

## Inspecting Hazardous Chemicals/ Materials & Their Occupancies

Spring 2012  
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### Introduction

- This class will review
  - CT Statutes, Regulations and adopted standards relative to the CT Hazardous Chemical Code
  - The relationship between the Hazardous Chemicals/ Materials and the CSFSC & SBC
  - CGS 29-307a

### Introduction

- This class focuses providing information / reference to assist with the inspecting of buildings
- Plan review for buildings that will contain hazardous chemicals is not the focus of this class
- Due to time constraints this class will be an overview of applicable codes & standards

### Introduction

- CGS & Regulations –Haz Chem/Mat
  - In the CT General Statutes
    - Chapter 541 Title 29 Part II
      - Fire Marshals and Fire Hazards
      - State Fire Prevention Code
      - Fire Safety Code
  - Addresses Hazardous Chemicals & Materials

### Introduction

- Statutes relative to Haz Chem/Mat
  - 29-307a
    - Hazardous materials in manufacturing establishments. Penalty. Distribution of information
  - 29-307b
    - Notice to water companies of the presence or elimination of hazardous material

### Introduction

- Statutes & Haz Chem/Mat cont.
  - 29-317 Oil Burning & Equipment Code
  - 29-320 Flammable & Combustible Liquids Code
  - 29-329 Gas Equipment & Piping Code
  - 29-331 Liquefied petroleum gas & Liquefied natural gas Code

## Introduction

- Statutes & Haz Chem
  - 29-336 Hazardous chemicals. Definitions.

Hazardous chemicals	Compressed gas
Corrosive liquids	Flammable solid
Highly toxic material	Poisonous gas
Oxidizing materials	Vapor pressure
Potentially explosive chemical	

- Originally enacted in 1957

## Introduction

- Statutes & Haz Chem/Mat cont.
  - 29-337 Hazardous Chemical Code
  - 29-349 Explosives & Blasting
  - 29-357 Fireworks & Special Effects
  - 29-367 Model Rocketry

## Introduction

- CT Haz Chem Code
  - Regulations 29-337-1b to 29-337-3b
    - 29-337-1b The CT Haz Chem Code : Purpose and Applicability
      - The regulations of the

## Introduction

- CT Haz Chem Code Regs. – cont
  - 29-337-1b The CT Haz Chem Code : Purpose and Applicability
    - Regulations of the Department of Construction Services 29-337-1b to 29-337-3b inclusive shall be known as the CT Hazardous Chemicals Code

## Introduction

- CT Haz Chem Code Regs. – cont
  - 29-337-3b Authority Having Jurisdiction
    - The State Fire Marshal is the AHJ
      - Administration
      - Interpretation
      - Modifications
    - LFM shall make the initial determination concerning compliance, except as stated otherwise in a section

## Introduction

- CT Haz Chem Code Regs. – cont
  - 29-337-3b Adopted Standards
    - NFPA 45-1996                      NFPA 50-1996
    - NFPA 50A-1994                    NFPA 50B-1994
    - NFPA 51-1992                    NFPA 51B-1994
    - NFPA 55-1993                    NFPA 99-1996
    - NFPA 430-1995
    - 49 CFR Part 107, Subpart B Parts 171 – 178 and Part 180 all as amended

## NFPA 45

Fire Protection for Laboratories  
Using Chemicals  
1996

## NFPA 45

- **Scope**

- This standard shall apply to laboratory
  - buildings
  - laboratory units
  - laboratory work areas
- Whether located above or below grade
- Where chemicals are handled or stored in quantities greater than the minimum specified
- Seven exceptions

## NFPA 45

- **Exceptions**

- Labs units with  $\leq 1.1$  gal. of flammable / combustible liquids and  $< 75$  cubic ft of flammable gas
- Pilot plants
- Labs that are primarily manufacturing plants

## NFPA 45

- **Exceptions cont.**

- Incidental testing facilities
- Labs that use chemicals only for incidental purposes such as cleaning
- Labs that work with only radioactive materials
- Labs that work with only explosive materials

## NFPA 45

- The purpose of this standard is to provide basic requirements for

- The protection of life and property
- Through prevention & control of fires / explosions
- Involving the use of chemicals in laboratory-scale operations.

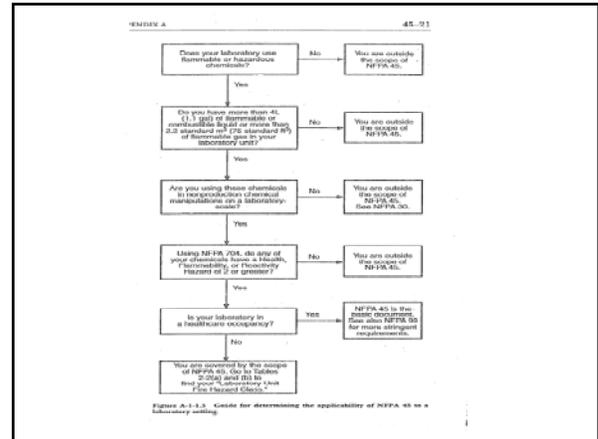
## NFPA 45

- **Overview**

- Chp.1 General
- Chp.2 Lab. Unit Hazard Classification
- Chp.3 Lab. Unit Design & Construction
- Chp. 4 Fire Protection
- Chp. 5 Explosion Hazard Protection

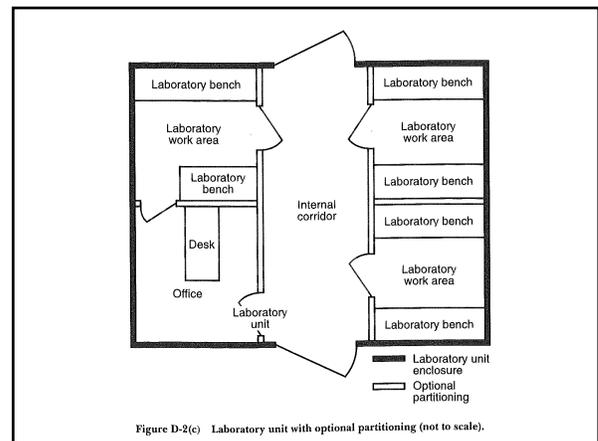
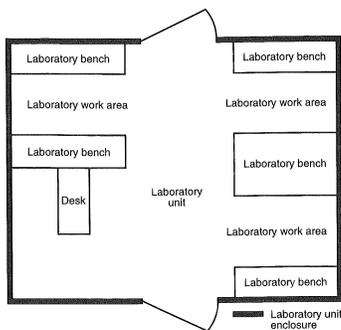
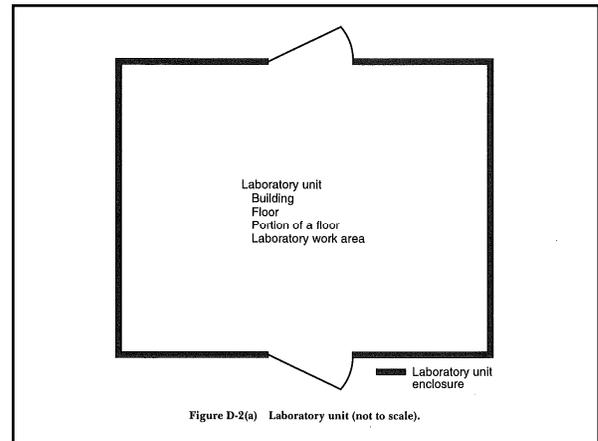
## NFPA 45

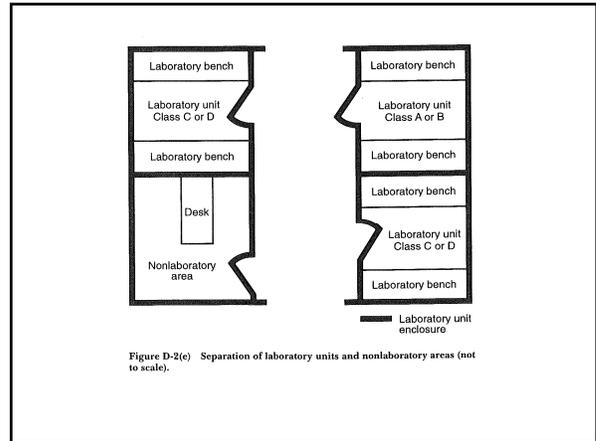
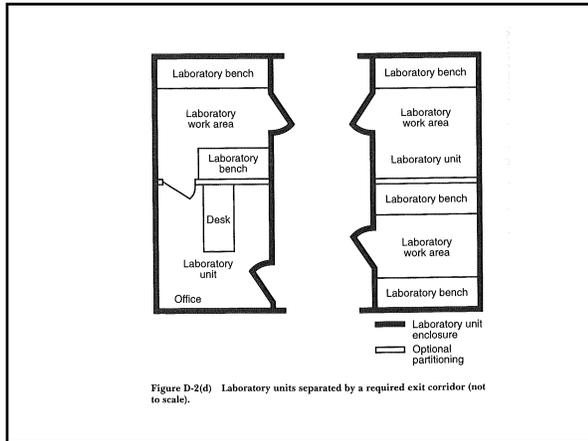
- Overview cont.
  - Chp. 6 Lab. Ventilation Systems & Hood Req.
  - Chp. 7 Chemical Storage, Handling & Waste Disposal
  - Chp. 8 Compressed & Liquefied Gases
  - Chp. 9 Lab. Operations & Apparatus
  - Chp. 10 Hazard Identification



## NFPA 45

- Laboratory Unit - Defined
  - An enclosed space used for experiments or tests
  - Can include offices, lavatories, other incidental contiguous rooms & corridors within the unit maintained/used by lab personnel
  - Can contain 1 or more separate lab work areas or an entire building





- ### NFPA 45
- Lab Unit Fire Hazard Classification
  - Based on flammable & combustible liquids
    - Class A High Fire Hazard
    - Class B Moderate Fire Hazard
    - Class C Low Fire Hazard
    - Class D Minimum Fire Hazard

- ### NFPA 45
- Fire Protection
    - All lab units shall be provided with fire protection appropriate to the fire hazards
    - General
      - Portable fire extinguishers 4-4
      - Fire alarm systems 4-5
      - Evacuation & emergency plans 4-6

- ### NFPA 45
- Fire Protection cont.
    - Situational conditions
      - Automatic sprinkler systems 4-2
      - Standpipe & hose systems 4-3

- ### NFPA 45
- Fire Prevention Procedures (4-6.1)
    - Certain critical areas require special attention
      - Handling & storage of chemicals, flammable and combustible liquids and gases
      - Open flame & spark producing equipment /permit system
      - Arrangement / use of portable electric cords
      - Smoking area controls

## NFPA 45

- Emergency Plans (4-6.3)
  - Plans for lab emergencies shall be developed and include:
    - Alarm activation
    - Evacuation & building re-entry procedures
    - Equipment shutdown procedures or applicable emergency operations
    - Fire-fighting operations
    - Nonfire hazards

## NFPA 45

- Explosion Hazard Protection (5-5)
  - Inspection of all protective construction devices and systems shall be conducted at least annually
- Laboratory Hoods (6-13)
  - When installed or modified and at least annually, hoods and hood exhaust systems and special exhaust systems shall be inspected & tested

## NFPA 45

- Chemical Storage, Handling & Disposal
  - Class 1 liquids shall not be stored or transferred in any exit access (7-2.2.5)
  - Container types & max. capacities shall comply with Table 7-2 (7-2.3.2)
    - Two exceptions

## NFPA 45

- Chemical Storage, Handling & Disposal
  - Containers of materials that might become hazardous upon prolonged storage (7-2.3.5)
    - Shall be dated when first opened
    - At end of 6 months material is tested/evaluated
    - For continued safe use

## NFPA 45

- Chemical Storage, Handling & Disposal
  - Materials found to be safe or that can be made safe shall be permitted to be redated & retained for an additional 6 months
  - All other material shall be safely discarded
  - Examples
    - Picric acid
    - Peroxides
    - Metallic sodium

## NFPA 45

- Cylinder Safety (8-1.5)
- Cylinder in Use (8-1.6)

## NFPA 45

- Hazard Identification (10-1)
  - Entrances to
    - Lab units / work areas
    - Storage areas
    - Associated facilities
  - Shall be identified by signs to warn emergency response personnel of unusual or severe hazards that are not directly related to fire hazards of contents

## NFPA 45 (Examples)

- Unstable chemical
- Radioactive chemicals
- High powered lasers
- Carcinogens, mutagens & teratogens
- Pathogens
- High pressure reactions
- Water reactive materials
- Cryogenics

## NFPA 50

Bulk Oxygen Systems at  
Consumer Sites  
1996

## NFPA 50

- This standard shall cover the general principals recommended for
  - The installation of bulk oxygen systems on consumer premises
  - Where supply to the consumer premises originates outside the consumer premises
  - And is delivered by mobile equipment

## NFPA 50

- This standard does not apply to
  - Oxygen manufacturing plants
  - Other establishments operated by the oxygen supplier or his agent for the purpose of
    - Storing oxygen
    - Refilling portable containers, trailers, mobile supply trucks or tank cars

## NFPA 50

- This standard shall not apply to oxygen storage systems having capacities less than those stated in the definition of Bulk Oxygen System in sect. 1-3
  - A bulk oxygen system contains more than 20,000 cu. ft. of oxygen (NTP)
- When a bulk oxygen system is intended for medical gas applications, additional provisions are included in NFPA 99

## NFPA 50A

Gaseous Hydrogen Systems at  
Consumer Sites  
1994

## NFPA 50A

- This standard covers the requirements for the installation of gaseous hydrogen systems on consumer premises where:
  - The hydrogen supply to the consumer premises originates outside the consumer premises, and
  - The hydrogen supply is delivered by mobile equipment.

## NFPA 50B

Liquefied Hydrogen Systems at  
Consumer Sites  
1994

## NFPA 50B

- This standard covers the requirements for the installation of liquefied hydrogen systems on
  - Consumer premises where the liquid hydrogen supply to the consumer premises originates outside the consumer premises
  - And is delivered by mobile equipment

## NFPA 50B

- This standard shall not apply to:
  - Portable containers having a total liquefied hydrogen content of less than 39.7 gallons
  - Liquefied hydrogen manufacturing plants or other establishments operated by the hydrogen supplier/agent for the sole purpose of
    - Storing liquefied hydrogen
    - Refilling portable containers, trailers, mobile supply trucks or tank cars

## NFPA 50B

- Retroactivity
  - An existing system that is not in strict compliance with the provisions of this standard shall be permitted to be continued in use where such use does not constitute a distinct hazard to life or adjoining property

## NFPA 51

Design & Installation of Oxygen-Fuel  
Gas Systems for Welding, Cutting and  
Allied Process

1997

## NFPA 51

- **Scope:**
  - Design & installation of oxygen-fuel gas welding and cutting systems and allied processes, except for systems meeting the criteria in 1-1.5
  - Utilization of gaseous fuels generated from flammable liquids under pressure when such fuels are used with oxygen

## NFPA 51

- **Scope cont.**
  - Storage, on site of a welding and cutting system installation of the following:
    - Gases to be used with such systems where more than 1 cylinder each of oxy & fuel gas are stored in any single storage area
    - Calcium carbide

## NFPA 51

- **Section 1-1.5**
  - Systems of one cylinder of oxygen & one cylinder of fuel gas for cutting & welding
  - Systems where fuel gases are not used with Oxy
  - Manufacture of gases & filling of cylinders
  - Storage of empty cylinders
  - Compressed air-fuel gas systems

## NFPA 51B

Fire Prevention in the Use of  
Cutting & Welding Processes

1994

## NFPA 51B

- **Purpose** – This standard has been prepared for the guidance of cutters & welders including:
  - Persons who perform cutting & welding
  - Fire watches their supervisors
  - Managers on whose property cutting and welding is to be performed

## NFPA 51B

- **Scope** – This standard covers provisions to prevent loss of life and property from fire in the use of:
  - Oxy-fuel gas
  - Electric arc cutting
  - Welding equipment where used for cutting & welding

## NFPA 51B

- **Management (2-1)**
  - Shall be responsible for the safe usage of cutting & welding equipment on its property
    - Establish approved areas for cutting & welding
    - Designate an individual for authorizing the work
    - Ensure only approved apparatus/equipment is used
    - Ensure cutters & welders / supervisors are trained in safe operation of equipment

## NFPA 51B

- **Management (2-1) cont.**
  - Select contractors to perform work who employ trained personnel and who are aware of the risks involved in cutting & welding
  
  - Advise all contractors regarding flammable materials or hazardous conditions

## NFPA 51B

- **Supervisor (2-2)**
  - Includes responsibilities
- **Cutter / Welder (2-3)**
  - Includes responsibilities

## NFPA 51B

- **Fire Prevention Precautions**
  - Permissible Areas (3-1)
    - Areas that are or have been made fire safe
    - Work areas shall be either
      - A specific area designed/approved for such work
        - » Maintenance shop
        - » Detached outside location
        - » Of noncombustible or fire resistive construction
      - An area made fire safe by removing or protecting combustibles from ignition sources

## NFPA 51B

- **Fire Prevention Precautions cont.**
  - Cutting & welding shall not be permitted in:
    - Areas not authorized by management
    - Sprinklered buildings while system impaired
    - Explosive atmospheres or explosive atmospheres that can develop inside unclean drums, tanks or other containers
      - Mixtures of gases, vapors or dusts

## NFPA 51B

- Fire Prevention Precautions
  - Permit (3-2)
    - Before cutting / welding is permitted at least once a day the area shall be inspected by the person authorizing the operation
  - All combustibles shall be relocated or if impractical protected at least 35 ft horizontally from the work site
  - Fully charged & operable fire extinguishers shall be available at the work area

## NFPA 51B

- Fire Prevention Precautions
  - Fire Watchers (3-3)
    - Shall be required whenever cutting / welding is performed in locations where other than minor fires could develop or where:
      - Combustible material is closer than 35 ft to point of operation
      - Wall / floor openings within 35 ft radius
      - Combustible materials adjacent to opposite side of metal partitions, walls, ceilings or roofs

## NFPA 51B

- Fire Prevention Precautions
  - Fire Watchers (3-3) cont.
    - Shall have extinguishers readily available and be trained in their use
    - Be familiar with procedures for sounding an alarm in the event of a fire

## NFPA 51B

- Fire Prevention Precautions
  - Fire Watchers (3-3) cont.
    - Watch for fires and try to extinguish them only when within the capacity of the equipment provided or sound alarm immediately
    - Maintained for at least 30 min after completion of work to prevent smoldering fires

## NFPA 51B

- Public Exhibitions & Demonstrations
  - 4-1 Scope
  - 4-2 Supervision
  - 4-3 Site
  - 4-4 Fire Protection
  - 4-5 Cylinders

## NFPA 55

Storage, Use & Handling of  
Compressed and Liquefied Gases  
in Portable Cylinders  
1993

## NFPA 55

- Scope
  - This standard applies to the storage, use and handling of compressed and liquefied gases in portable cylinders in all occupancies

## NFPA 55

- Scope cont.
  - This standard shall not apply to:
    - Off-site transportation of compressed gases
    - Storage, use & handling of cylinders at gas manufacturing and distributing facilities
    - The storage, use & handling of radioactive gases
    - The storage, use & handling of medical gases at health care facilities

## NFPA 55

- Scope cont.
  - Cryogenic liquids in bulk & portable containers
  - Systems for gases, each containing
    - More than 20,000 cu ft of oxy
    - 3,000 cu. ft of hydrogen
    - 5000 cu. ft of acetylene
  - Storage & use of more than 735 lbs water capacity [ nominal 300 lbs propane] of liquefied flammable gases

## NFPA 55

- Scope cont.
  - Systems of single cylinder of oxy & a single cylinder of fuel gas for welding & cutting
  - Compressed & liquefied gases in separate storage areas in quantities less than specified in Tables 1-1.2(a) & 1-1.2(b) unless otherwise specified

## NFPA 55

- Scope cont.
  - Flammable gases used as a vehicle fuel when stored on the vehicle
  - Handling & uses of compressed or liquefied gases in lab work areas covered by NFPA 45

## NFPA 55

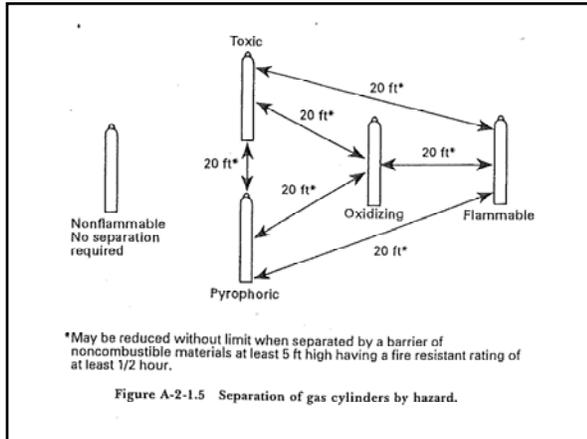
- Training (1-3)
  - Persons responsible for working in the areas where compressed gases are produced, stored handled or used shall be trained:
    - In the chemical & physical properties of the materials
    - The appropriate emergency response

## NFPA 55

- General Storage Requirements (2-1)
  - This chapter shall apply to the storage of all compressed & liquefied gases
  - Gases shall be separated in storage in accordance with Table 2-1.5

## NFPA 55

- Gen. Storage Requirements (2-1) cont.
  - When a gas has more than 1 category all compatibilities shall be checked and the most stringent shall apply (2-1.3)
  - Toxic gases shall be stored per Table 2-1.5 & Chapter 3



## NFPA 55

- Storage Location 2-1.6
  - Outdoor storage areas shall have a minimum of 25 % of the perimeter open to the atmosphere
  - This open space shall be permitted to incorporate
    - Chain link fence
    - Lattice construction
    - Open block
    - Or similar materials
  - For the full height & width of the opening

## NFPA 55

- Outdoor storage cont.
  - Storage areas shall be kept clear of dry vegetation & combustible materials for a min. distance of 15 ft
  - Cylinders shall not be placed on bare ground or on surfaces where water can accumulate
  - Storage area shall be provided with physical protection from vehicle damage
  - Storage areas shall be permitted to be covered with noncombustible canopies

## NFPA 55

- General Storage Req. (2-1.6.3)
  - When 2 or more compressed gases are in a gas cabinet, the gases shall be compatible
    - Table 2-1.5
  - Spill control / containment not required
  - Floors of storage areas shall be noncombustible / limited combustible
  - Noncombustible shelving shall be used for storage of cylinders

## NFPA 55

- General Storage Req. (2-1.6.3) cont.
  - Separation from incompatible or combustible materials storage of compressed gases shall either:
    - Segregated from any incompatible/combustible storage by a min. distance of 20 ft or
    - Isolated from any incompatible/combustible storage by a noncombustible barrier at least 5 ft high with a min. fire resistance of 30 min.

## NFPA 55

- Flammable Gases (2-2)
  - Storage of nonliquefied flammable gases cylinders in buildings are determined by the total volume flammable gas and per Table 2-2.1
  - Storage of compressed flammable gases in other than industrial / storage occupancies per Table 1-1.2(b)

## NFPA 55

- Flammable Gases (2-2) cont.
  - Storage in mercantile & business occupancies shall be limited to 400 cu ft
  - Storage of liquefied flammable gases in all occupancy per CT LPG & LNG Code
  - Smoking / open flames shall not be allowed in storage areas or within 20 ft of storage areas

## NFPA 55

- Flammable Gases (2-2) cont.
  - Gas cylinders shall be stored at least 20 ft from storage of flammable / combustible liquids and solids
  - Liquefied cylinders shall be stored upright or such that the pressure relief valve is in within the vapor space

## NFPA 55

- Flammable Gases (2-2) cont.
  - Storage of multiple cylinders each 2500 cu ft or less in 1 fire hazard area is allowed when groups are separated by a min. of 100 ft (2-2.1.7)
    - Except. – Distance can be reduced to 0 ft when separated by 2 hr masonry walls
  - Different flammable gases are permitted to be stored as a group (2-2.1.8)

## NFPA 55

- Flammable Gases (2-2) cont.
  - Storage between 2501-5000 cu ft in area
    - Cylinders stored in a room/enclosure with a min. 1 hr rating (2-2.2.1)
      - Exception
      - Entire building is sprinklered per NFPA 13
      - System protects a distance of 25 ft beyond all directions of cylinders
      - With a density of 0.30gpm per sq ft
      - 1 hr rating not required

## NFPA 55

- Flammable Gases (2-2) cont.
  - Storage between 2501-5000 cu ft in area
    - Multiple groups of cylinders within 1 sprinklered fire area permitted where groups are separated by a min. of 100 ft (2-2.2.2)
      - Distance can be reduced to 50 ft if building is protected with a system designed for Ordinary Hazard Group 1 or Light Hazard occupancies
    - Distance can be reduced to 25 ft where the occupancy between storage areas is free of combustible materials and protected as mentioned above

## NFPA 55

- Flammable Gases (2-2) cont.
  - Cylinder storage rooms shall be provided with natural or mechanical ventilation (2-2.2.3)
  - The following shall apply to storage of greater than 5000 cu ft of gas in any location
    - Room/enclosure 2 hr min. rating with at least 1 wall being an exterior wall
    - Sprinkler density of 0.30gpm/sq ft for 2500 sq ft or entire room whichever is smaller
    - Provide mechanical ventilation

## NFPA 55

- Chapter 3 Toxic Gases
- Chapter 4 Hazard Warnings
- Chapter 5 Emergency Plan

## NFPA 55

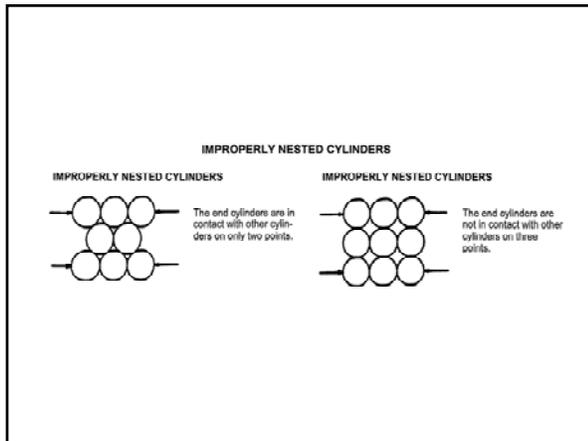
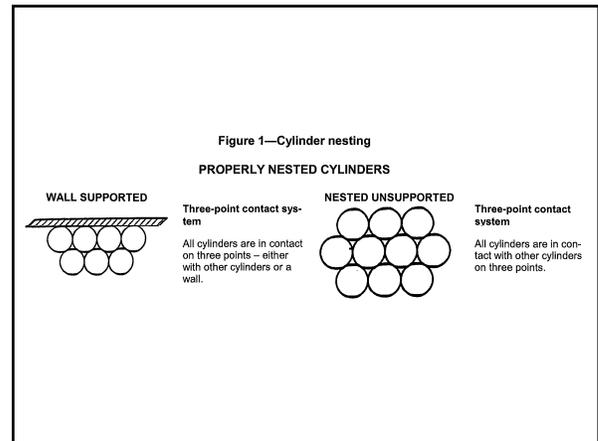
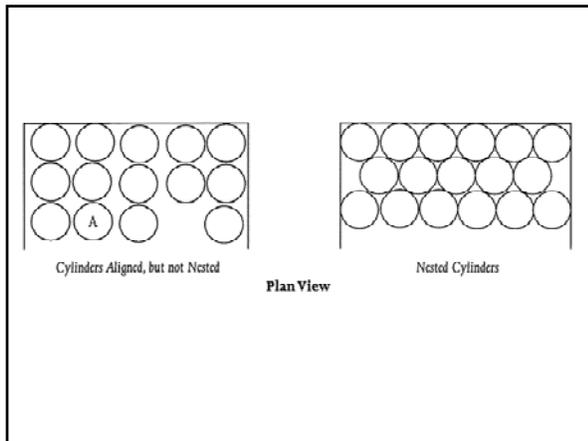
- Chapter 6 Compressed Gas Cylinders
  - Cylinders shall be designed, fabricated, tested and marked per US DOT or ASME Boiler & Pressure Vessel (6-1)
  - Cylinders having residue products shall be treated as full except when being examined, serviced or refilled by a gas manufacturer / distributor (6-3)
  - Valve protective caps shall be kept on cylinders at all times except when being filled or connected for use (6-4)

## NFPA 55

- Chapter 6 cont.
  - Valve outlet caps/plugs shall be kept on cylinders at all times except when being filled or connected for use (6-5)
  - Cylinders in use or in storage shall be secured to prevent them from falling or being knocked over
    - Except.1 When being examined, serviced or refilled
    - Except.2 At filling plants & distributor's warehouses nesting to secured cylinder is allowed

## NFPA 55

- Chapter 6 cont.
  - Compressed gas cylinders shall be permitted to be stored & used in the horizontal position



## NFPA 55

- Chapter 7 Safety Precautions
  - Smoking or open flames not permitted within 20 ft of any areas where the following gases are stored:
    - Flammable
    - Oxidizing
    - Pyrophoric
    - Toxic

## NFPA 99

Health Care Facilities  
1996

## NFPA 99

- **Scope** – The scope of this document is to establish criteria to minimize the hazards of fire , explosion and electricity in health care facilities providing services to human beings
- These criteria include performance, maintenance, testing and safe practices for facilities, material, equipment and appliances and include other hazards associated with the primary hazards

## NFPA 99

- Application –
  - This document shall apply to all health care facilities.
  - Construction and equipment requirements shall be applied only to new construction and new equipment, except as modified in individual chapters.

## NFPA 99

- Application cont.
  - Only the altered, renovated or modernized portion of an existing system or individual component shall be required to meet the installation and equipment requirements
  - If the alteration, renovation or modernization adversely impacts existing performance requirements of a system or component additional upgrading shall be required

## NFPA 430

Storage of Liquid & Solid  
Oxidizers  
1995

## NFPA 430

- Scope
  - This code shall apply to the storage of oxidizers that are liquid or solid at ambient conditions
  - Separate chapters specify for storage of oxidizers by class where the quantities stored are greater than the stated minimums
  - This codes does not apply to storage of solid and liquid oxidizers for normal use in single-family dwellings

## NFPA 430

- Purpose
  - The purpose of this code shall be to provide reasonable requirements for the safe storage of commercial available strengths of liquid and solid oxidizers
  - Examples
    - 2001 NAMCO Incident – Manchester
    - 1988 Swimming Pool Chemical Plant Fire - Springfield

## NFPA 430

- Purpose cont.
  - The hazards of stored oxidizers can manifest themselves in one or more of five distinct hazardous situations:
    - Increase burning rate of combustibles
    - Cause spontaneous ignition of combustibles
    - Decompose rapidly
    - Liberate hazardous gases
    - Undergo self-sustained decomposition

## NFPA 430

- Oxidizer
  - Any material that readily yields oxygen or other oxidizing gas, or readily reacts to promote or initiate combustion of combustible materials
  - Oxidizing gases include:
    - Bromine
    - Chlorine
    - Fluorine

## NFPA 430

- Classification of Oxidizers (1-6)
  - Class 1
    - Primary hazard is that it slightly increases the burning rate but does not cause spontaneous ignition with combustibles
  - Class 2
    - Causes a moderate increase in the burning rate or causes spontaneous ignition of combustibles

## NFPA 430

- Classification of Oxidizers
  - Typical Class 1
    - Calcium peroxide
    - Lead dioxide
    - Zinc oxide
  - Typical Class 2
    - Calcium chlorate
    - Potassium permanganate
    - Sodium peroxide

## NFPA 430

- Classification of Oxidizers (1-6) cont.
  - Class 3
    - Causes a severe increase in the burning rate of combustibles or will undergo vigorous self-sustained decomposition due to contamination or exposure to heat

## NFPA 430

- Classification of Oxidizers cont.
  - Typical Class 3
    - Hydrogen peroxide solutions > 52% to 91%
    - Nitric acid, fuming > 86%
    - Potassium bromate
    - Sodium chlorate

## NFPA 430

- Classification of Oxidizers (1-6) cont.
  - Class 4
    - Can undergo an explosive reaction due to contamination or exposure to thermal / physical shock, will enhance the burning rate and can cause spontaneous ignition of combustibles

## NFPA 430

- Classification of Oxidizers cont.
  - Typical Class 4
    - Ammonium permanganate
    - Hydrogen peroxide solutions > 91%
    - Tetranitromethane

## NFPA 430

- Storage Facilities (1-7)
  - Segregated
    - Storage in the same room or inside area, but physically separated by distance from incompatible materials
  - Cutoff
    - Storage in the same building or inside area but physically separated from incompatible materials by partitions or walls, or storage in a fixed tank

## NFPA 430

- Storage Facilities (1-7) cont.
  - Detached
    - Storage in either an open outside area or a separate building containing no incompatible materials & located away from all other structures

## NFPA 430

- Hazard Management
  - Emergency plans shall be prepared for each facility (2-1.2)
    - Plans shall be reviewed & training exercises shall be conducted at least annually with local emergency organizations
  - All storage areas containing oxidizers shall be conspicuously identified by the words "Class (appropriate classification #) Oxidizers" per 1-6 (2-2.1)

## NFPA 430

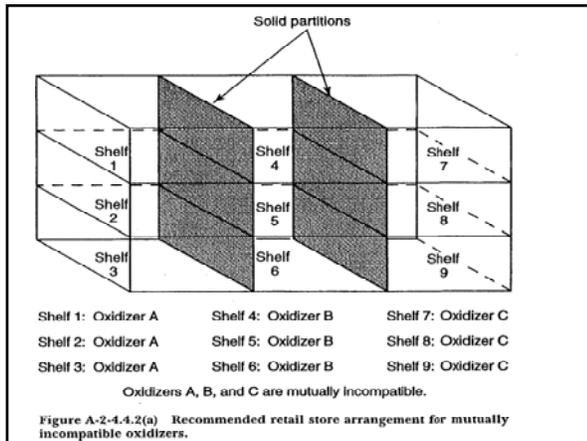
- Storage Arrangements
  - The arrangement & quantity of oxidizers in storage can deviate from the requirements of this standard where specially engineered fire prevention / protection systems acceptable to the AHJ are provided (2-4.1.1)

## NFPA 430

- Storage Arrangements cont.
  - Oxidizers shall be stored to avoid contact with
    - Ordinary combustibles
    - Combustible / flammable liquids
    - Greases
    - Materials promoting decomposition of oxidizers
  - These do not include approved packing materials, pallets, or other dunnage (2-4.2)
    - Except. Hydrogen peroxide (Classes 2 -4) stored in drums shall not be stored on wooden pallets

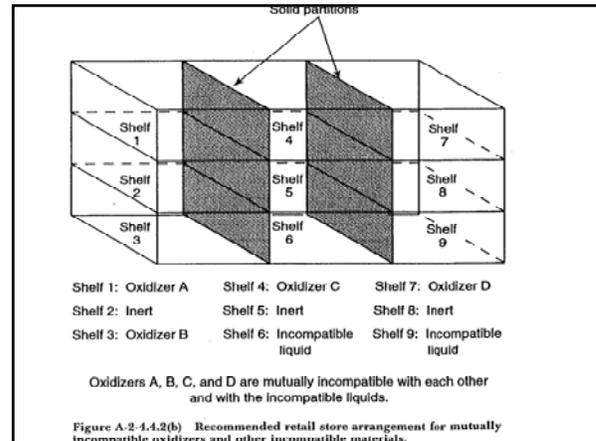
## NFPA 430

- Storage Arrangements cont.
  - Special care shall be taken to prevent any contamination of oxidizers in storage
  - Where oxidizers are stored in segregated warehouses with flammable liquids the oxidizers & flammable liquids shall be separated by at least 25 ft



## NFPA 430

- Retail Storage of Oxidizers (2-4.4)
  - Oxidizers in retail storage accessible to the public shall be arranged so that:
    - Shelves & vertical barriers shall be placed between incompatible materials and shall solid & noncomb.
    - Solid oxidizers shall not be stored directly beneath incompatible liquids
    - Storage no greater than 6 ft high
    - Total amount of all oxidizers 2 tons N/S, 4 tons sprinklered



## NFPA 430

- Smoking (2-9)
  - Smoking shall be prohibited in all storage areas containing oxidizers
  - No Smoking signs shall be placed conspicuously within all entrances to storage areas

## NFPA 430

- Fire Protection (2-11)
  - The need for automatic sprinkler protection is determined by:
    - Nature of the materials
    - Manner of storage
    - Building construction
  - Only wet pipe sprinkler systems shall be used to protect buildings or areas containing Class 2 or Class 3 oxidizers

## NFPA 430

- Housekeeping & Waste Disposal (2-13)
  - Accumulation of combustible waste in oxidizer storage area is prohibited
  - Spilled, leaking, broken oxidizer containers shall be removed immediately to a safe area to await proper disposal
  - Used, empty, combustible containers shall be stored in a detached or sprinklered area

## NFPA 430

- Class 1 Oxidizers
  - This chapter applies to storage of Class 1 where quantities exceed 4,000 lbs & Chp. 2 (3-1)
  - The storage of Class 1 oxidizers shall be segregated, cutoff or detached (3-2)
  - Class 1 oxidizers shall per stored per Tables 3-.2.2(a) & (b) (3-2.2)

430-8

STORAGE OF LIQUID ANI

**Table 3-2.2(a) Storage of Class 1 Oxidizers  
Nonsprinklered Building**

	Nonretail Establishment	Retail Establishment*
Building limit (tons)	200 (181 met ton)	15 (13.6 met ton)
Pile limit (tons)	20 (18 met ton)	2 (1.8 met ton)
Pile height (ft)	8 (2.4 m)	6 (1.8 m)
Pile width (ft)	16 (4.9 m)	8 (2.4 m)
Maximum distance from any container to a working aisle (ft)	8 (2.4 m)	4 (1.2 m)
Distance to next pile (ft)	** **	** **
Distance to wall (ft)	4 (1.2 m)	4 (1.2 m)
Distance to incompatible material (ft)	12 (3.7 m)	10 (3 m)

\*Totals in this column are for storage in those areas of a retail occupancy not accessible to the public, and separated from the sales display area by a minimum of 1-hr fire-resistive construction. For storage in retail sales display areas, see 2-4.4.  
\*\*Aisle width equal to pile height.

**Table 3-2.2(b) Storage of Class 1 Oxidizers  
Sprinklered Building\***

	Nonretail Establishment	Retail Establishment**
Building limit (tons)	2000 (1814 met ton)	30 (27 met ton)
Pile limit (tons)	200 (181 met ton)	4 (3.6 met ton)
Pile height (ft)	12 (3.7 m)	8 (2.4 m)
Pile width (ft)	24 (7.3 m)	12 (3.7 m)
Maximum distance from any container to a working aisle (ft)	12 (3.7 m)	6 (1.8 m)
Distance to next pile (ft)	*** **	*** **
Distance to wall (ft)	2 (0.6 m)	2 (0.6 m)
Distance to incompatible material (ft)	8 (2.4 m)	8 (2.4 m)

\*If the storage is to be considered sprinklered, see Section 3-3.  
\*\*Totals in this column are for storage in those areas of a retail occupancy not accessible to the public, and separated from the sales display area by a minimum of 1-hr fire-resistive construction. For storage in retail sales display areas, see 2-4.4.  
\*\*\*Aisle width equal to pile height.

## NFPA 430

- Class 1 Oxidizers cont.
  - The building limit in tons is permitted to be 4 times the quantities shown in Table 3-2.2(b) if all of the following are met:
    - Storage is cutoff or detached
    - Storage is located in nonretail occupancies
    - Noncombustible containers are used or buildings are noncombustible

## NFPA 430

- Class 2 Oxidizers
  - This chapter applies to Class 2 oxidizers where stored in quantities in excess of 1,000 lbs & Chp 2 (4-2)
  - Cutoff walls shall have a fire resistance rating of at least 1 hour (4-2.2)
  - Storage in accordance with Tables 4-2.3(a) & (b) (4-2.3)

## NFPA 430

- Class 2 Oxidizers cont.
  - The building limit in tons is permitted to be 4 times the quantities shown in Table 4-2.3(b) if all of the following are met (4-2.4):
    - Storage is cutoff or detached
    - Storage is located in nonretail occupancies
    - Noncombustible containers are used or buildings are noncombustible
  - Storage in basements prohibited (4-2.6)
    - Except. Where stored in fixed tanks

Table 4-4.1  
Sprinkler Protection for Class 2 Oxidizers

Type of Storage	Storage Height ft (m)	Density		Area of Application ft <sup>2</sup> (m <sup>2</sup> )	In-Rack Sprinklers
		gpm/ft <sup>2</sup> (L/min/m <sup>2</sup> )	(8)		
Palletized or	8 (2.4)	0.20	(8)	3750 (348)	
Bulk	12 (3.7)	0.35	(14)	3750 (348)	
Rack	12 (3.7)	0.20	(8)	3750 (348)	One line above each level of storage except the top level
	16 (4.9)	0.30	(12)	2000 (186)	

## NFPA 430

- Class 3 Oxidizers
  - This chapter applies to Class 3 oxidizers where stored in quantities in excess of 200 lbs & Chp 2 (5-1)
  - The storage shall be segregated, cutoff or detached (5-2.1)
  - Class 3 oxidizer storage shall be on the ground floor only (5-2.2)
  - Cutoff walls at least 2 hour rating
  - Storage per Tables 5-2.4(a) & (b) (5-2.4)

## NFPA 430

- Class 3 Oxidizers cont.
  - The building limit in tons is permitted to be 2 times the quantities shown in Table 5-2.4(b) if all of the following are met (5-2.5):
    - Storage is cutoff or detached
    - Storage is located in nonretail occupancies
    - Noncombustible containers are used or buildings are noncombustible

## NFPA 430

- Class 4 Oxidizers
  - This chapter applies to Class 4 oxidizers where stored in quantities in excess of 10 lbs & Chp 2 (6-1)
  - The storage of Class 4 oxidizers shall be detached (6-2.1)
  - Storage in glass carboys shall be 1 carboy high, drums, containers or cases shall not exceed Table 6-2.2 (6-2.2)

Table 6-2.2 Storage of Class 4 Oxidizers in Drums, Containers, Cases

	Nonsprinklered Building	Sprinklered Building
Piles		
Length (ft)	10 (3.0 m)	10 (3.0 m)
Width (ft)	4 (1.2 m)	4 (1.2 m)
Height (ft)	4 (1.2 m)	8 (2.4 m)
Distance to next pile (ft)	6 (1.8 m)	8 (2.4 m)
Quantity Limit per building (tons)	1 (0.9 met tons)	No Limit

**Table 6-3.4 Separation of Buildings, Tanks Containing Class 4 Oxidizers**

Weight of Class 4 Oxidizer		Distance	
(lb)	(kg)	(ft)	(m)
over 10 to 100	(4.5 to 45.4)	75	(23)
101 to 500	(45.8 to 227)	100	(30)
501 to 1,000	(227 to 454)	125	(38)
1,001 to 3,000	(454 to 1361)	200	(61)
3,001 to 5,000	(1361 to 2268)	300	(91)
5,001 to 10,000	(2268 to 4536)	400	(122)
over 10,000	(over 4536)	Subject to approval by the authority having jurisdiction.	

## Title 49 CFR

Part 107 Subpart B & Parts 171 through 178 inclusive & Part 180 as amended

## Haz Chem/Mat

CT State Building Code/Fire Safety Code

## Haz Chem/Mat & Codes

- Part III of CSFSC
  - How do we get from the Fire Safety Code to the Building Code?
  - How does the Building Code relate to Haz Mat / Chem?
  - Inspection of building built after 12/31/05

## Haz Chem/Mat & Codes

- Part III
  - High Hazard Group H (Sect. 202 p.33)
    - Includes a building/structure or part thereof that involves
      - Manufacturing
      - Processing
      - Generation
      - Storage
    - In quantities in excess of those found in
      - Table 307.7(1) & Table 307.7(2) of the SBC

307.8 - 307.9

USE AND OCCUPANCY CLASSIFICATION

[F] TABLE 307.7(2)  
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIAL POSING A HEALTH HAZARD<sup>a,b,c</sup>

MATERIAL	STORAGE <sup>d</sup>			USE-CLOSED SYSTEMS <sup>d</sup>			USE-OPEN SYSTEMS <sup>d</sup>	
	Solid pounds <sup>e,1</sup>	Liquid gallons (pounds) <sup>e,1</sup>	Gas (cubic feet at NTP) <sup>e</sup>	Solid pounds <sup>e</sup>	Liquid gallons (pounds) <sup>e</sup>	Gas (cubic feet at NTP) <sup>e</sup>	Solid pounds <sup>e</sup>	Liquid gallons (pounds) <sup>e</sup>
Corrosive	5,000	500	810 <sup>f,2</sup>	5,000	500	810 <sup>f,2</sup>	1,000	100
Highly toxic	10	(10) <sup>f</sup>	20 <sup>f</sup>	10	(10) <sup>f</sup>	20 <sup>f</sup>	3	(3) <sup>f</sup>
Toxic	500	(500) <sup>f</sup>	810 <sup>f</sup>	500	(500) <sup>f</sup>	810 <sup>f</sup>	125	(125) <sup>f</sup>

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307.7(1) (see commen-  
...s that be assigned to p-  
each relevant high-hazard  
For example, a material co-  
Class 2 oxidizer (Group H-  
H-4). If the given quantity e  
lowable quantity per control  
Class 2 oxidizer and a con-

## Haz Chem/Mat & Codes

- Table 307.7(1) & (2)
  - The max. quantities of high hazard materials allowed in each control area before having to classify as high-hazard occupancy
  - Table only contains materials applicable to H-1 to H-3
  - Table 307.7(2) applies to H-4

## Haz Chem/Mat & Codes

- Table 307.7(1) & (2)
  - The presence of any one or more of the materials listed in the tables in any greater amount than allowed requires the building or area containing that material be classified as high-hazard
  - If a building or area contain only materials listed in the tables in the max. amount per control area or less then that building/area would not be classified high-hazard

## Haz Chem/Mat & Codes

- Table 307.7(1)
  - Notable footnotes
    - d Max. allowable quantities shall be increased 100% in buildings equipped throughout with a fire sprinkler system per 903.3.1.1
    - e Max. allowable quantities shall be increased 100% when stored in approved storage cabinets, exhaust enclosures or safety cans

## Haz Chem/Mat & Codes

- Table 307.7(1) cont.
  - Foot notes
    - Where both d and e notes apply the increase shall be applied accumulatively
  - Example - A flammable solid in an Occupancy
    - Table 125 lbs
    - H-3 125+ lbs
    - Sprinkler or cabinet + 100% 250lbs
    - Both sprinkler & cabinet + 100% 500lbs
    - H-3 500+lbs

## Haz Chem/Mat & Codes

- Part III cont.
  - Exception
    - Occupancies as provided in the SBC shall not be classified as Group H but as the occupancy which they nearly resemble

## Haz Chem/Mat & Codes

- Part III cont.
  - Control Area
    - Spaces in a building enclosed by exterior walls, fire walls, fire barriers & roofs, where quantities of haz mat NOT exceeding the max. allowable quantities per control area are
      - Stored
      - Dispensed
      - Used
      - Handled

## Haz Chem/Mat & Codes

- Part III cont.
  - Group H-1
    - Buildings/structures containing materials that can detonate
  - Group H-2
    - Building/structures containing materials that can deflagrate

## Haz Chem/Mat & Codes

- Part III cont.
  - Group H-3
    - Buildings/structures containing materials that readily support combustion
  - Group H-4
    - Buildings/structures containing materials that are health hazards
  - Group H-5
    - Semiconductor fabrication & research and development containing certain haz mat

## Haz Chem/Mat & Codes

- Part III cont.
  - Section 401.14 CSFSC sends you to the following sections of the SBC:
    - Section 414 – Hazardous Materials
    - Section 415 – Groups H-1 through H-5

## Haz Chem/Mat & Codes

- Section 414
  - Control Areas (414.2.)
    - Construction requirements
    - Number
      - Table 414.2.2
    - Separation
    - Haz mat in Group M display & storage areas in Group S storage areas

[F] TABLE 414.2.2  
DESIGN AND NUMBER OF CONTROL AREAS

FLOOR LEVEL	PERCENTAGE OF THE MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA <sup>a</sup>	NUMBER OF CONTROL AREAS PER FLOOR <sup>b</sup>	FIRE-RESISTANCE RATING FOR FIRE BARRIERS IN HOURS <sup>c</sup>	
Above grade	Higher than 9	5	1	2
	7-9	5	2	2
	6	12.5	2	2
	5	12.5	2	2
	4	12.5	2	2
	3	50	2	1
	2	75	3	1
Below grade	1	100	4	1
	1	75	3	1
	2	50	2	1
Lower than 2	Not Allowed	Not Allowed	Not Allowed	

- a. Percentages shall be of the maximum allowable quantity per control area shown in Tables 307.7(1) and 307.7(2), with all increases allowed in the notes to those tables.
- b. There shall be a maximum of two control areas per floor in Group M occupancies and in buildings or portions of buildings having Group S occupancies with storage conditions and quantities in accordance with Section 414.2.4.
- c. Fire barriers shall include walls and floors as necessary to provide separation from other portions of the building.

## Haz Chem/Mat & Codes

- Section 414
  - Haz mat in Group M displays & storage areas and in Group S storage areas (414.2.4)
    - The aggregate quantity of nonflammable solid/liquid
    - Permitted in a single control area of a Group M or S or an outdoor control area
    - Permitted to exceed max. amt. in Tables 307.7 (1)&(2)
    - Without becoming a Group H
    - When quantities do not exceed Table 414.2.4

TABLE 307.7(1)  
 MAXIMUM ALLOWABLE QUANTITIES (MAQ) FOR STORAGE AND DISPENSING OF HAZARDOUS MATERIALS IN AREAS OF OCCUPANCY  
 HAZARDOUS MATERIALS GROUPS AND HAZARD RATES OF HAZARDOUS MATERIALS

HAZARDOUS MATERIALS GROUP	HAZARD RATE	MAQ (LBS)	MAQ (KG)
A. Flammable (except flammable solids and liquids)	1.1	10,000	4,536
	1.2	5,000	2,268
B. Health hazard	2.1	5,000	2,268
	2.2	1,000	454
C. Toxic	3.1	1,000	454
	3.2	500	227
D. Flammable (except flammable solids and liquids)	4.1	10,000	4,536
	4.2	5,000	2,268
E. Health hazard	5.1	5,000	2,268
	5.2	1,000	454
F. Toxic	6.1	1,000	454
	6.2	500	227

## Haz Chem/Mat & Codes

- Section 414
  - Haz Mat Systems (414.4)
  - Inside storage, dispensing & use (414.5)
    - Haz mat quantities in excess of Tables 307.7(1) & 307.7(2) per control area shall be in accordance with sections 414.5.1 through 414.5.5 & IFC

## Haz Chem/Mat & Codes

- Section 414 cont.
  - 414.5.1 Explosion control
  - 414.5.2 Monitor control equipment
  - 414.5.3 Automatic fire detection systems
  - 414.5.4 Standby / emergency power
  - 414.5.5 Spill control, drainage & containment

## Haz Chem/Mat & Codes

- Section 414 cont.
  - Outdoor storage, dispensing & use (414.6)
  - Emergency alarms (414.7)

## Haz Chem/Mat & Codes

- Section 415 Groups H-1 through H-5
  - 415.1 Scope
  - 415.2 Definitions
  - 415.3 Location on property
  - 415.4 Special provisions H-1
  - 415.5 Special provisions H-2 & H-3
  - 415.6 Smoke & heat venting

## Haz Chem/Mat & Codes

- Section 415 cont.
  - 415.7 Group H-2
  - 415.8 Group H-3 & H-4
  - 415.9 Group H-5

### CGS 29-307a

- Haz Mat in Manufacturing Establishments
  - Notice to local fire marshal
  - Penalty
  - Distribution of information

### CGS 29-307a

- Employer
  - A person engaged in the operation of a manufacturing establishment who has employees
  - Does not mean the state or any political subdivision

### CGS 29-307a

- Haz Mat means
  - (A) has been identified by the DOT as a hazardous material in the Federal Regulations, Title 49, Part 172, Subpart B, section 172.101 and
  - (B) meets the definitional requirements of the hazardous classes established for such haz mat in the CFR Title 49, Part 173, Subparts C to J inclusive

### CGS 29-307a

- Manufacturing establishment
  - Means a business so designed
  - By North American Industry Classification System
    - Sector 31
    - Sector 32
    - Sector 33

### Manufacturing Survey

- Each employer who uses, keeps, stores or produces any haz mat in their manufacturing establishment shall
- Within 30 days, provide the LFM where the establishment is located with notice
- In writing of the presence or elimination of any haz mat in his establishment

### Manufacturing Survey

- The notification shall include, but not limited to the following:
  - 1. The name of the hazardous material
  - 2. It's federal DOT identification # and designated hazardous class
  - 3. The maximum inventory quantity on site
  - 4. The units of measure
  - 5. The location in the establishment where it can normally be found

## Manufacturing Survey

- Upon receipt of any notification required under the provisions of subsection (b)
- The LFM shall distribute the information contained in such notice
- To the persons providing fire protection in each town, city or borough under his jurisdiction

## Manufacturing Survey

- Notwithstanding the provisions of section 1-19, the LFM or any firefighter shall maintain the confidentiality and not disclose such information to any person
- Any LFM or firefighter found to have disclosed such information in violation of this subsection shall have committed an infraction