

## CHAPTER 22

# HAZARDOUS MATERIALS

### SECTION 2201 HAZARDOUS MATERIALS

**2201.1 Objective.** To protect people and property from the consequences of unauthorized discharge, fires or explosions involving hazardous materials.

#### 2201.2 Functional statements.

**2201.2.1 Prevention.** Provide adequate safeguards to minimize the risk of unwanted releases, fires or explosions involving hazardous materials as appropriate to the design performance level determined in Chapter 3.

**2201.2.2 Mitigation.** Provide adequate safeguards to minimize the consequences of an unsafe condition involving hazardous materials during normal operations and in the event of an abnormal condition in accordance with the design performance level determined in Chapter 3.

#### 2201.3 Performance requirements.

**2201.3.1 Properties of hazardous materials.** The properties of hazardous materials on site shall be known and shall be available to employees, neighbors and code-enforcement officials.

**2201.3.2 Reliability of equipment and operations.** Equipment and operations involving hazardous materials shall be designed, installed and maintained to ensure that they reliably operate as intended.

**2201.3.3 Prevention of unintentional reaction or release.** Adequate safeguards shall be provided to minimize the risk of an unintentional reaction or release that could endanger people or property.

**2201.3.4 Spill mitigation.** Spill containment systems or means to render a spill harmless to people or property shall be provided where a spill is determined to be a plausible event and where such an event would endanger people or property not in the immediate area of the spill.

**2201.3.5 Ignition hazards.** Adequate safeguards shall be provided to minimize the risk of exposing combustible hazardous materials to unintended sources of ignition.

**2201.3.6 Protection of hazardous materials.** Adequate safeguards shall be provided to minimize the risk of exposing hazardous materials to a fire or physical damage whereby such exposure could endanger or lead to the endangerment of people or property.

**2201.3.7 Exposure hazards.** Adequate safeguards shall be provided to minimize the risk of and limit damage from a fire or explosion involving explosive hazardous materials whereby such fire or explosion could endanger or lead to the endangerment of people or property.

**2201.3.8 Detection of gas or vapor release.** Where a release of hazardous materials gas or vapor would cause immediate harm to persons or property and where such materials would not be detectable at the danger threshold by

sight or smell, an adequate means of detecting, diluting or otherwise mitigating the dangerous effects of a release shall be provided.

**2201.3.9 Reliable power source.** Where a power supply is relied upon to prevent or control an emergency condition that could endanger people or property, the power supply shall be from a reliable source.

**2201.3.10 Ventilation.** Where ventilation is necessary to limit the risk of creating an emergency condition resulting from normal or abnormal operations, an adequate means of ventilation shall be provided.

**2201.3.11 Process hazard analyses.** Process hazard analyses shall be conducted as necessary to reasonably ensure protection of people and property from dangerous conditions involving hazardous materials.

**2201.3.12 Written procedures and enforcement for pre-startup safety review.** Written documentation of pre-startup safety review procedures shall be developed and enforced to ensure that operations are initiated in a safe manner. The process of developing and updating such procedures shall involve participation of affected employees.

**2201.3.13 Written procedures and enforcement for operation and emergency shutdown.** Written documentation of operating procedures and procedures for emergency shutdown shall be developed and enforced to ensure that operations are conducted in a safe manner. The process of developing and updating such procedures shall involve participation of affected employees.

**2201.3.14 Written procedures and enforcement for management of change.** A written plan for management of change shall be developed and enforced. The process of developing and updating the plan shall involve participation of affected employees.

**2201.3.15 Written procedures for action in the event of emergency.** A written emergency response plan shall be developed to ensure that proper actions are taken in the event of an emergency, and the plan shall be followed if an emergency condition occurs. The process of developing and updating the plan shall involve participation of affected employees.

**2201.3.16 Written procedures for investigation and documentation of accidents.** Written procedures for investigation and documentation of accidents shall be developed, and accidents shall be investigated and documented in accordance with these procedures.

**2201.3.17 Consequence analysis.** Where an accidental release of hazardous materials could endanger people or property off site, an analysis of the expected consequences of a plausible release shall be performed and utilized in the analysis and selection of active and passive hazard mitigation controls.

**2201.3.18 Safety audits.** Safety audits shall be conducted on a periodic basis to verify compliance with the requirements of this chapter.

**2201.3.19 Levels of impact.** Levels of impact related to injuries to persons, damage to processes, structure, contents and to the environment shall comply with the requirements of Section 304 for design performance levels.

**2201.3.19.1 General.** Magnitudes of design events shall reflect the ignition, spill or release, growth, and spread potential of hazardous materials that can be reasonably expected to impact buildings and facilities as designed or constructed.

**2201.3.19.2 Design hazardous materials release or reaction events.** Magnitudes of design events are described in terms of the potential effects given the proposed design, arrangement, construction, furnishing and use of a building or facility.

**2201.3.19.3 Range of event sizes.** Magnitudes of design events shall be defined as small, medium, large and very large, where the quantification of the design event is a function of building or facility use and associated performance group.

**2201.3.19.4 Engineering analysis of potential event scenarios.** Quantification of the magnitudes of design events shall be based on engineering analyses of potential scenarios that can be expected to impact a building or facility through its intended life. For each design scenario considered, the analyses shall include the ignitability, reactivity, spill or release potential, the peak release rate, the rate of continued release and expected incident growth, the overall quantity, the toxicity, chemical state, and other specific hazards of the material and its impacts on people and property. The physical characteristics and ventilation of the space or area and adjoining spaces or areas shall also be considered.

**2201.3.19.5 Design parameters.** Multiple scenarios, ranging from small to very large design events, must be considered to ensure that associated levels of tolerable damage are not exceeded as appropriate to the performance group.

**2201.3.19.6 Factors in determining design events scenarios.** The use of the room or area of event and adjoining spaces, in terms of occupant risk, property protection and community welfare (importance) factors, shall be considered in the development of design scenarios.

**2201.3.19.7 Justification.** Justification of the magnitudes of design events shall be part of the analysis prepared by the design professional.