

TITLE 32: ENERGY
CHAPTER II: ILLINOIS EMERGENCY MANAGEMENT AGENCY
SUBCHAPTER b: RADIATION PROTECTION

PART 390
PARTICLE ACCELERATORS

Section	
390.10	Scope
390.20	Definitions
390.30	Operating Procedures and Instructions
390.40	Equipment Controls
390.50	Radiation Monitoring
390.60	Radiation Surveys
390.70	Personnel Training

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Section 390.10 Scope

Except as otherwise specifically provided, this Part applies to all persons who develop, manufacture, receive, possess, use, own or acquire accelerators. These provisions are in addition to, and not in substitution for, other applicable provisions of Agency regulations. See 32 Ill. Adm. Code 360 for applicable regulations concerning particle accelerators for medical therapeutic applications.

(Source: Amended at 33 Ill. Reg. 4326, effective March 9, 2009)

Section 390.20 Definitions

As used in this Part:

"Accelerator facility" means the location at which one or more particle accelerators are installed within one building or under one roof and are operated

under the same administrative control.

"Particle accelerator" means any device other than an x-ray machine that emits ionizing radiation as a result of the acceleration of charged particles. Examples are cyclotrons, betatrons, electron linear accelerators and potential drop accelerators.

"Qualified expert" means an individual who has demonstrated to the satisfaction of the Agency that he or she possesses the knowledge and training to measure ionizing radiation, to evaluate safety techniques and to advise regarding radiation protection needs. Satisfactory demonstration of knowledge and training should include certification by a nationally recognized credentialing entity in the field of radiation protection.

(Source: Amended at 33 Ill. Reg. 4326, effective March 9, 2009)

Section 390.30 Operating Procedures and Instructions

- a) Each registrant shall inform individuals working in or frequenting any portion of a restricted area as to the presence of radiation or particle accelerators; instruct those individuals in safety problems associated with those areas and in precautions or procedures to minimize radiation exposure; instruct the individuals in the provisions of Agency regulations for the protection of personnel from exposures to radiation; and advise the individuals of reports of radiation exposure that those individuals may request pursuant to this Part.
- b) Each particle accelerator facility shall be under the administrative control of a radiation protection officer or radiation safety committee that will be responsible for the safe operation of the accelerator.
- c) Written operating and emergency procedures, as well as specified safety rules, shall be established for each accelerator facility and approved by the radiation protection officer.
- d) Personnel who operate or maintain particle accelerators shall be familiar with, and have available a copy of, the written operating and emergency procedures.
- e) No individual shall be permitted to operate or maintain an accelerator until the individual has received at least the training specified in Section 390.70.
- f) Modification, repairs or preventive maintenance on accelerator components or safety interlocks may be performed only by or under the direct supervision of individuals who have received at least the training specified in Section 390.70.

- g) Provisions shall be made at each accelerator control console to display the name of the individual who is authorized to operate the accelerator. Only the individual whose name is displayed may turn on the accelerator or open entrances to high radiation areas.
- h) The radiation safety officer shall maintain a current list of all personnel who are qualified to operate or service the particle accelerator.
- i) No registrant shall permit a particle accelerator to operate at any time with a safety interlock bypassed, except for necessary testing. Upon circumvention of an interlock, the registrant shall maintain records showing the date and reasons for bypassing the interlock. A sign shall be posted at the personnel entrance door being bypassed and this condition terminated as soon as possible.
- j) Additional Requirements. The Agency may, by rule, regulation or order, impose upon any registrant requirements in addition to those established in this Part as it deems appropriate or necessary to minimize danger to public health and safety or property.

(Source: Amended at 33 Ill. Reg. 4326, effective March 9, 2009)

Section 390.40 Equipment Controls

- a) All meters and controls on the accelerator control console shall be clearly identified and easily discernible. Accelerator control consoles shall be equipped with a keyswitch or other device that will render the console inoperative when the key or device is removed. Only one key shall be available to the operating crew.
- b) All entrances into a target room or other high radiation area shall be provided with a minimum of two personnel interlocks.
- c) The interlock system shall be designed to prevent restarting of the accelerator without manually resetting the accelerator "ON" switch at the control console after the tripping of a shielding interlock or a power failure. At the time of such an occurrence, the registrant is required to resurvey the radiation area prior to reactivation of the accelerator. Records documenting the circumstances surrounding such occurrences shall be maintained for review by the Agency.
- d) A scram or panic button or other emergency power cut-off switch shall be located and easily identifiable in all accessible high radiation areas. A visible and/or audible signal system shall be installed within the protective enclosure that will be activated for a reasonable length of time before the power to the accelerator can

be activated.

- e) Electrical circuit diagrams of the accelerator and the associated interlock system shall be kept current and on file at each accelerator facility.
- f) All safety and warning devices, including interlocks, shall be checked and appropriately serviced each month. A log and written records of these tests shall be kept by the registrant and made available for inspection by the Agency.

(Source: Amended at 33 Ill. Reg. 4326, effective March 9, 2009)

Section 390.50 Radiation Monitoring

- a) Portable radiation monitoring equipment shall be properly maintained and available at the accelerator facility. An appropriate radiation monitor shall be used for all accelerator target rooms and other high radiation areas. This monitor shall be one or more of the following:
 - 1) An area monitor with an easily observable indicator located near the entrance that warns of radiation levels above a predetermined limit;
 - 2) A personal radiation monitor of the "chirpie" type worn while in the room;
 - 3) A portable survey instrument carried into the room; or
 - 4) A monitor approved by the Agency.
- b) No registrant shall permit any individual to enter a restricted area unless the individual wears both:
 - 1) An individual monitoring device, assigned to and worn by only one individual, that is provided and evaluated by a qualified dosimetry processor as described in 32 Ill. Adm. Code 340.510(d); and
 - 2) A direct reading pocket ionization chamber or an electronic dosimeter capable of measuring doses from zero to at least 51.6 microC/kg (200 mR).

(Source: Amended at 33 Ill. Reg. 4326, effective March 9, 2009)

Section 390.60 Radiation Surveys

- a) The registrant shall maintain sufficient calibrated and operable radiation survey

instruments to make physical radiation surveys as required by the Agency. Each radiation survey instrument shall be checked every 3 months and calibrated at intervals not to exceed 1 year. After each instrument servicing, a record shall be maintained of the latest response check or calibration date.

- b) Before a new accelerator with its associated components is placed in routine operation, a radiation protection survey shall be made by a qualified expert and a copy of the results submitted to the Agency.
- c) The area surrounding a particle accelerator and associated components shall be surveyed at intervals not to exceed 3 months. A record shall be made of the accelerator operating conditions and radiation levels measured at specific control points. These control points must be well defined and reported on at least four consecutive surveys. One of these control points must be at the normal work station of the individual who operates the accelerator. These records shall be made available for inspection by the Agency.

(Source: Amended at 33 Ill. Reg. 4326, effective March 9, 2009)

Section 390.70 Personnel Training

- a) The registrant shall ensure that all personnel who operate particle accelerators:
 - 1) Receive instruction in the fundamentals of radiation safety including:
 - A) Characteristics of beta, gamma and x-radiation;
 - B) Units of radiation dose equivalent (sievert or rem);
 - C) Hazards of excessive exposure to radiation;
 - D) Levels of radiation from particle accelerators; and
 - E) Methods used to limit radiation doses at the specific facility to be operated, including:
 - i) Shielding;
 - ii) Interlock system;
 - iii) Safety rules; and
 - iv) Radiation monitoring equipment.

- 2) Receive instruction in the use and care of individual monitoring devices used at the facility.
 - 3) Are knowledgeable of:
 - A) The location and use of all operating controls;
 - B) The pertinent requirements of 32 Ill. Adm. Code: Chapter II, Subchapter b; and
 - C) The registrant's written operating and emergency procedures.
 - 4) Receive at least 1 month of on-the-job training before assuming operational responsibility.
- b) All operator's assistants or helpers shall receive the training listed in subsections (a)(1) through (a)(3) above.

(Source: Amended at 18 Ill. Reg. 3143, effective February 22, 1994)