

1 **216-RICR-40-20-13**

2 **TITLE 216 – DEPARTMENT OF HEALTH**

3 **CHAPTER 40 – PROFESSIONAL LICENSING & FACILITIES REGULATION**

4 **SUBCHAPTER 20 - RADIATION**

5 **PART 13 – RADIATION SAFETY REQUIREMENTS FOR PARTICLE**
6 **ACCELERATORS**

7 **13.1 Authority**

8 A. This Part is promulgated pursuant to the authority conferred under R.I. Gen.
9 Laws § [23-1.3-5\(f\)](#), as amended.

10 B. This Part establishes procedures for the registration (or licensing) and the use of
11 particle accelerators intended for other than healing arts use. Requirements for
12 registration and use of particle accelerators for healing arts use are contained in
13 Part 5 of this Subchapter.

14 C. In addition to the requirements of this Part, all registrants are subject to the
15 requirements of Parts 1, 2 and 3 of this Subchapter. Registrants engaged in
16 industrial radiographic operations are subject to the requirements of Part 10 of
17 this Subchapter. Registrants (or licensees) whose operations result in the
18 production of radioactive material are also subject to the requirements of Part 7
19 of this Subchapter.

20 **13.2 Definitions**

21 A. Whenever used in this Part, the following terms shall be construed as follows:

22 “Act” means Title 23, Chapter 1.3 of the General Laws of the State of Rhode
23 Island entitled "Radiation Control".

24 “Agency” means Rhode Island Radiation Control Agency (RCA), Center for
25 Health Facilities Regulation - Radiation Control Program, Rhode Island
26 Department of Health.

27 "Facility" means the location, building, vehicle, or complex under one
28 administrative control, at which one or more radiation machines are installed,
29 located and/or used.

30 “Registration” means registration with the Agency pursuant to this Subchapter
31 and the Act.

32 “R.I. Gen. Laws” means the General Laws of Rhode Island, as amended.

1 **13.3 Registration Procedure**

2 **13.3.1 Registration (or Licensing) Requirement**

3 All No person shall receive, possess, use, transfer, own, or acquire a particle
4 accelerator except as authorized in a registration (or license) issued pursuant to
5 this Subchapter or as otherwise provided for in this Subchapter. The general
6 procedures for registration (or licensing) of particle accelerator facilities are
7 included in Part 3 (or 7) of this Subchapter.

8 **13.3.2 General Requirements for the Issuance of a Registration (or License) for**
9 **Particle Accelerators**

10 A. In addition to the requirement of Part 3 (or 7) of this Subchapter, a registration (or
11 licensing) application for use of a particle accelerator will be approved only if the
12 Agency determines that:

- 13 1. The applicant is qualified by reason of training and experience to use the
14 accelerator in question for the purpose requested in accordance with this
15 Part and Parts 1 and 2 of this Subchapter in such a manner as to minimize
16 danger to public health and safety or property;
- 17 2. The applicant's proposed equipment, facilities, operating and emergency
18 procedures are adequate to protect health and minimize danger to public
19 health and safety or property;
- 20 3. The issuance of the registration (or license) will not be inimical to the
21 health and safety of the public;
- 22 4. The applicant has appointed a radiation safety officer;
- 23 5. The applicant and/or his staff has substantial experience in the use of
24 particle accelerators for the intended uses;
- 25 6. The applicant has established a radiation safety committee to approve, in
26 advance, proposals for uses of particle accelerators, whenever deemed
27 necessary by the Agency; and
- 28 7. The applicant has an adequate training program for particle accelerator
29 operators.

30 **13.4 Radiation Safety Requirements for the Use of Particle**
31 **Accelerators**

32 **13.4.1 Limitations**

33 A. No registrant (or licensee) shall permit any person to act as a particle accelerator
34 operator until such person:

- 1 1. Has been instructed in radiation safety and shall have demonstrated an
2 understanding thereof;
- 3 2. Has received copies of and instructions in this Part and the applicable
4 requirements of Parts 1 and 2 of this Subchapter, pertinent registration (or
5 license) conditions and the registrant's (or licensee's) operating and
6 emergency procedures, and shall have demonstrated understanding
7 thereof; and
- 8 3. Has demonstrated competence to use the particle accelerator, related
9 equipment, and survey instruments which will be employed in his
10 assignment.
- 11 B. Either the radiation safety committee or the radiation safety officer shall have the
12 authority to terminate the operations at a particle accelerator facility if such action
13 is deemed necessary to minimize danger to public health and safety or property.

14 **13.4.2 Shielding and Safety Design Requirements**

- 15 A. A qualified expert, registered with the Agency, shall be consulted in the design of
16 a particle accelerator installation and called upon to perform a radiation survey
17 when the accelerator is first capable of producing radiation.
- 18 B. Each particle accelerator installation shall be provided with such primary and/or
19 secondary barriers as are necessary to assure compliance with §§ 1.7.1 and
20 1.8.1 of this Subchapter.

21 **13.4.3 Particle Accelerator Controls and Interlock System**

- 22 A. Instrumentation, readouts and controls on the particle accelerator control console
23 shall be clearly identified and easily discernible.
- 24 B. Each entrance into a target room or other high radiation area shall be provided
25 with a safety interlock that shuts down the machine under conditions of barrier
26 penetration.
- 27 C. When a safety interlock system has been tripped, it shall only be possible to
28 resume operation of the accelerator by manually resetting controls at the position
29 where the safety interlock has been tripped, and lastly at the main control
30 console.
- 31 D. Each safety interlock shall be on a circuit which shall allow its operation
32 independently of all other safety interlocks.
- 33 E. All safety interlocks shall be fail safe (i.e., designed so that any defect or
34 component failure in the safety interlock system prevents operation of the
35 accelerator).

- 1 F. A scram button or other emergency power cutoff switch shall be located and
2 easily identifiable in all high radiation areas. Such a cutoff switch shall include a
3 manual reset so that the accelerator cannot be restarted from the accelerator
4 control console without resetting the cutoff switch.

5 **13.4.4 Warning Devices**

- 6 A. All locations designated as high radiation areas, and entrances to such locations
7 shall be equipped with easily observable warning lights that operate when, and
8 only when, radiation is being produced.
- 9 B. Except in facilities designed for human exposure, each high radiation area shall
10 have an audible warning device which shall be activated for fifteen (15) seconds
11 prior to the possible creation of such high radiation area. Such warning device
12 shall be clearly discernible in all high radiation areas.
- 13 C. Barriers, temporary or otherwise, and pathways leading to high radiation areas
14 shall be identified in accordance with § 1.14.1 of this Subchapter.

15 **13.4.5 Operating Procedures**

- 16 A. Particle accelerators, when not in operation, shall be secured to prevent
17 unauthorized use.
- 18 B. Only a switch on the accelerator control console shall be routinely used to run the
19 accelerator beam on and off. The safety interlock system shall not be used to
20 turn off the accelerator beam except in an emergency.
- 21 C. All safety and warning devices, including interlocks, shall be checked for proper
22 operability at intervals not to exceed three months. Results of such tests shall be
23 maintained for inspection at the accelerator facility.
- 24 D. Electrical circuit diagrams of the accelerator, and the associated interlock
25 systems, shall be kept current and maintained for inspection by the Agency and
26 available to the operator at each accelerator facility.
- 27 E. If, for any reason, it is necessary to intentionally bypass a safety interlock or
28 interlocks, such action shall be:
- 29 1. Authorized by the radiation safety committee and/or radiation safety
30 officer;
- 31 2. Recorded in a permanent log and a notice posted at the accelerator
32 control console; and
- 33 3. Terminated as soon as possible.

- 1 F. A copy of the current operating and the emergency procedures shall be
2 maintained at the accelerator control panel.

3 **13.4.6 Radiation Monitoring Requirements**

- 4 A. There shall be available at each particle accelerator facility, appropriate portable
5 monitoring equipment which is operable and has been calibrated for the
6 appropriate radiations being produced at the facility. Such equipment shall be
7 tested regularly and prior to use, and calibrated at intervals not to exceed twelve
8 (12) months, and after each servicing and repair which could affect the
9 calibration.
- 10 B. A radiation protection survey shall be performed and documented by an
11 individual registered with the Agency to provide Radiation Physics Services
12 pursuant to Part 3 of this Subchapter when changes have been made in
13 shielding, operation, equipment, or occupancy of adjacent areas.
- 14 C. Radiation levels in all high radiation areas shall be continuously monitored. The
15 monitoring devices shall be electrically independent of the accelerator control
16 and safety interlock systems and capable of providing a readout at the control
17 panel.
- 18 D. All area monitors shall be calibrated at intervals not to exceed three (3) months.
- 19 E. Whenever applicable, periodic surveys shall be made to determine the amount of
20 airborne particulate radioactivity present in areas of airborne hazards.
- 21 F. Whenever applicable, periodic smear surveys shall be made to determine the
22 degree of contamination in target and other pertinent areas.
- 23 G. All area surveys shall be made in accordance with the written procedures
24 established by a qualified expert, or the radiation safety officer of the particle
25 accelerator facility.
- 26 H. Records of all radiation protection surveys, calibration results, instrumentation
27 tests, and smear results shall be kept current and on file at each accelerator
28 facility.

29 **13.4.7 Ventilation Systems**

- 30 A. Ventilation systems shall be provided to ensure that personnel entering any area
31 where airborne radioactivity may be produced will not be exposed to airborne
32 radioactive material in excess of those limits specified in § 1.18, Table I of this
33 Subchapter.
- 34 B. A registrant (or licensee), as required by § 1.8.1 of this Subchapter, shall not
35 vent, release or otherwise discharge airborne radioactive material to an
36 uncontrolled area which exceed the limits specified in § 1.18, Table II of this

1 Subchapter, except as authorized pursuant to § 1.15.2 or § 1.8.1(C) of this
2 Subchapter. For purposes of §§ 13.4.7(A) & (B) of this Part, concentrations may
3 be averaged over a period not greater than twelve (12) months. Every
4 reasonable effort should be made to maintain releases of radioactive material to
5 uncontrolled areas, as far below these limits as practicable.