Program

4.1 Program Review

All information for the program can be found on the NSHA Engage4Health Website:
<https://www.engage4health.ca/cyclotron-radiation-safety-public-information-disclosure-program>

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

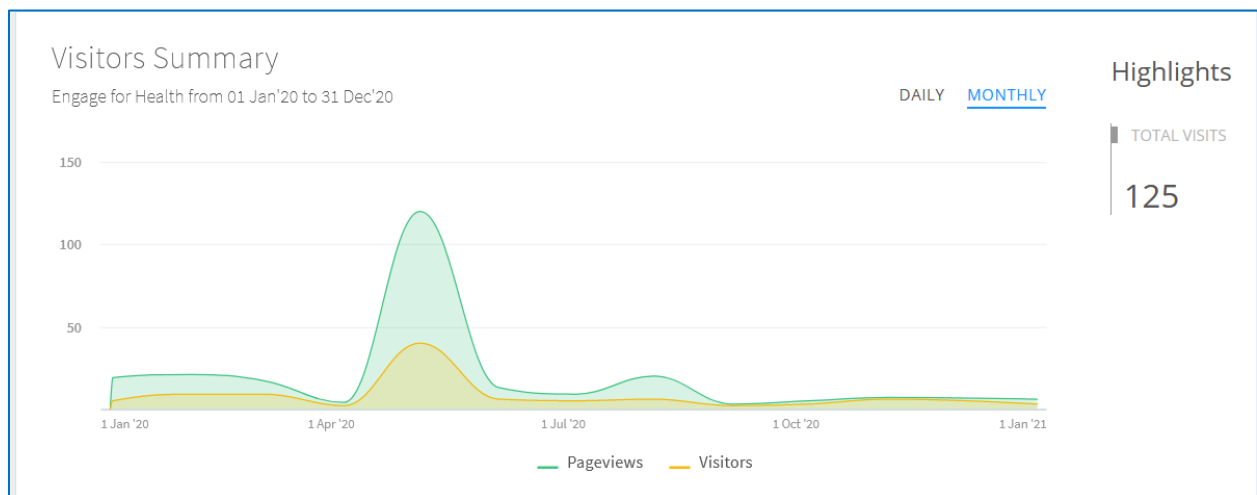
4.2 Program Communications

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

Communication	Audience	Date
NSHA Radiation Safety Committee	Staff	May 2020
NSHA 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	
NSHA 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 NSHA	Public, Staff, Patients	

4.3 Engage4Health Website Data

The Engage4Health platform offers data analysis on site visitors. The following chart represents website traffic following program communications.



Data Highlights:

- 125 total site visits
- 88 visitors explored at least one page
- 25 documents downloaded from the 2019 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 2020.

The program continues to work on having the Public Disclosure Summary available in French.

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 Authority, 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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 Office: 902-473-2767 Cell: 902-717-2669 Email: brandon.hardy@nshealth.ca

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 	NSHA Social Media	All audiences*
Annual Radiation Safety Program Report (Cyclotron)	Annually <ul style="list-style-type: none"> • Within 1 month of ACR Submission 	NSHA Social Media	
Unplanned radiological events exceeding regulatory limits	Within 48hrs of occurrence	NSHA Social Media	
Non-routine release of radioactive material	Within 48hrs of occurrence	NSHA Social Media	
Events likely to attract public and media interest	Within 48hrs of occurrence	NSHA Social Media	
Events where there could be perceived risk to public or the environment	Within 48hrs of occurrence	NSHA Social Media	

*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 2020



Nova Scotia Health

2020 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 2020.

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 and accepted by the regulators.

To complete our public engagement survey or for more information, please visit the following link or contact the Radiation Safety Office.



<https://www.engage4health.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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