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TITLE 216 – DEPARTMENT OF HEALTH

CHAPTER 40 – PROFESSIONAL LICENSING AND FACILITY REGULATION

SUBCHAPTER 20 – RADIATION

PART 13 – Radiation Safety Requirements for Particle Accelerators

13.1 Authority

A. This Part is promulgated pursuant to the authority conferred under R.I. Gen. Laws § 23-1.3-5.

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

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

13.2 Definitions

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

1. “Act” means R.I. Gen. Laws Chapter 23-1.3 entitled "Radiation Control."

2. “Agency” means Rhode Island Radiation Control Agency (RCA), Center for Health Facilities Regulation – Radiation Control Program, Rhode Island Department of Health.

3. "Facility" means the location, building, vehicle, or complex under one (1) administrative control, at which one (1) or more radiation machines are installed, located and/or used.

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

13.3 Registration Procedure

13.3.1 Registration (or Licensing) Requirement

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

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

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

1. The applicant is qualified by reason of training and experience to use the accelerator in question for the purpose requested in accordance with this Part and Parts 1 and 2 of this Subchapter in such a manner as to minimize danger to public health and safety or property;

2. The applicant's proposed equipment, facilities, operating and emergency procedures are adequate to protect health and minimize danger to public health and safety or property;

3. The issuance of the registration (or license) will not be inimical to the health and safety of the public;

4. The applicant has appointed a radiation safety officer;

5. The applicant and/or his staff has substantial experience in the use of particle accelerators for the intended uses;

6. The applicant has established a radiation safety committee to approve, in advance, proposals for uses of particle accelerators, whenever deemed necessary by the Agency; and

7. The applicant has an adequate training program for particle accelerator operators.

13.4 Radiation Safety Requirements for the Use of Particle Accelerators

13.4.1 Limitations

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

1. Has been instructed in radiation safety and shall have demonstrated an understanding thereof;

2. Has received copies of and instructions in this Part and the applicable requirements of Parts 1 and 2 of this Subchapter, pertinent registration (or license) conditions and the registrant's (or licensee's) operating and emergency procedures, and shall have demonstrated understanding thereof; and

3. Has demonstrated competence to use the particle accelerator, related equipment, and survey instruments which will be employed in his assignment.

B. Either the radiation safety committee or the radiation safety officer shall have the authority to terminate the operations at a particle accelerator facility if such action is deemed necessary to minimize danger to public health and safety or property.

13.4.2 Shielding and Safety Design Requirements

A. A qualified expert, registered with the Agency, shall be consulted in the design of a particle accelerator installation and called upon to perform a radiation survey when the accelerator is first capable of producing radiation.

B. Each particle accelerator installation shall be provided with such primary and/or secondary barriers as are necessary to assure compliance with §§ 1.7.1 and 1.8.1 of this Subchapter.

13.4.3 Particle Accelerator Controls and Interlock System

A. Instrumentation, readouts and controls on the particle accelerator control console shall be clearly identified and easily discernible.

B. Each entrance into a target room or other high radiation area shall be provided with a safety interlock that shuts down the machine under conditions of barrier penetration.

C. When a safety interlock system has been tripped, it shall only be possible to resume operation of the accelerator by manually resetting controls at the position where the safety interlock has been tripped, and lastly at the main control console.

D. Each safety interlock shall be on a circuit which shall allow its operation independently of all other safety interlocks.

E. All safety interlocks shall be fail safe (i.e., designed so that any defect or component failure in the safety interlock system prevents operation of the accelerator).

F. A scram button or other emergency power cutoff switch shall be located and easily identifiable in all high radiation areas. Such a cutoff switch shall include a

manual reset so that the accelerator cannot be restarted from the accelerator control console without resetting the cutoff switch.

13.4.4 Warning Devices

A. All locations designated as high radiation areas, and entrances to such locations shall be equipped with easily observable warning lights that operate when, and only when, radiation is being produced.

B. Except in facilities designed for human exposure, each high radiation area shall have an audible warning device which shall be activated for fifteen (15) seconds prior to the possible creation of such high radiation area. Such warning device shall be clearly discernible in all high radiation areas.

C. Barriers, temporary or otherwise, and pathways leading to high radiation areas shall be identified in accordance with § 1.14.1 of this Subchapter.

13.4.5 Operating Procedures

A. Particle accelerators, when not in operation, shall be secured to prevent unauthorized use.

B. Only a switch on the accelerator control console shall be routinely used to run the accelerator beam on and off. The safety interlock system shall not be used to turn off the accelerator beam except in an emergency.

C. All safety and warning devices, including interlocks, shall be checked for proper operability at intervals not to exceed three (3) months. Results of such tests shall be maintained for inspection at the accelerator facility.

D. Electrical circuit diagrams of the accelerator, and the associated interlock systems, shall be kept current and maintained for inspection by the Agency and available to the operator at each accelerator facility.

E. If, for any reason, it is necessary to intentionally bypass a safety interlock or interlocks, such action shall be:

1. Authorized by the radiation safety committee and/or radiation safety officer;

2. Recorded in a permanent log and a notice posted at the accelerator control console; and

3. Terminated as soon as possible.

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

13.4.6 Radiation Monitoring Requirements

A. There shall be available at each particle accelerator facility, appropriate portable monitoring equipment which is operable and has been calibrated for the appropriate radiations being produced at the facility. Such equipment shall be tested regularly and prior to use, and calibrated at intervals not to exceed twelve (12) months, and after each servicing and repair which could affect the calibration.

B. A radiation protection survey shall be performed and documented by an individual registered with the Agency to provide Radiation Physics Services pursuant to Part 3 of this Subchapter when changes have been made in shielding, operation, equipment, or occupancy of adjacent areas.

C. Radiation levels in all high radiation areas shall be continuously monitored. The monitoring devices shall be electrically independent of the accelerator control and safety interlock systems and capable of providing a readout at the control panel.

D. All area monitors shall be calibrated at intervals not to exceed three (3) months.

E. Whenever applicable, periodic surveys shall be made to determine the amount of airborne particulate radioactivity present in areas of airborne hazards.

F. Whenever applicable, periodic smear surveys shall be made to determine the degree of contamination in target and other pertinent areas.

G. All area surveys shall be made in accordance with the written procedures established by a qualified expert, or the radiation safety officer of the particle accelerator facility.

H. Records of all radiation protection surveys, calibration results, instrumentation tests, and smear results shall be kept current and on file at each accelerator facility.

13.4.7 Ventilation Systems

A. Ventilation systems shall be provided to ensure that personnel entering any area where airborne radioactivity may be produced will not be exposed to airborne radioactive material in excess of those limits specified in ~~§ 1.18~~ § 1.19 of this Subchapter.

B. A registrant (or licensee), as required by § 1.8.1 of this Subchapter, shall not vent, release or otherwise discharge airborne radioactive material to an uncontrolled area which exceed the limits specified in ~~§ 1.18~~ § 1.19 of this Subchapter, except as authorized pursuant to §§ 1.15.2 or 1.8.1(A) of this Subchapter. For purposes of §§ 13.4.7(A) and (B) of this Part, concentrations may be averaged over a period not greater than twelve (12) months. Every

reasonable effort should be made to maintain releases of radioactive material to uncontrolled areas, as far below these limits as practicable.