

**3701:1-68-05 Industrial Particle accelerators.**

In addition to the applicable rules in Chapter 3701:1-38 and Chapter 3701:1-68 of the Administrative Code, handlers of particle accelerators shall comply with the following requirements:

- (A) Handlers shall not use a particle accelerator until the department has verified that:
  - (1) The handler and the operators are qualified by reason of training and experience to use the particle accelerator for its intended uses, in accordance with the requirements of this rule;
  - (2) The proposed or existing particle accelerator, facility, and operating procedures are adequate to protect health and minimize danger to public health and safety;
  - (3) The individual responsible for radiation protection (IRRP) has been appointed;
  - (4) There is an established radiation safety committee to approve, in advance, proposals for uses of the particle accelerator whenever deemed necessary by the department;
  - (5) There is an adequate training program for operators of particle accelerators; and
  - (6) Any special requirements are met, as determined by the department, and that a certificate of registration has been issued.
- (B) Handlers of particle accelerators shall meet the following controls, warnings and interlock systems requirements:
  - (1) Each entrance into a target room or other high radiation area shall be provided with a safety interlock that shuts down the machine in the event of any barrier penetration;
  - (2) All safety instrumentation, readouts, and controls on the particle accelerator control console shall be clearly identified and easily discernible;
  - (3) Each safety interlock shall be on a circuit which allows it to operate independently of all other safety interlocks;
  - (4) All safety systems or interlocks shall be designed so that any defect or component failure in the safety interlock system prevents production of radiation by the accelerator;
  - (5) If a safety interlock system has been tripped, it shall only be possible to resume operation of the particle accelerator by manually resetting controls at the position where the safety interlock has been tripped, and at the control console;
  - (6) Each high radiation area shall have an audible and visual warning device which shall be activated for at least fifteen seconds prior to the possible creation of such a high radiation area. Such warning devices shall be clearly discernible in all high radiation areas;

- (7) Each particle accelerator shall bear a warning label on the control console which cautions individuals that radiation is produced when it is energized, and any other warning label required by rules adopted pursuant to Chapter 3701:1-38 of the Administrative Code;
  - (8) Each location designated as a high radiation area, and each entrance to such location, shall be equipped with easily observable warning lights that operate when, and only when the high-voltage portion of the machine is being energized;
  - (9) Barriers, temporary or otherwise, and pathways leading to high radiation areas shall be posted in accordance with rule 3701:1-38-18 of the Administrative Code; and
  - (10) An emergency power cutoff switch shall be located and easily identifiable in all high radiation areas and shall include a manual reset so that the accelerator cannot be restarted from the accelerator control console without resetting the cutoff switch.
- (C) Handlers shall comply with the following structural shielding and safety requirements:
- (1) A health physicist or a radiation expert, with education and experience acceptable to the department, 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;
  - (2) Provide each industrial particle accelerator installation with such shielding as is necessary to assure compliance with the applicable rules adopted pursuant to Chapter 3701:1-38 of the Administrative Code;
  - (3) The IRRP shall have the responsibility and authority to terminate the operations at a particle accelerator facility if such action is deemed necessary to minimize danger to public health and safety;
  - (4) 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 Table I of Appendix C to rule 3701:1-38-12 of the Administrative Code;
  - (5) A registrant, as required by Chapter 3701:1-38 of the Administrative Code, shall not vent, release, or otherwise discharge airborne radioactive material to an unrestricted area which exceeds the limits specified in Table II of Appendix C of rule 3701:1-38-12 of the Administrative Code. Concentrations may be averaged over a period not greater than one year. Every effort should be made to maintain releases of radioactive material to unrestricted areas as far below these limits as is reasonably achievable.
- (D) Handlers of particle accelerators shall comply with the following safe operating requirements:
- (1) The particle accelerator shall be secured when not in operation to prevent unauthorized use;
  - (2) The safety interlock system shall not be used to turn off the particle accelerator

- beam, except in an emergency or when testing of the safety interlock system;
- (3) All safety and warning devices, including interlocks, shall be checked for proper operation at intervals not to exceed three months. Results of such tests shall be maintained at the accelerator facility for inspection by the department. In the event the safety equipment is operating improperly, it shall be immediately reported to the IRRP and shall be repaired or replaced and never bypassed so as to enable radiation production;
  - (4) The handler's IRRP shall develop and maintain a particle accelerator handbook that describes the electrical circuits and the associated interlock systems, and this handbook shall be kept current as to any changes in the system;
  - (5) A copy of the current operating and the emergency procedures shall be maintained at the particle accelerator control console;
  - (6) If, for any reason, it is necessary to intentionally bypass a safety interlock or interlocks, such action shall be:
    - (a) Authorized by the IRRP;
    - (b) Recorded in a permanent log;
    - (c) Posted as a written notice at the accelerator control console; and
    - (d) Terminated as soon as possible; and
  - (7) The handler shall assure that each particle accelerator operator is supplied with, and uses, the following:
    - (a) Direct reading dosimeter; and
    - (b) Personnel dosimeter.
- (E) Handlers of particle accelerators shall comply with the following radiation monitoring requirements:
- (1) Appropriate portable monitoring equipment, which is operable and has been appropriately calibrated for the types of radiation being produced, shall be available at each particle accelerator facility. Such equipment shall be tested for proper operation daily and calibrated at intervals not to exceed one year and after each servicing and repair;
  - (2) A radiation shielding survey shall be performed and documented by a health physicist or qualified expert, with education and experience acceptable to the department, when changes have been made in shielding, operation, equipment, or occupancy of adjacent areas.
  - (3) Whenever applicable, periodic surveys shall be made to determine the amount of airborne particulate radioactivity present.
  - (4) 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;

- (5) All surveys shall be made in accordance with the written procedures established by a health physicist or radiation expert, with education and experience acceptable to the department;
  - (6) Records of all radiation surveys, calibrations, and instrumentation tests shall be maintained at the particle accelerator facility for inspection by the department;
  - (7) Whenever applicable, surveys for removable contamination shall be made to determine the degree of contamination.
- (F) No individual shall act as a particle accelerator operator:
- (1) Unless that individual has received instruction in, and has demonstrated an understanding of:
    - (a) The subjects outlined in appendix A of this rule;
    - (b) The requirements of this rule and the applicable requirements of Chapter 3701:1-38 of the Administrative Code;
    - (c) The registrant's operating and emergency procedures for each particle accelerator; and
  - (2) Until the IRRP has documented that the individual has demonstrated competency in the use of the particle accelerator, related equipment, and radiation survey instruments that will be used to monitor the particle accelerator at that facility. The particle accelerator operator shall have immediate access to copies of the documents required by paragraph (F)(1) of this rule.
- (G) The director may, upon application thereof or upon his or her own initiative, grant a variance to the requirements of this rule as he or she determines is authorized by law, provided that the registrant shows to the satisfaction of the director that there is good cause for the variance, and that the variance will not result in any undue hazard or effect on the public health, safety, or environment. The terms, conditions, and expiration of the variance shall be set forth in writing by the director. Failure to comply with the terms of the variance may result in immediate revocation of the variance.

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