

Nova Scotia Health Authority Radiation Safety Cyclotron Public Disclosure Program Report 2018



Period January 1, 2018 to December 31, 2018

Table of Content

Section 1 - General	3
A. Cyclotron Licence	3
B. Radiation Safety Committee.....	4
C. Radiation Safety Administration and Operations Group.....	4
D. Authorized Users and Training.....	4
F. Incidents	5
G. Waste Management	5
H. 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
3.5 Public Disclosure Program.....	8
APPENDIX A – Public Disclosure Protocol.....	9
APPENDIX B – Additional Resources	10

Section 1 - General

A. 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), issues licences for regulatory use to those who successfully go through the application process to operate a cyclotron facility.

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:	Tim Guest	VP Integrated Health Services Program Care 2
Signing Authority:	Brandon Hardy	NSHA Radiation Safety Officer
Cyclotron Radiation Safety Officer	George Mawko	Medical Physicist
Radiation Safety Committee Chairperson:	Chris Connolly	Director DI Western Zone

Cyclotron Department Organization

Brian Martell - Director Diagnostic Imaging

Michael Kivell - Manager, Cyclotron

Antoun Boulaouz - Team Lead, Cyclotron

Public Disclosure Program

The CNSC now requires the NSHA's current cyclotron licence to have a public information and disclosure program. 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.

B. Radiation Safety Committee

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

The Central Zone Committee met two times in 2018, prior to being disbanded for the NSHA Radiation Safety Committee. The new NSHA Radiation Safety Committee met once in 2018. The committee consists of a variety of stakeholders whom work with ionizing radiation from around the NSHA.

C. 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, six meetings were held via Skype; one meeting was held in person as an orientation to the new NSHA Radiation Safety program prior to the programs launch in the summer. The meetings were chaired by the NSHA Radiation Safety Officer.

D. Authorized Users and Training

Authorized Users

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

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

Training

Training is available to all authorized users in a variety of formats. Basic radiation safety orientation training is available on the hospital e-learning system. All training courses have now been updated to a NSHA format. Other training is provided by booklets and presentations that departments request through the radiation safety office. Refresher training is required every three years and is monitored by the radiation safety office. Additional training is provided for those requiring Transport of Dangerous Goods for shipping Class 7 Radioactive Material.

Regular audits of training are undertaken on a quarterly basis, each time the radiation monitoring badges are exchanged. It is the responsibility of the managers to ensure training is completed. The compliance tends to be good for support staff and authorized users.

F. Incidents

There were no reportable incidents from the cyclotron licence to regulatory authorities in 2018.

G. 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)

H. Inspections

There cyclotron facility was not inspected by regulatory authorities in 2018.

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 expected values 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.

NSHA Whole Body TLD Readings January to December 2018								
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					
			0 and ≤0.5 (mSv)	>0.5 and ≤1 (mSv)	>1.0 and ≤5.0 (mSv)	>5.0 (mSv)	Maximum Individual Dose (mSv)	Average Dose (mSv)
Others (Porters/Physicist)	2	1	3	-	-	-	0.00	0.00
Operators (Cyclotron)	0	5	5	-	-	-	0.22	0.04

NSHA Extremity TLD Readings January to December 2018								
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	5	-	-	-	7.48	4.45

Section 3 – Cyclotron Facility

3.1 Operations

The facility is fully operational and supplying the QEII Health Sciences Centre with F-18 for the PET program.

The cyclotron workload was within the operating parameters for the facility design.

Cyclotron Workload 2018					
Reaction	Product	Typical yield, EOB, Bq	Number of targets used for production	Total operation, (hours)	Total yield, (GBq)
$H_2^{18}O (p,n) ^{18}F^-$	$^{18}F^-$ (fluoride ion)	102 GBq	2	197.3	21,363
$^{16}O (p,\alpha) ^{13}N$	$^{13}NH_3$	16 GBq	2	3.5	327

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. Updating radioactive signage
2. Updating contamination monitoring forms
3. Updating shipping forms
4. Determining reliable contamination criteria for contamination monitors
5. Updating the authorized user list for new staff members.

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

The annual security report for the facility was completed with no issues identified.

3.3 Annual Compliance Report

The annual compliance report for 2018 was submitted to the CNSC in April 2018. The regulator had no questions regarding the report. The details of the annual compliance report in its entirety are located throughout this document.

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

<u>Address</u>	<u>City</u>	<u>Province</u>	<u>Room Type</u>	<u>Total Rooms</u>
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

<u>Manufacturer</u>	<u>Model</u>	<u>Serial #</u>	<u>Nuclear Substance</u>	<u>Current Activity</u>	<u>Date</u>
Eckert & Ziegler	RV-137-200U	1461-68-11	Cs-137	6155kBq	2018-12-01
Eckert & Ziegler	Ø	1975-82-1	Cs-137	35.36kBq	2018-12-01

Unsealed Sources

<u>Nuclear Substance</u>	<u>Current Activity</u>	<u>Date</u>
FDG-18	117GBq	2018-12-03

3.4 Facility & Policy Modifications

There were no changes to the cyclotron licence in 2018.

One employee at the Cyclotron facility has successfully completed Level 1 GE service training. This training allows the employee to perform preventative maintenance and basic planned maintenance that is listed in the Cyclotron Operator Manual.

3.5 Public Disclosure Program

The public disclosure program was created during the 2019 calendar year. This retrospective 2018 report is being published to gather views and opinions of the public for potential changes to the program in 2020.

The program is committed to public evaluation and program improvement. Any questions, concerns, views or suggestions from the media or public will be 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.

A summary of public comments and responses will be made available via the Public Disclosure Report for the following calendar year.

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

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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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 – Additional Resources

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

Topic	Resource
Introduction to Radiation	<p style="text-align: center;">Canadian Nuclear Safety Commission</p> <p style="text-align: center;">http://nuclearsafety.gc.ca/eng/resources/radiation/index.cfm</p>
Radiation Doses	<p style="text-align: center;">Canadian Nuclear Safety Commission</p> <p style="text-align: center;">http://nuclearsafety.gc.ca/eng/resources/radiation/introduction-to-radiation/radiation-doses.cfm</p>
Isotope Disposal Limits	<p style="text-align: center;">Canadian Nuclear Safety Commission</p> <p style="text-align: center;">REGDOC 1.6.1 Appendix R</p> <p style="text-align: center;">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 style="text-align: center;">Canadian Nuclear Safety Commission</p> <p style="text-align: center;">REGDOG 3.2.1</p> <p style="text-align: center;">https://nuclearsafety.gc.ca/eng/acts-and-regulations/regulatory-documents/published/html/regdoc3-2-1/index.cfm</p>
Federal Radiation Safety Oversight	<p style="text-align: center;">Canadian Nuclear Safety Commission</p> <p style="text-align: center;">Oversight Report</p> <p style="text-align: center;">http://www.nuclearsafety.gc.ca/eng/the-commission/meetings/cmd/pdf/CMD18/CMD18-M32.pdf</p>

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