

Controlling Risks Regulations



Why Do I Have to Have a Safety System?

- Legal requirements
- Good Business practices
- Liability reduction
- Competition for resources
- Mission accomplishment



Aren't Administrative Controls Good Enough?

- Not as effective as engineering controls
- Criticized as means of spreading exposures rather than eliminating or reducing them
- Depend upon continual human intervention
- Difficult to implement and maintain
- May be more expensive over the long term



What Are The Hazards Associated With Accelerators?

- Prompt Ionizing Radiation
- Residual Ionizing Radiation
- Oxygen Deficiency
- Fire/Explosive (Hazardous Classified) Areas
- Laser Radiation
- Other Non-Ionizing EM Radiation
- Open Machinery
- Exposed Electrical Equipment
- Chemical Processes
- Biological Research Facilities



Who Has Legal Authority Over Accelerators?

- OSHA covers all radiation sources not regulated by A.E.C.
 - Examples of non-A.E.C. regulated radiation sources include X-ray equipment, accelerators, accelerator-produced materials, electron microscopes, betatrons, and some naturally occurring radioactive materials.
- Many states have an agreement w/ OSHA for a state-approved plan to implement OSHA requirements.
 - DOE has agreement with AEC to regulate accelerators under 10 CFR 835.



Accelerator System Design and Implementation

- Very little specific requirements on accelerators exist in law/regulations
 - 10 CFR 835
 - 10 CFR 851
 - 29 CFR 1910.1096
 - 29 CFR 1910, Subpart S
- OSHA's Process Safety Standard, 29 CFR 1910.119, contains some guidance but is not applicable to accelerators
- Must defer to consensus standards for guidance



General Duty Clause (GDC)

Section 5 of the OSH Act or the "General Duty Clause" which states:

- A. Each Employer:
- 1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees;
 - 2) shall comply with occupational safety and health standards promulgated under this Act.

DOE Regulation 10CFR851

- (a) ... the contractor must:
- 1) Provide a place of employment that is free from recognized hazards that are causing or have the potential to cause death or serious physical harm to workers; and
 - 2) Ensure that work is performed in accordance with:
 - i. All applicable requirements of this part; and
 - ii. With the worker safety and health program for that workplace.



General Duty Clause (GDC)

Section 5 of the OSH Act or the "General Duty Clause" which states:

B. Each employee shall comply with occupational safety and health standards and all rules, regulations and orders issued pursuant to this Act which are applicable to his own actions and conduct.

DOE 10CFR 851 Subpart C
851.20

b) Worker rights and responsibilities.

Workers must comply with the requirements of this part, including the worker safety and health program, which are applicable to their own actions and conduct.



OSHA Liability Criteria

- The employer failed to keep the work place free of a hazard to which employees of that employer were exposed.
- The hazard is (or should have been) recognized by the employer.
- The hazard is causing or was likely to cause death or other serious physical harm.
- There is a feasible and useful method to correct the hazard.



10 CFR 835

- Subpart A - General Provisions

- § 835.1 Scope.

- (a) General. The rules in this part establish radiation protection standards, limits, and program requirements for protecting individuals from ionizing radiation resulting from the conduct of DOE activities.



Subpart F - Entry Control Program

§ 835.501 Radiological areas.

- (a) Personnel entry control shall be maintained for each radiological area.
- (b) The degree of control shall be commensurate with existing and potential radiological hazards within the area.
- (c) One or more of the following methods shall be used to ensure control:
 - (1) Signs and barricades;
 - (2) Control devices on entrances;
 - (3) Conspicuous visual and/or audible alarms;
 - (4) Locked entrance ways; or
 - (5) Administrative controls.
- (d) Written authorizations shall be required to control entry into and perform work within radiological areas. These authorizations shall specify radiation protection measures commensurate with the existing and potential hazards.
- (e) No control(s) shall be installed at any radiological area exit that would prevent rapid evacuation of personnel under emergency conditions.



Subpart F - Entry Control Program

§ 835.502 High and very high radiation areas.

(a) The following measures shall be implemented for each entry into a high radiation area:

- (1) The area shall be monitored as necessary during access to determine the exposure rates to which the individuals are exposed; and
- (2) Each individual shall be monitored by a supplemental dosimetry device or other means capable of providing an immediate estimate of the individual's integrated equivalent dose to the whole body during the entry.



§ 835.502 High and very high radiation areas

- (b) Physical controls. One or more of the following controls shall be used for each entrance or access point to a high radiation area where radiation levels exist such that an individual could exceed an equivalent dose to the whole body of 1 rem (0.01 Sv) in any one hour at 30 centimeters from the source or from any surface that the radiation penetrates:
- (1) A control device that prevents entry to the area when high radiation levels exist or that, upon entry, causes the radiation level to be reduced below the level that defines a high radiation area;
 - (2) A device that functions automatically to prevent use or operation of the radiation source or field while individuals are in the area;
 - (3) A control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the high radiation area and the supervisor of the activity are made aware of the entry;
 - (4) Entryways that are locked. During periods when access to the area is required, positive control over each entry is maintained;
 - (5) Continuous direct or electronic surveillance that is capable of preventing unauthorized entry;
 - (6) A control device that will automatically generate audible and visual alarm signals to alert personnel in the area before use or operation of the radiation source and in sufficient time to permit evacuation of the area or activation of a secondary control device that will prevent use or operation of the source.



§ 835.502 High and very high radiation areas

- (c) Very high radiation areas. In addition to the above requirements, additional measures shall be implemented to ensure individuals are not able to gain unauthorized or inadvertent access to very high radiation areas.
- (d) No control(s) shall be established in a high or very high radiation area that would prevent rapid evacuation of personnel.



Subpart G - Posting and Labeling

- Posting and labeling are outside of the scope of this course.

