

Hazardous Occupancies Plan Review and Inspection
Spring 2019 Career Development Series

Ignatius Kapalczynski, Principal,
American Fire Services Solutions

DAS Office of Education and Data Management

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



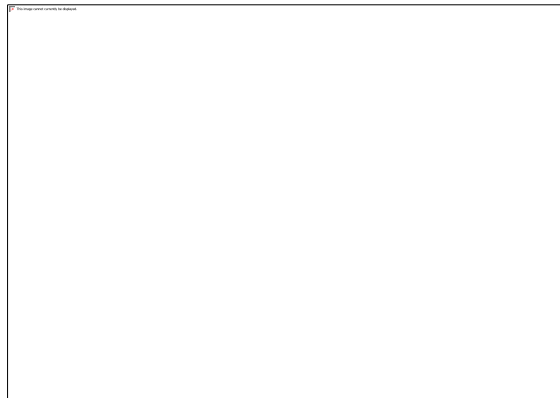
What is *hazardous*?

- 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 phosphate), HETP (hexaethyl tetraphosphate), and similar insecticides and pesticides;

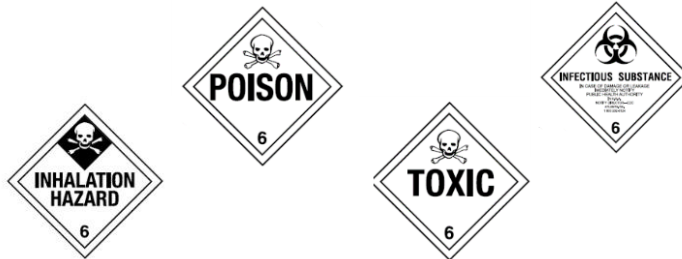


What is *hazardous*?

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 414.1.3
 - *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 I
 - 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 Areas

- Amounts – of substances
- Construction – of fire separations
- Location – of areas
- Number – of areas
- Indoor
- Outdoor

Control Area Tables

IBC tables 307 and IFC tables 5003 are the same

TABLE 307.1(1)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD^{1,2,3,4,5}

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE ⁶			USE-CLOSED SYSTEMS ⁶			USE-OPEN SYSTEMS ⁶	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	NA	H-2	See Note q	NA	NA	See Note q	NA	NA	See Note q	NA
Combustible fibers ⁴	Loose Baled ⁴	H-3	(100) (1,000)	NA	NA	(100) (1,000)	NA	NA	(20) (200)	NA
Combustible liquid ^{4,1}	II	H-2 or H-3	NA	120 ^{6,4}	NA	NA	120 ⁶	NA	NA	30 ⁶
	III A	H-2 or H-3	NA	330 ^{6,4}	NA	NA	330 ⁶	NA	NA	80 ⁶
	III B	NA	NA	13,200 ^{6,4}	NA	NA	13,200 ⁶	NA	NA	3,300 ⁶
Consumer fireworks	1.4G	H-3	125 ^{6,1}	NA	NA	NA	NA	NA	NA	NA
Cryogenic flammable	NA	H-2	NA	45 ⁶	NA	NA	45 ⁶	NA	NA	10 ⁶
Cryogenic inert	NA	NA	NA	NA	NL	NA	NA	NL	NA	NA
Cryogenic oxidizing	NA	H-3	NA	45 ⁶	NA	NA	45 ⁶	NA	NA	10 ⁶
Explosives	Division 1.1	H-1	1 ^{6,4}	(1) ^{6,4}	0.25 ⁶	(0.25) ⁶	0.25 ⁶	(0.25) ⁶	0.25 ⁶	(0.25) ⁶
	Division 1.2	H-1	1 ^{6,4}	(1) ^{6,4}	0.25 ⁶	(0.25) ⁶	0.25 ⁶	(0.25) ⁶	0.25 ⁶	(0.25) ⁶
	Division 1.3	H-1 or H-2	5 ^{6,4}	(5) ^{6,4}	1 ⁶	(1) ⁶	1 ⁶	(1) ⁶	1 ⁶	(1) ⁶
	Division 1.4	H-3	50 ^{6,4}	(50) ^{6,4}	NA	NA	NA	NA	NA	NA
	Division 1.4G	H-3	125 ^{6,4,1}	NA	NA	NA	NA	NA	NA	NA
	Division 1.5	H-1	1 ^{6,4}	(1) ^{6,4}	0.25 ⁶	(0.25) ⁶	0.25 ⁶	(0.25) ⁶	0.25 ⁶	(0.25) ⁶
Division 1.6	H-1	1 ^{6,4}	NA	NA	NA	NA	NA	NA	NA	
Flammable gas	Gaseous	H-2	NA	1,000 ^{6,4}	NA	NA	1,000 ^{6,4}	NA	NA	NA
	Liquefied	H-2	NA	(150) ^{6,4}	NA	NA	(150) ^{6,4}	NA	NA	NA
Flammable liquid ⁶	IA	H-2	NA	30 ^{6,4}	NA	NA	30 ⁶	NA	NA	10 ⁶
	IB and IC	H-2 or H-3	NA	120 ^{6,4}	NA	NA	120 ⁶	NA	NA	30 ⁶
Flammable liquid, combination (IA, IB, IC)	NA	H-2 or H-3	NA	120 ^{6,4,1}	NA	NA	120 ^{6,1}	NA	NA	30 ^{6,1}



Control Area Tables

IBC tables 307 and IFC tables 5003 are the same

TABLE 307.1(1)—continued
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD^{a, b, c, d}

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE ^e			USE-CLOSED SYSTEMS ^f			USE-OPEN SYSTEMS ^g	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)
Flammable solid	NA	H-3	125 ^{h, i}	NA	NA	125 ^h	NA	NA	25 ^h	NA
Inert gas	Gaseous	NA	NA	NA	NL	NA	NA	NL	NA	NA
	Liquefied	NA	NA	NA	NL	NA	NA	NL	NA	NA
Organic peroxide	UD	H-1	1 ^{h, i}	(1) ^{h, i}	NA	0.25 ^h	(0.25) ^h	0.25 ^h	(0.25) ^h	(0.25) ^h
	I	H-2	5 ^{h, i}	(5) ^{h, i}	NA	1 ^h	(1) ^h	1 ^h	(1) ^h	(1) ^h
	II	H-3	50 ^{h, i}	(50) ^{h, i}	NA	50 ^h	(50) ^h	NA	10 ^h	(10) ^h
	III	H-3	125 ^{h, i}	(125) ^{h, i}	NA	125 ^h	(125) ^h	NA	25 ^h	(25) ^h
	IV	NA	NL	NL	NL	NL	NL	NL	NL	NL
V	NA	NL	NL	NL	NL	NL	NL	NL	NL	
Oxidizer	4	H-1	1 ^h	(1) ^{h, i}	NA	0.25 ^h	(0.25) ^h	0.25 ^h	(0.25) ^h	(0.25) ^h
	3 ^h	H-2 or H-3	10 ^{h, i}	(10) ^{h, i}	NA	2 ^h	(2) ^h	2 ^h	(2) ^h	(2) ^h
	2	H-3	250 ^{h, i}	(250) ^{h, i}	NA	250 ^h	(250) ^h	NA	50 ^h	(50) ^h
	1	NA	4,000 ^{h, i}	(4,000) ^{h, i}	NA	4,000 ^h	(4,000) ^h	NA	1,000 ^h	(1,000) ^h
Oxidizing gas	Gaseous	H-3	NA	NA	1,500 ^{h, i}	NA	NA	1,500 ^{h, i}	NA	NA
Liquefied	H-3	NA	(150) ^{h, i}	NA	NA	(150) ^{h, i}	NA	NA	NA	
Pyrophoric	NA	H-2	4 ^{h, i}	(4) ^{h, i}	50 ^{h, i}	1 ^h	(1) ^h	10 ^{h, i}	0	0
Unstable (reactive)	4	H-1	1 ^{h, i}	(1) ^{h, i}	10 ^{h, i}	0.25 ^h	(0.25) ^h	2 ^{h, i}	0.25 ^h	(0.25) ^h
	3	H-1 or H-2	5 ^{h, i}	(5) ^{h, i}	50 ^{h, i}	1 ^h	(1) ^h	10 ^{h, i}	1 ^h	(1) ^h
	2	H-3	50 ^{h, i}	(50) ^{h, i}	750 ^{h, i}	50 ^h	(50) ^h	750 ^{h, i}	10 ^h	(10) ^h
	1	NA	NL	NL	NL	NL	NL	NL	NL	NL
Water reactive	3	H-2	5 ^{h, i}	(5) ^{h, i}	NA	5 ^h	(5) ^h	NA	1 ^h	(1) ^h
	2	H-3	50 ^{h, i}	(50) ^{h, i}	NA	50 ^h	(50) ^h	NA	10 ^h	(10) ^h
	1	NA	NL	NL	NL	NL	NL	NL	NL	NL

Control Area Tables

IBC tables 307 and IFC tables 5003 are the same

[F] TABLE 307.1(2)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIAL POSING A HEALTH HAZARD^{a, b, c, d}

MATERIAL	STORAGE ^e			USE-CLOSED SYSTEMS ^f			USE-OPEN SYSTEMS ^g	
	Solid pounds ^{h, i}	Liquid gallons (pounds) ^{h, i}	Gas cubic feet at NTP (pounds) ^h	Solid pounds ^h	Liquid gallons (pounds) ^h	Gas cubic feet at NTP (pounds) ^h	Solid pounds ^h	Liquid gallons (pounds) ^h
Corrosives	5,000	500	Gaseous 810 ^h Liquefied (150) ^h	5,000	500	Gaseous 810 ^h Liquefied (150) ^h	1,000	100
Highly Toxic	10	(10)	Gaseous 20 ^h Liquefied (4) ^h	10	(10)	Gaseous 20 ^h Liquefied (4) ^h	3	(3)
Toxic	500	(500)	Gaseous 810 ^h Liquefied (150) ^h	500	(500)	Gaseous 810 ^h Liquefied (150) ^h	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

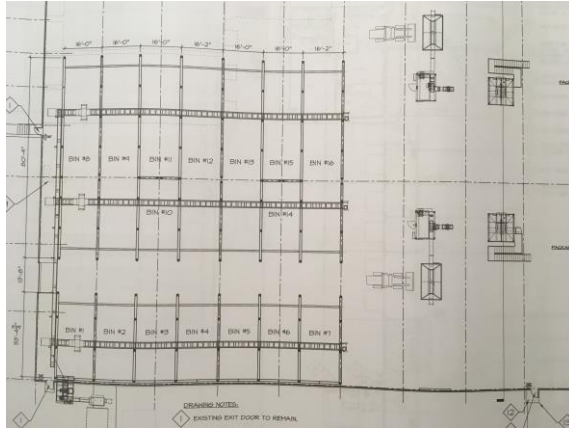
Case Study

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



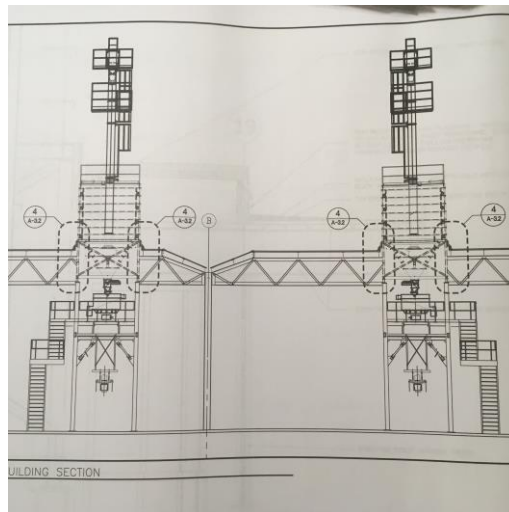
Case Study Observations

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



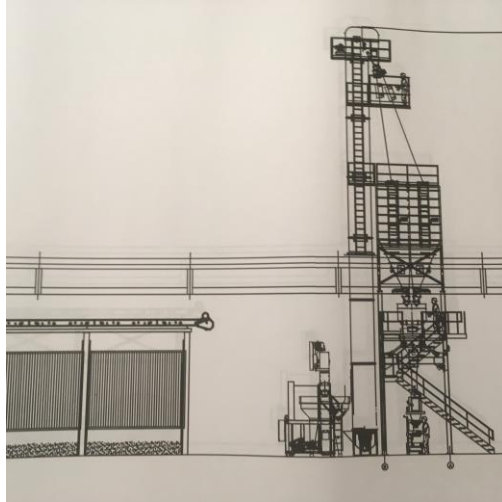
Case Study Observations

- Mixing towers
- Separators
- Silos



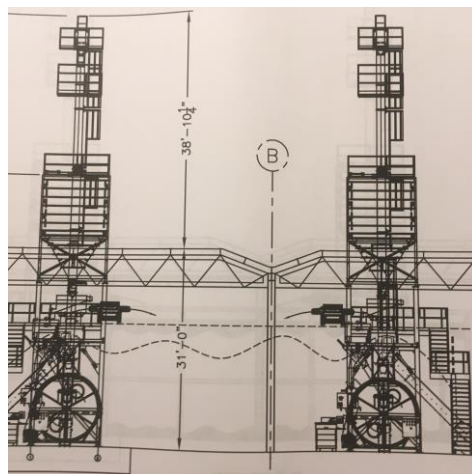
Case Study Observations

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



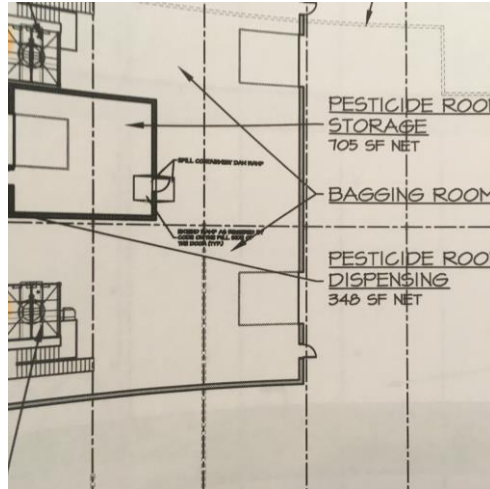
Case Study Observations

- Mixing drums
- Curing ovens
- Mixtures



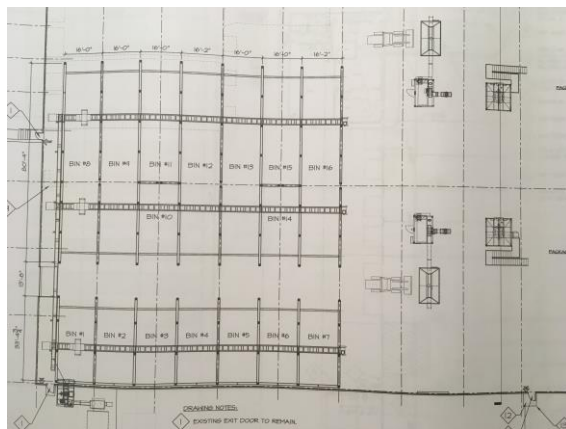
Case Study Observations

- Enclosure
- Curbing / diking
- Toxics (pesticides)



Case Study Observations

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



Case Study Toxics and Poisons

- Total limit per control area
- Number of control areas
- Location of control areas

building.

Dimension. Wax material, 6,600 lbs. Class IIIB Combustible Liquid, H-3 Occupancy. As per the 2016 CSBC / 2012 IBC, Table 307.1(1) Combustible Liquids, Class IIIB. Storage: 13,200 gallons. Sprinkler increase 100%. Total allowable is 26,400 gallons.

Use-Closed System, 13,200 gallons. Sprinkler increase 100%. Total allowable is 26,400 gallons.

Use-Open Systems, 3,300 gallons. Sprinkler increase 100%. Total allowable is 6,600 gallons. 6,600 lbs. / 10 = 660 gallons. Comply. No enclosure is needed.

Prodiamine, Granules. 12,000 lbs. Toxic Material, H-4 Occupancy. As per the 2016 CSBC / 2012 IBC, Table 307.1 (2). Toxic, Storage 500 lbs. Sprinkler increase 100%. Total allowable is 1000 lbs.

Use-Closed System, 500 lbs. Sprinkler increase 100%. Total allowable is 1000 lbs.

Use-Open System, 125 lbs. Sprinkler increase 100%. Total allowable is 250 lbs.

Limit per control area is 1,000 lbs. in storage.

Limit per control area is 1,000 lbs. in use closed system.

Limit per control area is 250 lbs. in use-open system.

The total limit cannot exceed 1,000 lbs., which is the limit in storage per control area.

We are allowed four control areas on the first floor, each separated from each other and of the floor by one-hour fire barrier construction. Walls and Ceiling. The floor is two-rated. Table 414.2.2

Case Study Flammable and Combustible Liquids

- Total limit per control area
- Outside storage areas
- Hazardous materials storage locker
- Separation distances

Mallet 20 MC. Liquid, 1,925 gallons. Approx. Class IIIA Combustible Liquid, H-3 Occupancy.

As per the 2016 CSBC / 2012 IBC, Table 307.1(1) Combustible Liquids, Class IIIA. Storage: 330 gallons. Sprinkler increase 100%. Total allowable is 660 gallons.

Use-Closed System, 330 gallons. Sprinkler increase 100%. Total allowable is 660 gallons.

Use-Open Systems, 80 gallons. Sprinkler increase 100%. Total allowable is 160 gallons.

Limit per control area is 660 gallons in storage.

Limit per control area is 660 gallons in use closed system.

Limit per control area is 160 gallons in use-open system.

The total limit cannot exceed 660 gallons, which is the limit in storage per control area.

We are allowed four control areas on the first floor, each separated from each other and the rest of the floor by one-hour fire barrier construction. Walls and Ceiling. The floor is two-hour rated. Table 414.2.2

If we do not exceed 660 gallons total in the building, then the building becomes one control area. No H-3 occupancy in the building.

The other 1,265 gallons would need to be in storage outside the building, which can be in a Hazardous Materials Storage Locker, NFPA 20.2012, Chapter #14, H-3 Occupancy.

The rating of the Hazardous Materials Storage Locker would be based on the distance from the building and the property line. Fire Separation Distance, Table 602.

Because this is an unlimited area building, the storage lockers need to be at least 60 feet from building to be considered not a part of the building. At 60 feet the lockers are not required to be rated.



Case Study Material Safety Data Sheets

- Identification
- Hazards Identification
- Composition/Information on Ingredients

SAFETY DATA SHEET DOW AGROSCIENCES LLC		
Product name: Dithiopyr Technical Herbicide		Issue Date: 04/07/2015 Print Date: 05/08/2015
DOW AGROSCIENCES LLC encourages and expects you to read and understand the entire MSDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.		
1. IDENTIFICATION		
Product name: Dithiopyr Technical Herbicide		
Recommended use of the chemical and restrictions on use Identified uses: Herbicide for use in manufacturing, formulating or repackaging		
COMPANY IDENTIFICATION DOW AGROSCIENCES LLC 9330 ZIONSVILLE RD INDIANAPOLIS IN 46268-1053 UNITED STATES		
Customer Information Number:	800-992-5994	info@dow.com
EMERGENCY TELEPHONE NUMBER 24-Hour Emergency Contact: 800-992-5994 Local Emergency Contact: 352-323-3500		
2. HAZARDS IDENTIFICATION		
Hazard classification This material is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.		
Other hazards no data available		
3. COMPOSITION/INFORMATION ON INGREDIENTS		
Synonyms: Dithiopyr: S,S'-dimethyl 2-(difluoro-methyl-4-(2-methylpropyl)-6-(trifluoromethyl)-3,5-pyridinediyl) ribothiolate This product is a substance.		
Component	CASRN	Concentration

Case Study Material Safety Data Sheets

- First Aid Measures
- Firefighting Measures
- Dust generation

SAFETY DATA SHEET DOW AGROSCIENCES LLC		
Product name: Dithiopyr Technical Herbicide		
Dithiopyr	97886-45-8	91.0%
Toluene	108-88-3	0.4%
Balance	Not available	8.6%
4. FIRST AID MEASURES		
Description of first aid measures General advice: If potential for exposure exists refer to Section 8 for specific personal protective equipment.		
Inhalation: No emergency medical treatment necessary.		
Skin contact: Wash off with plenty of water.		
Eye contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.		
Ingestion: No emergency medical treatment necessary.		
Most important symptoms and effects, both acute and delayed: Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.		
Indication of any immediate medical attention and special treatment needed Notes to physicians: No specific antidotes. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Have the Safety Data Sheet, and if available, the product container or label with you when calling a poison control center or doctor, or going for treatment.		
5. FIREFIGHTING MEASURES		
Suitable extinguishing media: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam.		
Unsuitable extinguishing media: no data available		
Special hazards arising from the substance or mixture Hazardous combustion products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Nitrogen oxides. Hydrogen fluoride. Hydrogen chloride. Carbon monoxide. Carbon dioxide.		
Unusual Fire and Explosion Hazards: Container may rupture from gas generation in a fire situation. Pneumatic conveying and other mechanical handling operations can generate combustible dust. To reduce the potential for dust explosions, do not permit dust to accumulate. Dense smoke is produced when product burns.		



Case Study Material Safety Data Sheets

- Accidental Release Measures
- Handling and Storage
- Exposure Controls/Personal Protection
- Dust control (again)

Product name: Dithiopyr Technical Herbicide		Issue Date: 04/27/2015																								
<p>Advice for firefighters: Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Soak thoroughly with water to cool and prevent explosion. If material is molten, do not spray direct steam/water. Use fine water spray or foam. Use water spray to cool fire exposed containers and fire extinguishers. Use fine water spray to cool and prevent explosion. Fight fire from protected location or elevated area until fire is out and danger of explosion has passed. Fight fire from protected location or elevated area until fire is out and danger of explosion has passed. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the safe distance. Consider the use of unmanned hose holders or discoloration if safe. Move container from fire area if this is possible without hazard. Contain fire water run-off if possible. This water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this (MSDS).</p> <p>Special protective equipment for firefighters: Wear positive pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.</p>																										
<p>6. ACCIDENTAL RELEASE MEASURES</p> <p>Personal precautions, protective equipment and emergency procedures: Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.</p> <p>Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.</p> <p>Methods and materials for containment and cleaning up: Contain spilled material if possible. Small spills: Sweep up. Collect in suitable and properly labeled containers. Large spills: Contact Dow AgroSciences for clean-up assistance. See Section 13, Disposal Considerations, for additional information.</p>																										
<p>7. HANDLING AND STORAGE</p> <p>Precautions for safe handling: Keep out of reach of children. Do not swallow. Avoid breathing dust or mist. Avoid contact with eyes, skin, and clothing. Keep away from heat, sparks and flame. Good housekeeping and controlling of dusts are necessary for safe handling of product. Wash thoroughly after handling. Use with adequate ventilation.</p> <p>Conditions for safe storage: Store in a dry place. Store in original container. Do not store near food, foodstuffs, drugs or potable water supplies.</p>																										
<p>8. EXPOSURE CONTROLS/PERSONAL PROTECTION</p> <p>Control parameters Exposure limits are listed below, if they exist.</p> <table border="1"> <thead> <tr> <th>Component</th> <th>Regulation</th> <th>Type of listing</th> <th>Value/Notation</th> </tr> </thead> <tbody> <tr> <td>Dithiopyr</td> <td>Dow IHG</td> <td>TWA</td> <td>0.25 mg/m³</td> </tr> <tr> <td>Toluene</td> <td>ACGIH</td> <td>TWA</td> <td>20 ppb</td> </tr> <tr> <td></td> <td>OSHA Z-1</td> <td>TWA</td> <td></td> </tr> <tr> <td></td> <td>ACGIH</td> <td>TWA</td> <td>10</td> </tr> <tr> <td></td> <td>OSHA Z-2</td> <td>TWA</td> <td>200 pp</td> </tr> </tbody> </table>			Component	Regulation	Type of listing	Value/Notation	Dithiopyr	Dow IHG	TWA	0.25 mg/m ³	Toluene	ACGIH	TWA	20 ppb		OSHA Z-1	TWA			ACGIH	TWA	10		OSHA Z-2	TWA	200 pp
Component	Regulation	Type of listing	Value/Notation																							
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Toluene	ACGIH	TWA	20 ppb																							
	OSHA Z-1	TWA																								
	ACGIH	TWA	10																							
	OSHA Z-2	TWA	200 pp																							

- Physical and Chemical Properties

Product name: Dithiopyr Technical Herbicide		Issue Date: 04/27/2015
<p>RECOMMENDATIONS IN THIS SECTION ARE FOR MANUFACTURING, COMMERCIAL BLENDING AND PACKAGING WORKERS. APPLICATORS AND HANDLERS SHOULD SEE THE PRODUCT LABEL FOR PROPER PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING.</p> <p>Exposure controls: Engineering controls: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations.</p> <p>Individual protection measures Eye/face protection: Use safety glasses (with side shields). Skin protection: Hand protection: Chemical protective gloves should not be needed when handling this material. Consistent with general hygienic practice for any material, skin contact should be minimized. Other protection: No precautions other than clean body covering clothing should be needed. Respiratory protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. For most conditions no respiratory protection should be needed, however, if discomfort is experienced, use an approved air-purifying respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.</p>		
<p>9. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>Appearance Physical state: Solid Color: Tan Odor: Sulfur-like Odor Threshold: no data available pH: 4.2 Melting point/range: 65 °C (149 °F) Freezing point: Not applicable to solids Boiling point (760 mmHg): Not applicable to solids Flash point: closed cup 154 °C (363 °F) Evaporation Rate (Butyl Acetate = 1): no data available Flammability (solid, gas): no data available Lower explosion limit: Not applicable Upper explosion limit: Not applicable Vapor Pressure: Negligible Relative Vapor Density (air = 1): No test data available Relative Density (water = 1): No test data available</p>		



Case Study Material Safety Data Sheets

- Stability and Reactivity
- Toxicological Information

Product name: Dithioxy Technical Herbicide		Issue Date: 04/27/2015
Water solubility	0.00014 % at 20 °C (68 °F)	
Partition coefficient: n-octanol/water	no data available	
Auto-ignition temperature	Not applicable	
Decomposition temperature	No test data available	
Kinematic Viscosity	no data available	
Explosive properties	no data available	
Oxidizing properties	no data available	
Liquid Density	Not applicable	
Solid Density	1.41 g/cm ³	
Molecular weight	no data available	

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Reactivity: no data available

Chemical stability: Thermally stable at typical use temperatures.

Possibility of hazardous reactions: Polymerization will not occur.

Conditions to avoid: Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems.

Incompatible materials: Avoid contact with: Strong oxidizers.

Hazardous decomposition products: Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Hydrogen chloride, Hydrogen fluoride, Nitrogen oxides. Toxic gases are released during decomposition. Decomposition products can include trace amounts of: Hydrogen cyanide.

11. TOXICOLOGICAL INFORMATION

Ecotoxicological information on this product or its components appear in this section when such data is available.

Acute toxicity

Acute oral toxicity
Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.

As product:
LD50, Rat, > 5,010 mg/kg. No deaths occurred at this concentration.

Acute dermal toxicity
Prolonged skin contact is unlikely to result in absorption of harmful amounts.

Case Study Material Safety Data Sheets

- Ecological Information

12. ECOLOGICAL INFORMATION

Ecotoxicological information on this product or its components appear in this section when such data is available.

Toxicity

Acute toxicity to fish
Material is highly toxic to aquatic organisms on an acute basis (LC50/EC50 between 0.1 and 1 mg/L in the most sensitive species tested).

LC50, Oncorhynchus mykiss (rainbow trout), 96 Hour, 0.46 mg/l

Acute toxicity to aquatic invertebrates
LC50, saltwater mysid Mysidopsis bahia, 0.586 mg/l

EC50, eastern oyster (Crassostrea virginica), 0.168 mg/l

Toxicity to Above Ground Organisms
Material is practically non-toxic to birds on a dietary basis (LC50 = 5000 ppm)
Material is practically non-toxic to birds on an acute basis (LD50 > 2000 mg/kg)

dietary LC50, Colinus virginianus (Bobwhite quail), > 5,620 ppm
oral LD50, Colinus virginianus (Bobwhite quail), > 2,250 mg/kg
contact LD50, Apis mellifera (bees), 48 Hour, 87 µg/bee

Toxicity to soil-dwelling organisms
LC50, Eisenia fetida (earthworms), mortality, > 1,000 mg/kg

Persistence and degradability

Dithioxy
Biodegradability: Biodegradation may occur under aerobic conditions (in the presence of oxygen).

Toluene
Biodegradability: Material is readily biodegradable. Passes OECD tests for ready biodegradability.
10-day Window: Not applicable
Biodegradation: 100 %
Exposure time: 14 d
Method: OECD Test Guideline 301C or Equivalent

Theoretical Oxygen Demand: 3.13 mg/mg. Calculated.

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitizer: OH radicals
Atmospheric half-life: 2 d
Method: Estimated.



Case Study Material Safety Data Sheets

- Disposal Considerations
- Transport Information

Issue Date: 04/27/2015

product name: Dithiopyr Technical Herbicide

Biodegradability: No relevant data found.

Bioaccumulative potential
Bioaccumulation: No data available.

Mobility in soil

Dithiopyr
Expected to be relatively immobile in soil (Koc > 5000).
Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.
Partition coefficient(Koc): 20500

Toluene
Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient(Koc): 37 - 178 Estimated.

Balance
No relevant data found.

13. DISPOSAL CONSIDERATIONS

Disposal methods: If wastes and/or containers cannot be disposed of according to the product label directions, disposal of this material must be in accordance with your local or area regulatory authorities. This information presented below only applies to the material as supplied. The identification based on characteristics or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. If the material as supplied becomes a waste, follow all applicable regional, national and local laws.

14. TRANSPORT INFORMATION

DOT
Not regulated for transport

Classification for SEA transport (IMO-IMDG):
Proper shipping name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.(Dithiopyr)
UN number UN 3077
Class 9
Packing group III
Marine pollutant Dithiopyr
Transport in bulk Consult IMO regulations before transporting ocean bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code

Case Study Material Safety Data Sheets

- Regulatory Information

Issue Date: 04/27/2015

product name: Dithiopyr Technical Herbicide

Classification for AIR transport (IATA-ICAO):
Proper shipping name Environmentally hazardous substance, solid, n.o.s.(Dithiopyr)
UN number UN 3077
Class 9
Packing group III

The information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications and vary by container volume and may be influenced by regional or country standards in regulations. Additional Transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

OSHA Hazard Communication Standard
This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1980 Title III (Emergency Planning and Community Right-to-Know Act of 1980) Sections 311 and 312
Chronic Health Hazard

Superfund Amendments and Reauthorization Act of 1980 Title III (Emergency Planning and Community Right-to-Know Act of 1980) Section 313
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)
WARNING: This product contains a chemical(s) known to the State of California to cause birth defects or other reproductive harm.

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance Lists
To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

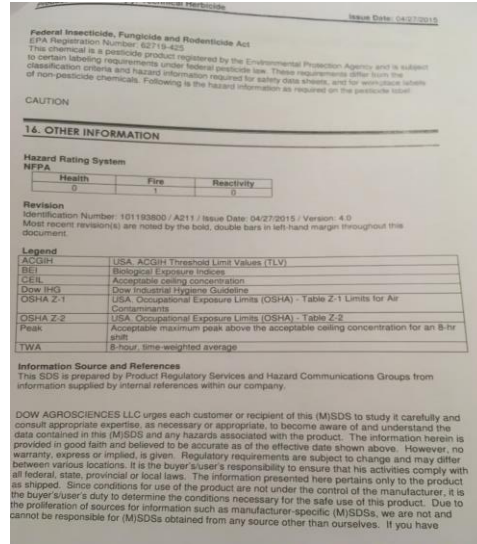
Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:
To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

United States TSCA Inventory (TSCA)
This product contains chemical substance(s) exempt from U.S. EPA TSCA inventory requirements. It is regulated as a pesticide subject to Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) requirements.



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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Ignatius Kapalczyński

Principal

139 Selden Hill Drive
West Hartford, CT
06107-3128

Office: (860) 521-7056
Cell: (860) 817-3771
AmericanFireServicesSolutions@gmail.com

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