

Hazardous Occupancies Plan Review and Inspection
Spring 2019 Career Development Series

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What is a *hazard*?

- Condition that may result in an accident
- Condition that produces a risk

What is *hazardous*?

- Conditions that may result in injury or illness
- Something that can hurt you or cause you to be hurt
- Caused by - Materials, substances, reactions, processes, storage, interactions, relationships



What is *hurt*?

- Physical
 - Kinetic (Blunt force) trauma
 - Falls, cuts, impacts, asphyxia, immobility to escape
 - Caused by fire, explosion, collapse, collision, forces
- Health
 - Medical, physiological
 - Absorption, ingestion, inhalation, infection, exposure
 - Caused by chemicals, poisons, toxins, radiation, temperature
- Emotional/Psychological
 - Feelings
 - Stress
 - I'm offended that you are offended that I offended you after you offended me.
 - Not going there – too much like work, politics, and relationships

Says who?

- Lots of agencies
 - Environmental Protection (DEEP)
 - Labor (DOL)
 - Health (DPH)
 - Transportation (DOT)
 - Public Safety (DESPP)
 - Miscellaneous Small Agencies (DAS)
- Federal Government
- Standards making organizations (ICC, NFPA)

What do they say?

- Environmental Protection
 - Definitions
 - Storage
 - Contamination
 - Waste
 - Disposal
 - Reporting
 - Notification



What do they say?

- Labor
 - Workplace
 - Health and welfare of workers
 - Occupational Safety and Health (OSHA)

What do they say?

- Health (DPH)
 - Exposure
 - Toxicity
 - Illness

What do they say?

- Transportation
 - Classification
 - Movement
 - When its moving on land, sea, air, or pipe, it's theirs
 - When its stops, it's yours



What do they say?

- Public Safety (DESPP)
 - Explosives
 - Fireworks

What do they say?

- Standards making organizations
 - Model Codes
 - Standards

What do they say?

- OSBI/OSFM
 - Building Code
 - Fire Code
 - Fire Prevention Code



Operative Code Issues

Hazardous Conditions
Hazardous Materials
Hazardous Operations
Production
Storage
Transportation
Quantities

What is *hazardous*?

• By physical properties

- Substance
- Physical form/Phase
- Temperature
- Weight/Size
- Arrangement
- Interaction/Reaction,

What is *hazardous*?

• By combustion/chemical properties

- Fire triangle :
 - Fuel – flammability, heat release rate, amount, arrangement
 - Oxidizer – reaction rate
 - Heat - reactions, processes



What is *hazardous*?

- By health properties
 - Toxicity

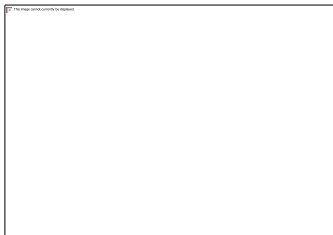
What is *hazardous*?

- By NFPA 704 classification



What is *hazardous*?

Per NFPA





What is *hazardous*?

- By statutes and regulations
 - 29–306 concerns
 - Statutory definitions
 - Exits
 - Rapid fire growth

What is *hazardous*?

- By interpretation and objective
 - Gunshot wound or acute lead overdose?
 - Water – vital substance (too little) or asphyxiant in drowning (too much)?
 - Ammonium nitrate – agricultural fertilizer or explosive?

What is *hazardous*?

- Anything can be Hazardous
 - Heavy object can be dropped
 - Objects can have sharp edges
 - Falls from heights
 - Papercuts
 - Blunt force – pinch, crush, asphyxiate



What is *hazardous*?

Per CGS

- Chemical liquid

What is *hazardous*?

Per CGS

- Hazardous waste
 - Any waste material which may pose a present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of or otherwise managed
 - Including hazardous waste identified in accordance with Section 3001 of the Resource Conservation and Recovery Act of 1976, 42 USC 6901 et seq

What is *hazardous*?

Per CGS

- Oil or petroleum
 - Oil or petroleum of any kind or in any form
 - including, but not limited to:
 - waste oils and distillation products such as –
 - fuel oil, kerosene, naphtha, gasoline and benzene, or their vapors



What is *hazardous*?

Per CGS

- Waste oil or solid
 - Oil having a flash point at or above 140° Fahrenheit (60° Centigrade)
 - No longer suitable for the services for which it was manufactured due to the presence of impurities or a loss of original properties
 - including, but not limited to –
 - crude oil, fuel oil, lubricating oil, kerosene, diesel fuels, cutting oil,
 - emulsions, hydraulic oils, polychlorinated biphenyls and other halogenated oils
 - discarded as waste or recovered from oil separators, oil spills, tank bottoms or other sources

What is *hazardous*?

Per CGS

- Hazardous chemicals
 - (a) Any materials that are
 - highly flammable or
 - may react to cause fires or explosions, or
 - by their presence create or augment a fire or explosion hazard, or
 - because of their toxicity, flammability or liability to explosion render fire fighting abnormally dangerous or difficult;

What is *hazardous*?

Per CGS

- Hazardous chemicals
 - (c) Such materials as
 - compressed gases, liquefied gases,
 - flammable solids,
 - corrosive liquids,
 - oxidizing materials,
 - potentially explosive chemicals,
 - highly toxic materials and poisonous gases;



What is *hazardous*?

Per CGS

- Potentially explosive chemical
 - Any chemical substance, other than one classified as an explosive, which can be exploded by heat or shock when it is unconfined and unmixed with air or other materials
 - Picric acid

What is *hazardous*?

Per DoT



- **Class 1 - Explosives**
 - Division 1.1 Explosives with a mass explosion hazard
 - Division 1.2 Explosives with a projection hazard
 - Division 1.3 Explosives with predominantly a fire hazard
 - Division 1.4 Explosives with no significant blast hazard
 - Division 1.5 Very insensitive explosives with a mass explosion hazard
 - Division 1.6 Extremely insensitive articles





What is *hazardous*?

Per CGS




- Compressed gas
 - Any mixture or material having in the container either
 - An absolute pressure exceeding 40 psi at 70° Fahrenheit, or
 - An absolute pressure exceeding 104 psi at 130° Fahrenheit, or both,
 - Any liquid flammable material having a vapor pressure exceeding 40 psi at 100° Fahrenheit;



What is *hazardous*?
Per DoT




- **Class 2 - Gases**
 - Division 2.1 Flammable gases
 - Division 2.2 Non-flammable, non-toxic* gases
 - Division 2.3 Toxic* gases





What is *hazardous*?
Per CGS

- **Hazardous chemicals**
 - (b) Flammable liquids that are
 - chemically unstable and
 - may spontaneously form explosive compounds, or
 - undergo spontaneous reactions of explosive violence, or
 - with sufficient evolution of heat to be a fire hazard

What is *hazardous*?
Per DoT



- **Class 3 - Flammable liquids (and Combustible liquids [U.S.]**





What is *hazardous*?

Per CGS

- Flammable solid
 - A solid substance, other than one classified as an explosive, that is liable to cause fires through
 - friction,
 - absorption of moisture,
 - spontaneous chemical changes or
 - as a result of retained heat from manufacturing or processing;

What is *hazardous*?

Per DoT

- **Class 4 - Flammable solids; Spontaneously combustible materials; and**
- **Dangerous when wet materials/Water-reactive substances**
 - Division 4.1 Flammable solids
 - Division 4.2 Spontaneously combustible materials
 - Division 4.3 Water-reactive substances/Dangerous when wet materials





What is *hazardous*?

Per CGS

- Oxidizing materials
 - Substances that yield oxygen readily to stimulate combustion;
 - Such as chlorates, permanganates, peroxides or nitrates



What is *hazardous*?
Per DoT





- **Class 5 - Oxidizing substances and Organic peroxides**
 - Division 5.1 Oxidizing substances
 - Division 5.2 Organic peroxides

What is *hazardous*?
Per CGS

- **Highly toxic materials**
 - Materials so toxic to man as to afford an unusual hazard to life and health during firefighting operations
 - Including parathion, malathion, TEPP (tetraethyl phosphite), HETP (hexaethyl tetraphosphate), and similar insecticides and pesticides;

What is *hazardous*?
Per DoT

- **Class 6 - Toxic* substances and Infectious substances**
 - Division 6.1 Toxic*substances
 - Division 6.2 Infectious substances (DPH)
 - * The words "poison" or "poisonous" are synonymous with the word "toxic".



What is *hazardous*?

Per CGS

- **Poisonous gas**
 - Any noxious gas of such nature that a small amount of the gas when mixed with air is dangerous to life
 - Examples including chlorpicrin, cyanogen, hydrogen cyanide, nitrogen peroxide and phosgene

What is *hazardous*?

Per DoT

- **Class 7 - Radioactive materials**



What is *hazardous*?

Per CGS

- **Corrosive liquids**
 - Those acids, alkaline caustic liquids and other corrosive liquids that,
 - when in contact with living tissue,
 - will cause severe damage of such tissue by chemical action or
 - are liable to cause fire when in contact with organic matter or with certain chemicals;



What is *hazardous*?

Per DoT

- **Class 8 - Corrosive substances**



What is *hazardous*?

Per CGS

- **Solid, liquid or gaseous products**
 - Any substance or material including, but not limited to,
 - Hazardous chemicals,
 - Flammable liquids,
 - Explosives as defined in section 29-343,
 - Liquefied petroleum gas, as defined in section 43-36,
 - Hazardous materials designated per HazMat Transportation Act, 49 USC 1801 et. seq.
 - Hazardous substances designated per Sec 311 of the federal Water Pollution Control Act

What is *hazardous*?

Per DoT

- **Class 9 - Miscellaneous hazardous materials/Products, Substances or Organisms**





CT Mandates for Compliance

- Sec. 22a-607. Notification by owner or operator of facility subject to requirements of Emergency Planning and Community Right-to-Know Act
 - Owner or operator of each facility
 - Substance on the list of extremely hazardous substances
 - Amount in excess of the threshold planning quantity
 - List is revised

CT Mandates for Compliance

- Sec. 22a-609. Submission of material safety data (MSDS) for certain chemicals.
- (a) Owner or operator of any facility
 - Material safety data sheet for a hazardous chemical
 - Amount equal to or in excess of the minimum threshold level
 - Submit a material safety data sheet for each such chemical to the appropriate local emergency planning committee

CT Mandates for Compliance

- Sec. 22a-609. Submission of material safety data for certain chemicals.
- (b) Local emergency planning committee upon request of any person, shall make available the material safety data sheet to the person.



CT Mandates for Compliance

- Sec. 22a-609. Submission of material safety data for certain chemicals.
- (c) Exceptions
 - (1) Food, food additive, color additive, drug or cosmetic regulated by the FDA,
 - (2) Solid substance where exposure does not occur under normal use
 - (3) Substance used for personal, family or household purposes or product packaged for distribution and use by the general public,
 - (4) Substance used in a research laboratory or a hospital or other medical facility
 - (5) Substance used in routine agricultural operation or is a fertilizer

CT Mandates for Compliance

- Sec. 22a-610. Preparation of emergency and hazardous chemical inventory form
 - Tier I and Tier II information
 - Inspection of facility by fire department.
 - Hazardous mitigation and evacuation plans
 - Community notification and emergency evacuation

CT Mandates for Compliance

- Sec. 22a-610. Preparation of emergency and hazardous chemical inventory form
 - (1) "Tier I information"
 - (A) Estimate of the maximum amount of hazardous chemicals,
 - (B) Estimate of the average daily amount of hazardous chemicals
 - (C) General location of hazardous chemicals



CT Mandates for Compliance

- Sec. 22a-610. (a) As used in this section:
 - (2) "Tier II information"
 - (A) Chemical or common name of the chemical as on the MSDS,
 - (B) Estimate of the maximum amount of the hazardous chemicals present,
 - (C) Estimate of the average daily amount of the hazardous chemicals present,
 - (D) Brief description of the manner of storage of the hazardous chemicals,
 - (E) Location at the facility of the hazardous chemicals and
 - (F) Withheld location information of a specific chemical from disclosure.

CT Mandates for Compliance

- Sec. 22a-610. (a) As used in this section:
 - (3) "Hazardous chemical" means a chemical for which a material safety data sheet is required under
 - the Occupational Safety and Health Act of 1970 (15 USC 651 et seq.) or
 - a chemical on a list required to be filed under section 22a-609.

CT Mandates for Compliance

- Sec. 22a-610. (a) As used in this section:
 - (2) Any state or municipal official may have access to Tier II information



CT Mandates for Compliance

- Sec. 29-306 Abatement of fire hazards: Order to remove or remedy
 - (a) When the local fire marshal ascertains that there exists in any building, or upon any premises
 - (1) combustible or explosive matter,
 - dangerous accumulation of rubbish or
 - any flammable material especially liable to fire,
 - so situated as to endanger life or property,

CT Mandates for Compliance

- Sec. 29-306 Abatement of fire hazards: Order to remove or remedy
 - (a) When the local fire marshal ascertains that there exists in any building, or upon any premises,
 - (2) obstructions or conditions that present a fire hazard to the occupants or
 - interfere with their egress in case of fire, or

CT Mandates for Compliance

- Sec. 29-306 Abatement of fire hazards: Order to remove or remedy
 - (a) When the local fire marshal ascertains that there exists in any building, or upon any premises,
 - (3) a condition in violation of the statutes relating to fire prevention or safety, or
 - any regulation made pursuant thereto,
 - the remedy of which requires construction or a change in structure,
 - local fire marshal shall order such materials to be immediately removed or
 - the conditions remedied by the owner or occupant of such building or premises
 - Any such removal or remedy shall be in conformance with all building codes, ordinances, rules and regulations of the municipality involved.



CT Mandates for Compliance

- Sec. 29-306 Abatement of fire hazards: Notification of officials; order to vacate; review by State Fire Marshal
 - (b) Upon failure of an owner or occupant to abate a hazard or remedy a condition pursuant to subsection (a) of this section within a reasonable period of time as specified by the local FM
 - such local fire marshal shall promptly notify in writing the prosecuting attorney having jurisdiction in the municipality in which such hazard exists, and
 - such official shall promptly take such action as the facts may require

CT Mandates for Compliance

- Sec. 29-306 Abatement of fire hazards: Notification of officials; order to vacate; review by State Fire Marshal
 - The local fire marshal may request the chief executive officer or any official of the municipality authorized to institute actions on behalf of the municipality in which the hazard exists
 - or the State Fire Marshal, for the purpose of closing or restricting from public service or use such place or premises until such hazard has been remedied,
 - to apply to any court of equitable jurisdiction for an injunction against such owner or occupant

CT Mandates for Compliance

- Sec. 29-306 Abatement of fire hazards:
 - (c) If the local fire marshal or a local police officer determines that there exists in a building a risk of death or injury from
 - (1) Blocked, insufficient or impeded egress,
 - (2) Failure to maintain or the shutting off of any required fire protection or fire warning system,
 - (3) Storage of any flammable or explosive material without a permit or in quantities in excess of any allowable limits,
 - (4) Use of any firework or pyrotechnic device without a permit, or
 - (5) Exceeding the occupancy limit



CT Mandates for Compliance

- Sec. 29-307 Fire hazards in manufacturing establishments.
 - Any building, structure or premises used in manufacturing,
 - Dangerous accumulations of rubbish or flammable materials especially liable to fire
 - Situated as to endanger life or property, or
 - Obstructions that interfere with the egress of the occupants in case of fire, or
 - Any condition in violation of the statutes relating to fire prevention or safety in manufacturing establishments
 - Fire Marshal shall order such materials to be removed or the conditions to be remedied by the owner or occupants of such building or premises

CT Mandates for Compliance

- Sec. 29-307a. Hazardous materials in manufacturing establishments
 - (1) "Employer" - person engaged in operation of manufacturing establishment who has employees
 - (2) "Hazardous material" - any substance or material identified as a hazardous material and
 - (3) "Manufacturing establishment" - business so designated in Sector 31, 32 or 33 of the North American Industry Classification System.
 - (b) Each employer shall report presence any hazardous material
 - (c) Fire marshal shall distribute the information

CT Mandates for Compliance

- Sec. 29-307b. Notice to water companies of the presence or elimination of hazardous material



CT Mandates for Compliance

- Sec. 29-310
 - (a) Investigation of origin of fires or explosions
 - (b) Order to remove combustible material or remedy flammable condition or fire hazard.

Code Compliance

- Building Official
 - Building Code
 - In buildings
- Fire Marshal
 - Fire Safety Code
 - Indoors
 - Outdoors
 - Fire Prevention Code
 - Everywhere except in-transit

Additional ICC Definitions

- CEILING LIMIT
- EXHAUSTED ENCLOSURE
- HIGHLY VOLATILE LIQUID
- IMMEDIATELY DANGEROUS TO LIFE AND HEALTH (IDLH)
- IRRITANT



Additional ICC Definitions

- MATERIAL SAFETY DATA SHEET (MSDS).
- MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA
- OUTDOOR CONTROL AREA
- PERMISSIBLE EXPOSURE LIMIT (PEL)

Additional ICC Definitions

- PHYSIOLOGICAL WARNING THRESHOLD
- SOLVENT OR LIQUID CLASSIFICATIONS
- SPRAY BOOTH / ROOM
- STORAGE, HAZARDOUS MATERIALS

Occupancies that can be hazardous

- Any
- All



Occupancies expected to be hazardous

- M – Mercantile
 - F – Factory
 - S – Storage
- H - Hazardous

When does an occupancy become hazardous?

- Mercantile Group M
 - Building or structure or a portion thereof for the display and sale of merchandise, and
 - involves stocks of **goods, wares or merchandise** incidental to such purposes
 - accessible to the public.
- Has accessory areas

When does an occupancy become hazardous?

Accessory storage spaces

- A room or space used for storage purposes less than 100 square ft in area
- accessory to another occupancy
- classified as part of that occupancy
- aggregate area of such rooms or spaces shall not exceed the allowable area limits of Section 508.2 of the *International Building Code*.



When does an occupancy become hazardous?

- Storage Group S
 - Use of a building or structure, or a portion thereof for storage that is not classified as a hazardous occupancy
 - Moderate-hazard storage, Group S-1
 - Buildings occupied for storage uses that are not classified as Group S-2
 - Low-hazard storage, Group S-2
 - Buildings used for the storage of noncombustible materials

When does an occupancy become hazardous?

- Factory Industrial Group F
 - Building or structure, or a portion thereof
 - for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations
 - not classified as Group H high-hazard or Group S storage occupancy

Factory Industrial F-1 Moderate-hazard occupancy
 Factory industrial uses that are not classified as Factory Industrial F-2 Low Hazard shall be classified as F-1 Moderate Hazard:

Factory Industrial F-2 Low-hazard Occupancy
 Factory industrial uses involving the fabrication or manufacturing of noncombustible materials that, during finishing, packaging or processing do not involve a significant fire hazard:

When does an occupancy become hazardous?

High-hazard Group H-1

- Buildings and structures containing materials that pose a *detonation* hazard
- Such materials shall include, but not be limited to, the following:
 - Detonable pyrophoric materials
 - Explosives:
 - Division 1.1
 - Division 1.2
 - Division 1.3
 - Division 1.4
 - Division 1.5
 - Division 1.6
 - Organic peroxides, unclassified detonable
 - Oxidizers, Class 4
 - Unstable (reactive) materials, Class 3 detonable, and Class 4



When does an occupancy become hazardous?

- Occupancies containing explosives not classified as H-1
 - Occupancies containing explosive materials shall be classified as follows:
 - 1. Division 1.3 explosive materials that are a mass fire hazard or explosion hazard shall be allowed in Group H-2 occupancies
 - 2. Articles, including articles packaged for shipment, that do not propagate a *detonation* or deflagration between articles shall be allowed in H-3 occupancies.

When does an occupancy become hazardous?

- High-hazard Group H-2
 - Buildings and structures containing materials that pose a *deflagration* hazard or
 - a hazard from accelerated burning
 - Materials shall include, but not be limited to, the following:
 - Class I, II or IIIA flammable or *combustible liquids* used or stored in normally open or closed containers or systems, pressurized at more than 15 psig
 - *Combustible dusts* where manufactured, generated or used in such concentration and conditions that create a fire or explosion hazard per information prepared in IBC Section 4.14.1.3
 - *Cryogenic fluids*, flammable
 - Flammable gases

When does an occupancy become hazardous?

- High-hazard Group H-2
 - Buildings and structures containing materials that pose a *deflagration* hazard or
 - a hazard from accelerated burning
 - Materials shall include, but not be limited to, the following:
 - Organic peroxides, Class 1
 - Oxidizers, Class 3, that are used or stored in normally open or closed containers or systems pressurized at more than 15 psig
 - Pyrophoric liquids, solids and gases, nondetonable
 - Unstable (reactive) materials, Class 3, nondetonable
 - Water-reactive materials, Class 3



When does an occupancy become hazardous?

- High-hazard Group H-3
 - Buildings and structures containing materials that
 - readily support combustion or
 - pose a *physical hazard*
 - include, but not be limited to, the following:
 - Class I, II or IIIA flammable or combustible liquids used or stored in normally closed containers or systems pressurized at 15 psig
 - Combustible fibers, other than densely packed baled cotton, where manufactured, generated or used that the concentration and conditions create a fire or explosion hazard per IBC Section 414.1.3
 - Consumer fireworks, 1.4G (Class C, Common)

When does an occupancy become hazardous?

- High-hazard Group H-3
 - Buildings and structures containing materials that
 - readily support combustion or
 - pose a *physical hazard*
 - include, but not be limited to, the following:
 - *Cryogenic fluids*, oxidizing
 - Flammable solids
 - Organic peroxides, Class II and III
 - Unstable (reactive) materials, Class 2
 - Water-reactive materials, Class 2

When does an occupancy become hazardous?

- High-hazard Group H-3
 - Buildings and structures containing materials that
 - readily support combustion or
 - pose a *physical hazard*
 - include, but not be limited to, the following:
 - Oxidizers, Class 2
 - Oxidizers, Class 3, used or stored in normally closed containers or systems pressurized at 15 psig or less
 - Oxidizing gases



When does an occupancy become hazardous?

- High-hazard Group H-4
 - Buildings and structures containing materials that are *health hazards*
 - include, but not be limited to, the following:
 - Corrosives
 - Highly toxic materials
 - Toxic materials

When does an occupancy become hazardous?

- High-hazard Group H-5
 - Semiconductor fabrication facilities
 - comparable research and development areas in which
 - hazardous production materials (HPM) are used and
 - the aggregate quantity of materials is in excess of those listed in Tables 5003.1.1(1) 307.1(1) and 5003.1.1(2) 307.1(2)
 - Facilities and areas shall be designed and constructed per IBC Section 415.11

When does an occupancy become hazardous?

- Multiple hazards.
 - Buildings and structures containing a material or materials representing hazards that are classified in one or more of Groups H-1, H-2, H-3 and H-4 shall conform to the code requirements for each of the occupancies so classified.
 - Note – not repeated in IFC



Control Area Tables

IBC tables 307 and IFC tables 5003 are the same

(F) TABLE 307.103
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIAL POSING A HEALTH HAZARD⁽¹⁾⁽²⁾⁽³⁾

MATERIAL	STORAGE ⁽⁴⁾			VULNERABLE SYSTEM ⁽⁵⁾			VULNERABLE SYSTEM ⁽⁶⁾	
	Basic (pounds) ⁽⁷⁾	Liquid gallons (pounds) ⁽⁸⁾	One cubic foot of HFP (pounds) ⁽⁹⁾	Basic (pounds)	Liquid gallons (pounds)	One cubic foot of HFP (pounds)	Basic (pounds)	Liquid gallons (pounds)
Composites	5,000	500	Composites 10P Liquefied (10)	5,000	500	Composites 10P Liquefied (10)	1,000	100
Highly Toxic	10	(10)	Composites 20P Liquefied (4)	10	(10)	Composites 20P Liquefied (4)	3	(3)
Toxic	500	(500)	Composites 10P Liquefied (10)	500	(500)	Composites 10P Liquefied (10)	125	(125)

Building/Fire Code Application

414 Hazardous Materials

- 414.1 General
 - 414.1.3 Information required as amended,

Building/Fire Code Application

414 Hazardous Materials

- 414.2 Control Areas
 - 414.2.1 Construction requirements
 - 414.2.2 Percentage of maximal allowable quantities
 - 414.2.3 Number
 - 414.2.4 Fire resistance rated requirements
 - 414.2.5 Group M display and storage and Group S storage



Building/Fire Code Application

414 Hazardous Materials

- Mechanical and operational requirements
 - 414.3 Ventilation
 - 414.4 Hazardous material systems
 - 414.5 Inside storage dispensing and use
 - 414.6 Outdoor storage dispensing and use

Building/Fire Code Application

415 Group H

- 415.1 Control areas per 307.1 (IFC gateway to IBC)
- 415.2 Definitions

Building/Fire Code Application

415 Group H

- Fire protection requirements
 - 415.3 Automatic fire detection
 - 415.4 Automatic sprinkler systems
 - 415.5 Emergency alarms
 - 415.6 Separation distances



Building/Fire Code Application

415 Group H

- Subgroup Requirements

- 415.7 Group H-1
- 415.8 Groups H-2 and H-3
- 415.9 Group H-2
- 415.10 Groups H-3 and H-4
- 415.11 Group H-5

Fire Prevention Code Application

Processes

- Chapter 40 Dust explosion and fire prevention
- Chapter 41 Welding and cutting and other hotwork
- Chapter 42 Refueling
- Chapter 43 Spraying, dipping and coating using flammable or combustible materials
- Chapter 44 Solvent extraction (dope)
- Chapter 45 Combustible fibers

Fire Prevention Code Application

Substances

- Chapter 60 Hazardous materials
- Chapter 61 Aerosol products
- Chapter 63 Compressed gases and cryogenic fluid
- Chapter 64 Corrosive solids and liquids
- Chapter 65 Explosives, fireworks, and model rocketry
- Chapter 66 Flammable and combustible liquids
- Chapter 67 Flammable solids
- Chapter 68 Highly toxic and toxic solids and liquids
- Chapter 69 Liquefied petroleum gases and liquefied natural gases



Fire Prevention Code Application

Substances

- Chapter 70 Oxidizer solids and liquids
- Chapter 71 Pyrophoric solids and liquids
- Chapter 72 Unstable reactive solids and liquids
- Chapter 73 Water reactive solids and liquids
- Chapter 74 Ammonium nitrate
- Chapter 75 Organic peroxide solids and liquids

Fire Prevention Code Application

Substances

- 20.15.5 Storage, arrangement, protection, and quantities of hazardous commodities
 - NFPA 13
 - NFPA 30
 - NFPA 30B
 - NFPA 400

Case Study

Plan Review

- 1st Step - Building & fire code issues
 - Structure,
 - Exiting,
 - Systems



Case Study Plan Review

- 2nd Step - Materials and substances in use, amounts, processes
 - Flammability,
 - Reactivity,
 - Health (Note NFPA 704 for reference)

Case Study Plan Review

- 3rd Step - Classification or reclassification of occupancy
 - (F to H, or S to H)

Case Study Plan Review

- 4th Step - Chapter 4 Section 414, potentially Section 415
 - IFC Process hazard chapters
 - FPC Substance hazard chapters
 - FPC Section 20.15.5
 - Referenced standards



Case Study

- Plan Review Indicators
 - Storage bins
 - Laboratories
 - Process machinery and conveyance
 - Structures
 - Drainage and curbing

Case Study

- Plan Review Indicators
 - Incompatible materials
 - Phase change processes
 - Regulated substances
 - Toxins, poisons, radioactives, gases, liquids, dust

Case Study

- Control Area Quantities
 - Storage
 - Mixing
 - Packaging
- Indoor versus outdoor control areas



Case Study

- Hazards
 - Dust
 - Process solvents and lubricants
 - Static Electricity

Case Study

- Design Notes
 - Architect notes and labels
 - Engineer designs (particularly mechanical)
 - Chemical and Safety Consultant evaluations
 - Facility Representative

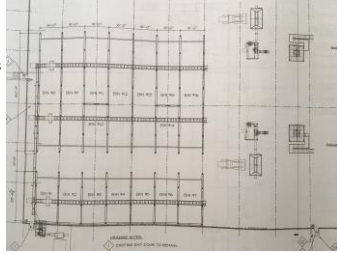
Case Study

- Addressing issues
 - One by one
 - Process of ruling out by elimination



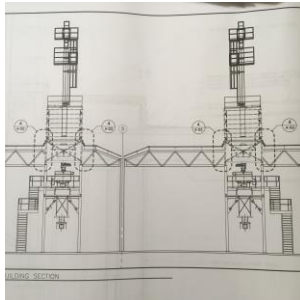
Case Study
Observations

- Bin storage of bulk materials
- Processing machinery
- Conveyors
- Hoppers
- Bucket loaders



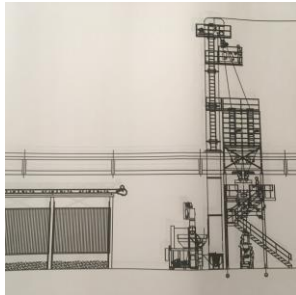
Case Study
Observations

- Mixing towers
- Separators
- Silos



Case Study
Observations

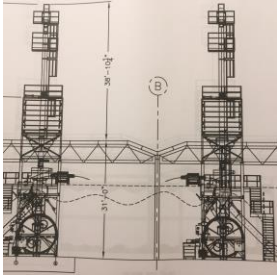
- Dust production
- Dust sprays
- Static electricity
- Explosion proof electrical (Class, Division)
- Fire alarm components





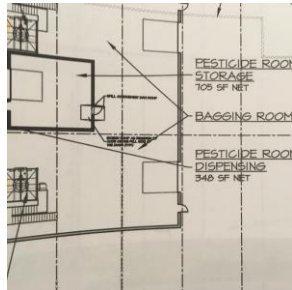
Case Study
Observations

- Mixing drums
- Curing ovens
- Mixtures



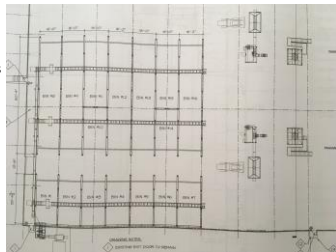
Case Study
Observations

- Enclosure
- Curbing / diking
- Toxics (pesticides)



Case Study
Observations

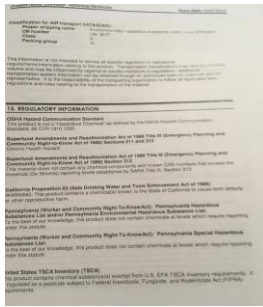
- Bin storage of bulk materials
- Processing machinery
- Conveyors
- Hoppers
- Bucket loaders





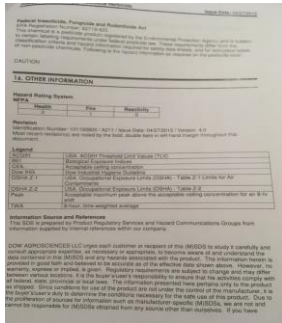
Case Study Material Safety Data Sheets

- Regulatory Information



Case Study Material Safety Data Sheets

- Other Information



Case Study Findings and Report

The storage of combustible materials in bulk bins constructed with 18 foot high dividing walls was evaluated as combustible high piled storage in excess of 12 feet in height.

CSFSC 413 and Chapter 2 definitions



Case Study Findings and Report

Automatic fire detection, as required for Group H occupancies was not shown.
CSFSC 415.3, High piled combustible storage areas CSFSC 907.2.15, and 3206.5

Case Study Inspection Findings / Plan Review Report

Manual alarm, detection and automatic fire extinguishing systems required by other provisions of CSFSC shall be electrically supervised and monitored by approved supervisory service.
CSFSC High piled combustible storage 3201.3 (10) and Hazardous materials 5005.1.6

Case Study Inspection Findings / Plan Review Report

Automatic fire sprinkler systems, as required for Group H occupancies were not shown.
CSFSC 415.4, 903.2.5 and 3206



Case Study
Inspection Findings / Plan Review
Report

Special, specific sprinkler design criteria in addition to the requirements of NFPA 13 are found in referenced standards:

- High piled combustible storage CSFSC 3201.3 (10)
- Hazardous materials CSFSC 5005.1.8
- Flammable and combustible liquid storage. CSFSC Chapter 57

Case Study
Inspection Findings / Plan Review
Report

Sprinkler protection for the process towers was not shown. Equipment platforms shall be fully protected by sprinklers above and below the platform where required by the standards referenced in

CSFSC sections 903.3, 903.2.4 (1), 903.2.5.1

Case Study
Inspection Findings / Plan Review
Report

Emergency or standby power shall be provided in occupancies with hazardous materials.

CSFSC 604.2.10, 5004.7 and 5005.1.5



Case Study
Inspection Findings / Plan Review
Report

Emergency power shall be provided for occupancies with highly toxic or toxic materials.

CSFSC 604.2.11, 604.2.2.8 and 604.3.4.2

Case Study
Inspection Findings / Plan Review
Report

Dampers were not shown at duct penetrations through fire resistance rated fire barriers and ducts with openings into spaces on either side of fire resistance rated barriers in the combustible liquids and toxic materials storage and processing areas.

CSFSC 714.1.1, 714.3 and 717

Case Study
Inspection Findings / Plan Review
Report

Portable fire extinguishers locations, types and ratings were not shown.

CSFSC 906.1 and CSFPC 13.6.2



Case Study
Inspection Findings / Plan Review
Report

An emergency alarm system as required for detection and notification of an emergency condition in Group H occupancies was not shown.

CSFSC 908.1, 5004.9, and 5004.10

Case Study
Inspection Findings / Plan Review
Report

Rooftop smoke and heat vents as required for buildings or portions thereof used as a Group F-1 occupancy having more than 50,000 ft² of undivided area were not shown.

CSFSC 910.2.1, 910.2.2,
High piled combustible storage 3201.3(12), 3206.2, 3206.7

Case Study
Inspection Findings / Plan Review
Report

Verify that new and re-used existing door hardware is panic hardware as required for Group H occupancies.

CSFSC 1008.1.10



Case Study
Inspection Findings / Plan Review
Report

Common path of travel was in excess of 25 foot limitation for Group H-3 occupancies in the vicinity of the second floor administrative office mezzanine.

CSFSC 1014.3

Case Study
Inspection Findings / Plan Review
Report

Will drying ovens be used in any process?

CSFSC Chapter 30

Case Study
Inspection Findings / Plan Review
Report

The following issues with respect to combustible dusts, dust amounts and dust producing processes can be evaluated once information on the materials, handling and processes is submitted:

- Combustible dusts, storage and handling. CSFSC 415.8
- Explosion control. CSFSC 911.1
- Combustible dust producing operations. CSFSC 2201.1
 - Agricultural and Food Products. NFPA 61
 - Explosion protection, NFPA 69
 - Manufacturing, processing, and handling of combustible particulate solids, NFPA 654
- Dust control measures. CSFPC 40.3.1, NFPA 654.8.1



Case Study Inspection Findings / Plan Review Report

The following issues with respect to manufacture, processing, dispensing, use, storage, handling, and transporting of hazardous materials (combustible and toxic per evaluation) in Group H-3 occupancies could not be evaluated with respect to Hazardous Materials – General Requirements.

CSFSC 414, Chapter 50 and CSFPC Chapter 60 and NFPA 400:

- Applicable provisions CSFSC 414.1.1, 415, 5003.1, CSFPC 60.5
- Materials CSFSC 414.1.2, CSFPC 60.3
- Control areas CSFSC 414.2, CSFPC 60.1, 60.4, 60.5
- Ventilation CSFSC 414.3 and CSFPC Chapter 60
- Hazardous material systems CSFSC 414.4
- Inside storage and use CSFSC 414.5
- Emergency alarms CSFSC 414.7
- Systems, equipment and processes CSFSC 5003.2, CSFPC 605.1.6
- Storage CSFSC 5003.4
- Use, dispensing and handling CSFSC 5003.5

Case Study Inspection Findings / Plan Review Report

Control area quantities of hazardous materials were reported in excess of single control area limitations.

CSFPC 60.4.2.1.13, 60.5.1

Case Study Inspection Findings / Plan Review Report

Control area quantities of flammable and combustible liquids were reported in excess of single control area limitations.

CSFPC 66.9.7



Case Study
Inspection Findings / Plan Review
Report

Control area quantities of toxic solids were reported in excess of single control area limitations.

CSFSC 5003.1.1 (2)

Case Study
Inspection Findings / Plan Review
Report

The following issues with respect to storage, handling, processing, and transporting of flammable and combustible liquids in Group H-3 occupancies could not be evaluated with respect to:

- Leakage containment inclusive of fire protection system discharge. CSFSC 415.8.2.4
- Leakage alarms. CSFSC 415.8.2.5
- Room ventilation. CSFSC 415.8.2.7 and CSFPC 66.18.6
- Explosion venting. CSFSC 415.9.2.8
- Secondary containment for hazardous material solids and liquids storage including combustible liquids and toxic materials was not shown. CSFSC 5004.2.2 (1), 5005.2.1.4
- Flammable and combustible liquid containment capacity with respect to automatic sprinkler system discharge was not shown. CSFPC 66.16.8

Case Study
Inspection Findings / Plan Review
Report

Provisions for control of static electricity were not shown.

CSFSC 5003.9.5, CSFPC 40.4.3.4 and 60.5.1.10



Case Study Inspection Findings / Plan Review Report

Information regarding powered industrial trucks, propane fuel and storage, batteries, and flammable motor fuel storage and operations was not provided.

CSFPC 10.18, NFPA 505, CSFPC 40.4.8

Use of OEDM Training Materials

Use of Office of Education and Data Management (OEDM) training materials must be approved in writing by the State of Connecticut, Department of Administrative Services' Office of Communications. In approving of such use, the State of Connecticut assumes no liability associated with such use, including, but not limited to, the user's dissemination of any inaccurate information or interpretation in connection with its use of these training materials. Use of the training materials is at the sole risk of the user, and the State's approval of the use does not constitute an endorsement of the user or its intended use.

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