

# Fire Safety

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# Sep 2014

- Waxahachie TX Fire Department Battalion Chief Randy Muirhead said at the time of the accident a worker was attempting to cut a 55-gallon barrel with a cutting torch.
- While the worker was cutting the barrel it exploded.
- The worker was transported by East Texas EMS ground ambulance to a Dallas Hospital.
- He received burns to his arms, face and part of his chest.



# 2013

- State fire investigators think a sparking forklift ignited a cloud of propane in a storage yard about 10 p.m. July 29, touching off a blast felt a mile away.
- Five employees were hospitalized for months with severe burns. One of the workers awoke from a coma a month after the accident



# August 2014

- Bradford PA
- The explosion occurred when an employee at the recycling company was cutting into a crude oil tank with a circular cut-off saw.
- Officials say the vapors in the tank were somehow ignited by the gas-powered saw.



# March 2014



- Authorities say workers were using a welding torch to dismantle the tank, but there was apparently some kind of combustible product inside and it ignited.

# March 2014

- Two separate fires brought responders to a downtown Erie plant on Tuesday.

The first one started around 1pm at Fralo Industries Metal Fabricators and left one worker in critical condition after he suffered severe burns to his body from a combustible dust fire ignited by a bearing/

Then a second, unrelated fire sparked just before 6pm. This time the fire was on the shop floor.



# Dec 2013

- The dumpster contained sawdust and waste wood.
- When the fire broke out, it caught the overhang and then spread into the metal building
- Four employees were cleaning up for the night when the fire started



# \$30 Million Award 2013

- Houston welding company to pay \$30 million for starting a fire that burned 74 condominiums in Galveston in 2009.



Workers were welding handrails connected to the building, which had been almost fully rebuilt after Hurricane Ike, when some wayward sparks ignited the inferno

# \$14 million award to workers

- Investigators determined that workers installing a water heater at the plant released natural gas inside the building as they purged a line, and a spark from nearby machinery caused the blast.



Three workers and a contractor were killed in the June 9, 2009, explosion, and dozens of others were injured

# Aug 2013

- "Failing to evacuate workers during a natural gas leak shows a serious disregard for worker safety and health," said Chris Zortman, OSHA's area director in Milwaukee.

# Confusions



Only one time, boss.



# 2010 Fire Fatality

- 05/11/2010
- Employee was using a gas powered abrasive cutoff saw to cut open a 2000 gal. fuel tank which was above ground.
- As he started to cut there was an ignition of vapors in the tank causing the end to be blown off killing him and igniting his truck which burned completely.

# Iroquois Theatre Fire

- December 30 , 1903
- Hot light started flames crackling up a velvet curtain
- Doors locked, unusual opening methods in others
- 600+ dead
- Lead actor told people to remain in their seats



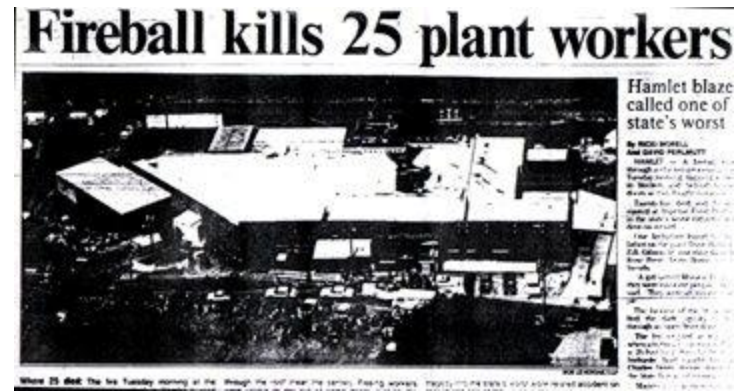
# Beverly Hills Supper Club

- May 28, 77 Southgate KY
- 165 people died, incl. staff.
- Aluminum wiring that pulled away from connections was the cause
- 34 died by one unmarked exit and 99 by another.
- Lights went out.
- Over crowded for exits people died at these exits.
- No sprinklers, alarms and detectors.



# Imperial Foods – 9/3/91

- 25 workers died in food processing plant
- Owner locked rear doors to prevent workers taking breaks, stealing chicken and to keep out insects. Company cited for flies in 6/90 by USDA.
- Emmet Roe – 25 counts of involuntary manslaughter – Served 4 ½ years in jail



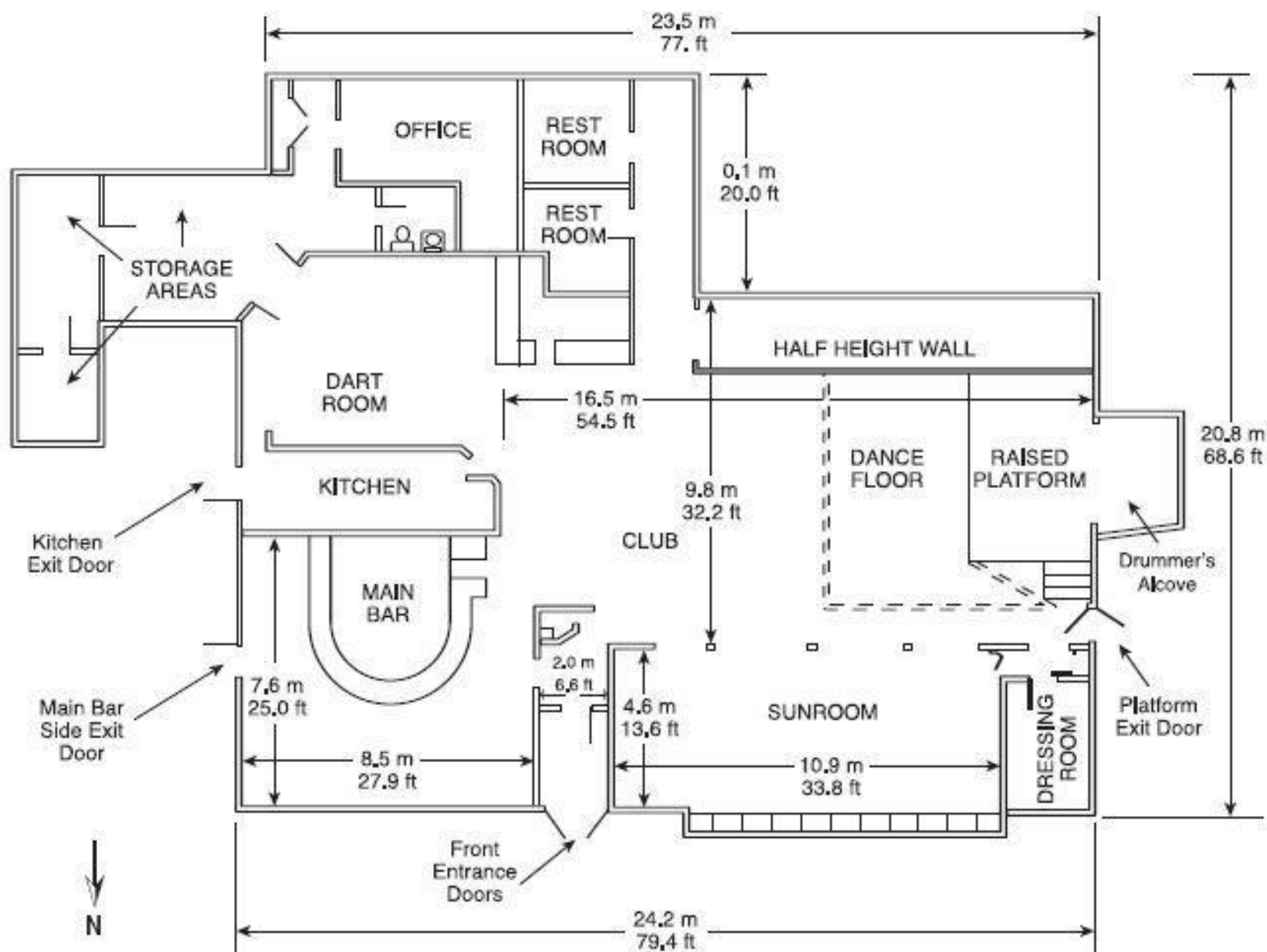
# Great White Fire

- February 20, 2003
- 4 Station employees, one band member and 95 others died
- 180 injured
- Club had \$1 million in liability policy limits, the foam insulation company had \$5 million, the property owners had none, the city had \$4 million, and the state has a cap of \$100,000 per plaintiff.
- December 2003, a grand jury indicted the club's owners, brothers Jeffrey and Michael Derderian, and Great White's former tour manager, Dan Biechele, on 100 felony counts of involuntary manslaughter.
- Jeffrey received a suspended sentence; Michael was sentenced to serve four years in prison because he bought the foam. Michael served less than three years and was released in 2008.



In May 2006, Biechele pled guilty to 100 counts of involuntary manslaughter and was served under two years in a minimum security prison

# Great White Fire



# Aug 2013

- "The employers' shocking decision to seal exit doors and block emergency exit routes to gain additional storage space placed the workers in great jeopardy," said Galen Lemke, director of OSHA's Honolulu Area Office, who said that the blocked exits could have devastating results in the event of an ammonia leak from piping located throughout the facility.

# Fire Protection Most Cited

- Fire extinguisher not accessible
- Exits not marked with an EXIT sign.
- No F.E. education program annually
- F.E. Annual maintenance check not recorded
- No training in F.E. use
- No emergency action plan
- Means of egress obstructed
- No monthly F.E. inspection
- Signs not posted along Exit travel
- F.E. not in operable condition

# Classification of Fires



# Extinguisher Training

- Educational program if all can use F.E.  
Education is initial employment and annually
- Training if only certain people are allowed to fight
- Training initially and annually



# Fire Extinguishers

- Fully charged always  
Accessible - 50 feet for Class B and C, 75 feet for Class A, & D.
- Annual maintenance check
- Hydrostatic testing every 5 years for water, 12 years for powder based



# Fire Extinguishers

- Fire Extinguisher is accessible



# Fire Extinguishers

- Fire extinguisher not checked in years
- **1910.157(e)(3)** The employer shall assure that portable fire extinguishers are subjected to an annual maintenance check.
- The employer shall record the annual maintenance date and retain this record for one year after the last entry or the life of the shell, whichever is less.
- The record shall be available to the Assistant Secretary upon request.



# Fire Extinguishers

- Fire Extinguisher not accessible



# Definitions

- Class I are areas where flammable gases may be present in sufficient quantities to produce explosive or flammable mixtures.
- Class II locations can be described as hazardous because of the presence of combustible dust.
- Class III locations contain easily ignitable fibers



A flammable painting room would be Class I

# Definitions

- Combustible liquid means any liquid having a flash point at or above 100F
- Flammable liquid means any liquid having a flash point below 100F
- Class IA shall include liquids having flash points below 73F and having a boiling point below 100F
- Class IB shall include liquids having flash points below 73F and having a boiling point at or above 100F
- Class IC shall include liquids having flash points at or above 73F and a boiling point below 100F



Many flammable paints  
and inks are Class 1B

# Flammable Liquid Storage

Flammable storage cabinet capacities:

- 25 gallons of Class I or Class II
- 120 gallons of Class III



# Let's count

- Cabinet or no cabinet?



# Inside Storage Room Requirements

- Fire resistant construction
- Sprinklers
- Raised sills or trench
- Fire doors
- Liquid tight (floor to wall)
- Windows
- Capacity ratings
- Electrical
- Ventilation
- Storage requirements
- Egress
- Leak procedures
- **29 CFR 1910.106(d)(4)**

# Fire Resistive Construction

- Walls per NFPA 251
- 29 CFR 1910.106(e)(3)(iii), Flammable and Combustible Liquids; Industrial Plants; Unit Physical Operations; Chemical Processes; establishes that a firewall may have a 2-hour fire resistance rating.



# Openings – Flammable Storage

- Non-combustible, liquid-tight sills or ramps – 4”
- Open-grated trench in alternative
- Storage area floor 4” below surrounding floor, in alternative



# Flammable Storage Rooms

- Self closing fire door, per NFPA 80-1968
- Floor to wall construction shall be liquid-tight



# Flammable Storage

- Where other portions of the building, or other properties are involved, protected windows are required per NFPA 80-1968



Flammable Storage rooms should never have normal windows.

# Other Acceptable Methods

- One inch nominal thickness of wood is acceptable for use in shelves, racks, floor overlays, etc



# Storage Room Capacity

- Reference Table H-13 in 1910.106(d)(4)
- Capacity is dependent on:
  - room size
  - fire resistant rating
  - if fire protection is available

(gals/cubic feet/floor area)



Electrical lighting of this type and windows not allowed

# Electrical

- Electrical installations (lighting, receptacles, etc) for Class I liquids must meet Class I, Division 2 Hazardous location requirements in Subpart S
- Electrical for Class II and III is approved for **general use**



# Ventilation

- Gravity or mechanical
- Six air changes/hour
- Locate switch outside of room – wired with lighting



# Inside Storage Rooms

- Minimum 3' wide aisles
- No stacking of containers over 30 gal
- Approved pump or self-closing faucet for dispensing



# Leaking Containers

- Move leaking containers either to storage room or outside building to transfer into intact containers



# Egress

- Cannot block or limit safe egress (access to exits)
- 1910.37(a)(3) Exits were not free and unobstructed.



# Means of Egress

- Means of Egress is the path of travel to a safe location, usually a public way.
- Exit Access - way to an exit
- Exit - area protected by fire rated construction (enclosed stairs)
- Exit Discharge - after the exit (courtyards, protected lobbies)



# Exit Access

- OSHA standard used  
1969 Life Safety Code
- Exit door swings with  
travel
- No travel through high  
hazard areas
- Minimum width of 28  
inches - 37(f)(6)



36 inches is required for  
most locations

# Fundamental Requirements

- Sufficient exits – see NFPA 101
- Unobstructed egress
- Two means of egress remote from each other



# Exit Marking

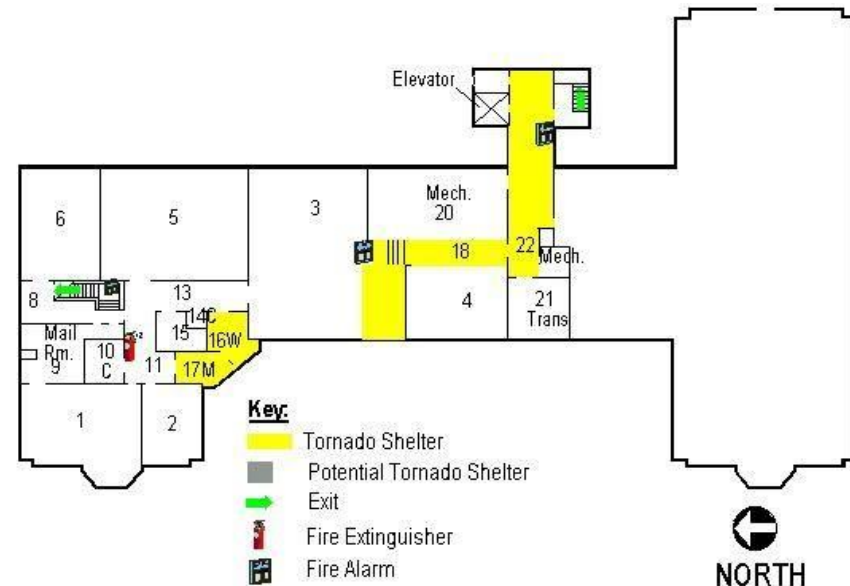
- Exits marked with a readily visible sign
- "Not an Exit" on confusing doors
- Signs with exit directions in rooms where exit not apparent
- Signs lit by 5 foot-candles



Exit sign not lit  
Exit blocked by material

# Emergency Action Plan

- Written
- Describes employer procedures in event of fires
- Discusses what employees are to do in case of fire
- Describes other emergencies procedures



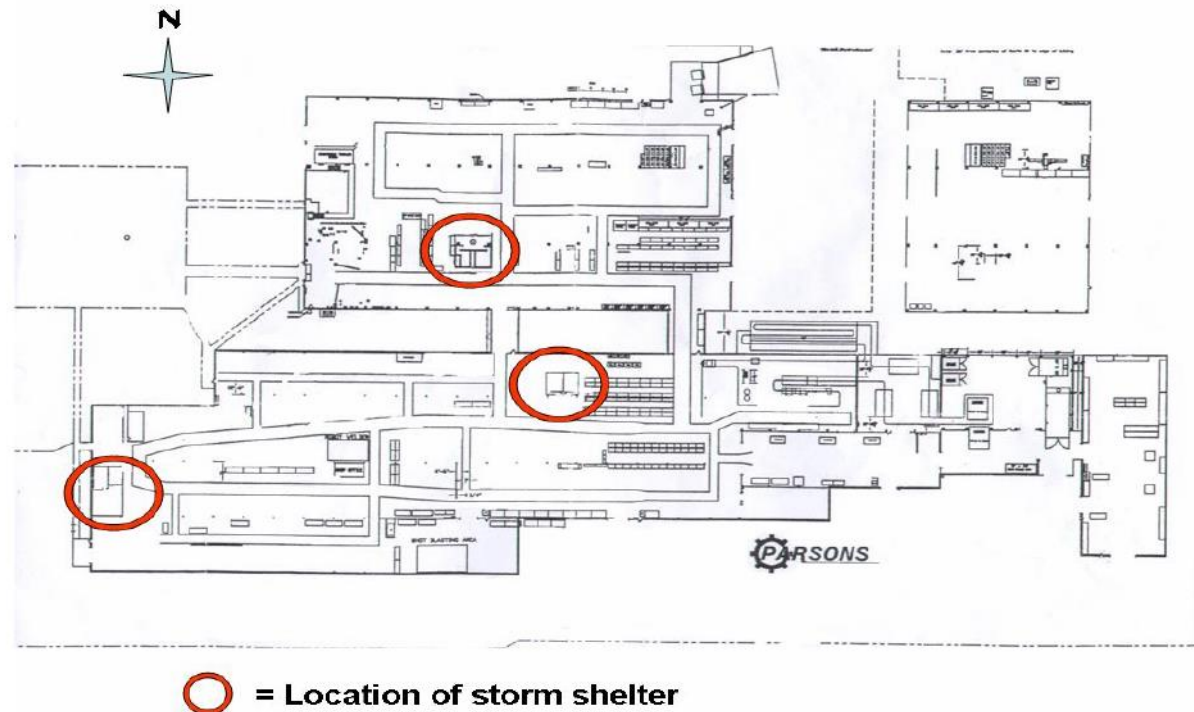
# Elements of an EAP

- Procedures for people who stay to shutdown critical operations
- Headcount procedures
- Method on how the emergency will be reported
- Rescue and medical duties



# Tornados

- Roanoke IL
- F4
- July 13, 2004
- Parsons Mfr
- The walls of the shelters were 10 inches thick
- Concrete ceilings 18 inches thick



# Parsons



- The shelters were constructed of poured concrete, reinforced with 5/8" rebar

# Fire Prevention Plans

- Requires housekeeping to prevent accumulation of flammable and combustible waste material and residue
- Plan made available for employees to view
- Requires training of employees in the plan



Flammable Ink not cleaned up

# Lightning

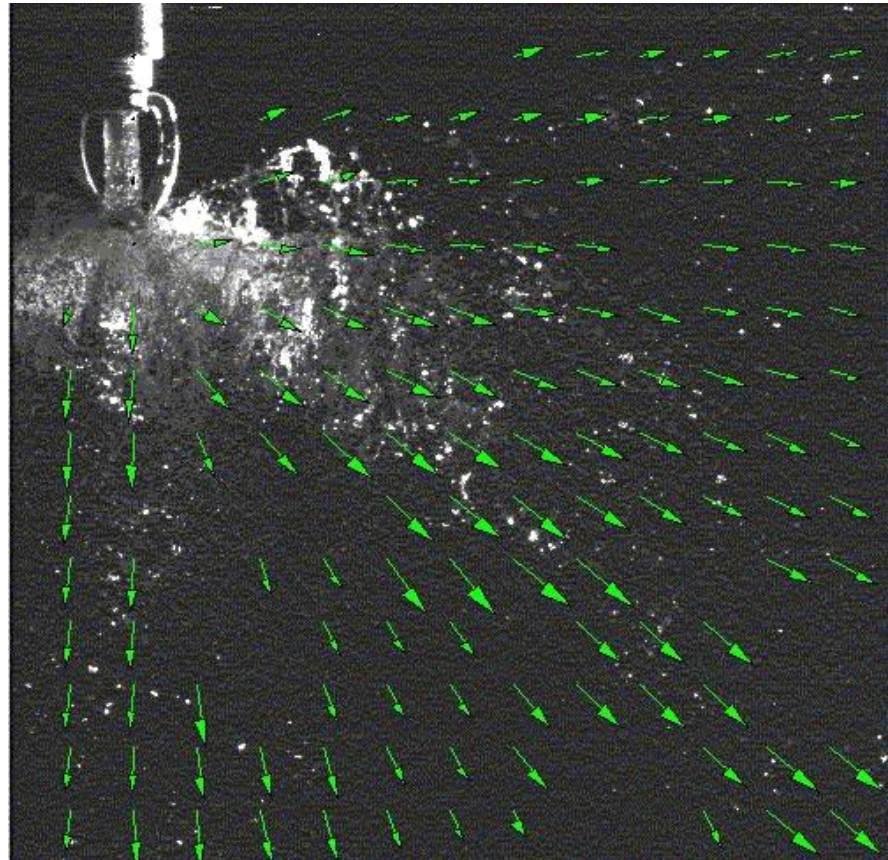
- **LUFKIN, Texas**
- **May 2013**
- Restaurant worker standing outside the eatery and holding an umbrella during a storm has died after being hit by lightning.



**BUCKEYE, Ky., Aug. 22, 2013**  
Two people died and three others were injured when lightning struck a tobacco curing barn

# Sprinklers

- Storage should be 18 inches below head
- **Sprinkler** heads kept dust, lint, and grease free
- **Sprinkler** heads and piping in good condition
- Main drain flow test annually
- Inspector's test valve opened every two years (most do it annually)



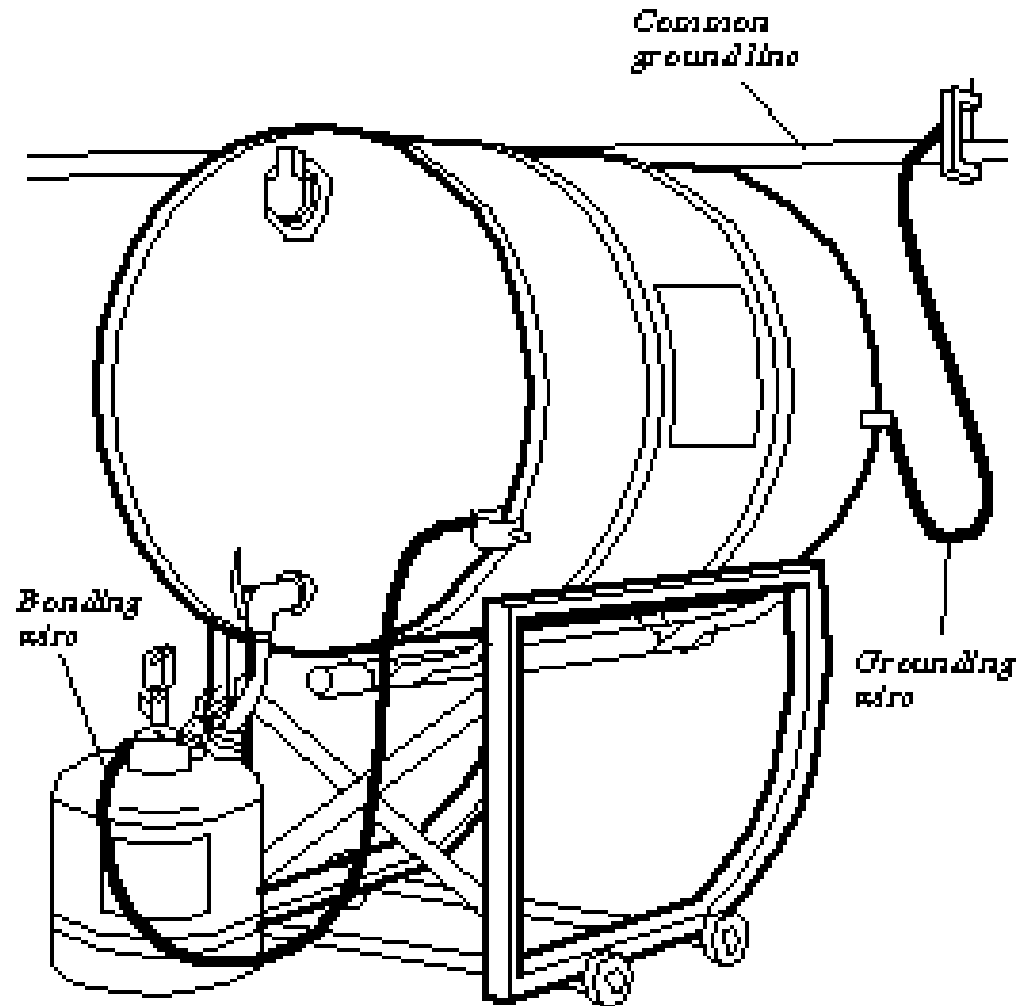
# Flammable Cylinders

- Oxygen and acetylene stored together.
- Must be 20 ft apart or have a ½ hour fire barrier.
- Steel has no fire rating since it conducts heat.



# Bonding and Grounding

- Many flash fires from dispensing flammables from one container to another.



# Aug 2013

- Bruce Hall, 44, died early Tuesday at Harborview Medical Center in Seattle from burns suffered when static electricity caused lacquer fumes to ignite in an enclosed area in the back of the shop.
- Hall was pouring the lacquer from a barrel to a smaller container through a funnel when the fumes exploded, Missoula Fire Marshal Gordy Hughes said.



# Spray Paint Booths

- Class 1 electric
- 100 fpm velocity
- No more than 1 day supply of paint
- Noncombustible material on floors
- Sprinklers provided
- Gages work for velocity



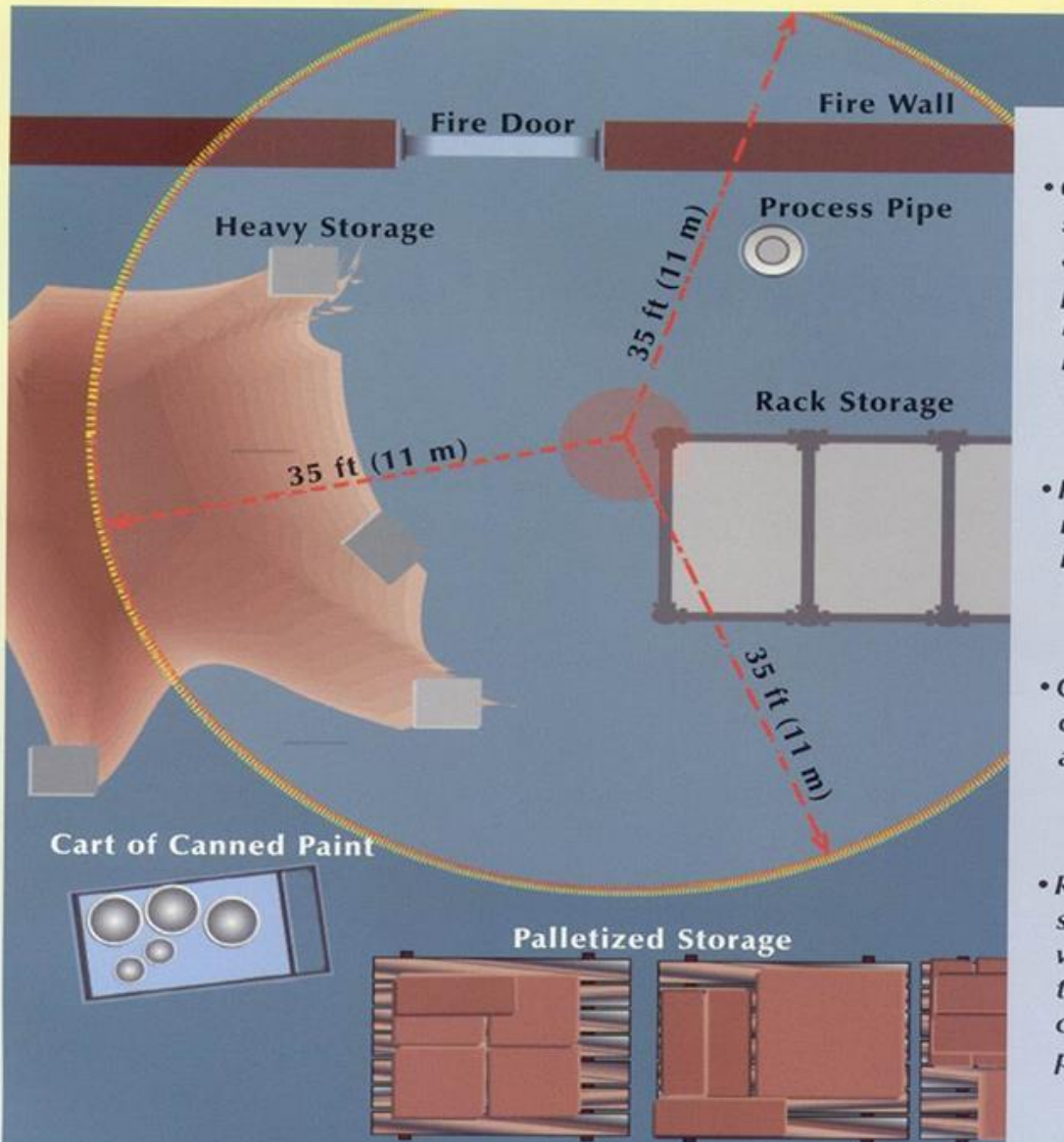
# Ovens

- January 2014 NJ
- Iodine and alcohol, were improperly heated in an Despatch electric oven “not designed and rated for processing flammable volatiles.”
- The explosion killed 52-year-old Dr. Arwed Ralf Uecker, a visiting global research and development and injured Neil Carter, a 58-year-old production manager at the plant



# Hotworks

## THE HOT WORK 35 FT (11 M) RULE



- Close fire doors and seal floor openings (such as the area surrounding process piping) with an FMRC-Approved fire-stop material.
- Remove storage from racks on which the work is to be done.
- Cover heavy, unmovable combustible storage with a fire-resistive tarpaulin.
- Remove or shield from sparks all potential fuels within 35 ft (11 m) of the work area. In this case, the paint cart and palletized storage.

# Quiz

- A combustible liquid is identified by OSHA as one having a flash point at or above \_\_\_\_\_F
- How often is fire extinguisher education done if required?  
\_\_\_\_\_
- Exits signs must be lit with \_\_\_\_\_ foot candles.
- Exit access width is minimum of \_\_\_\_\_ inches per OSHA.
- Over \_\_\_\_\_ gallons of a Class 1B requires a flammable liquid cabinet or flammable liquid storage room .
- A velocity of \_\_\_\_\_ fpm is required in a paint spray booth.

## Fire Distinguisher

