CERT Basic Training

Unit 6: Utility Controls and "HazMat"

CERT COMMUNITY EMERGENCY RESPONSE TEAM

U.S. DEPARTMENT OF HOMELAND SECURITY

FEMA

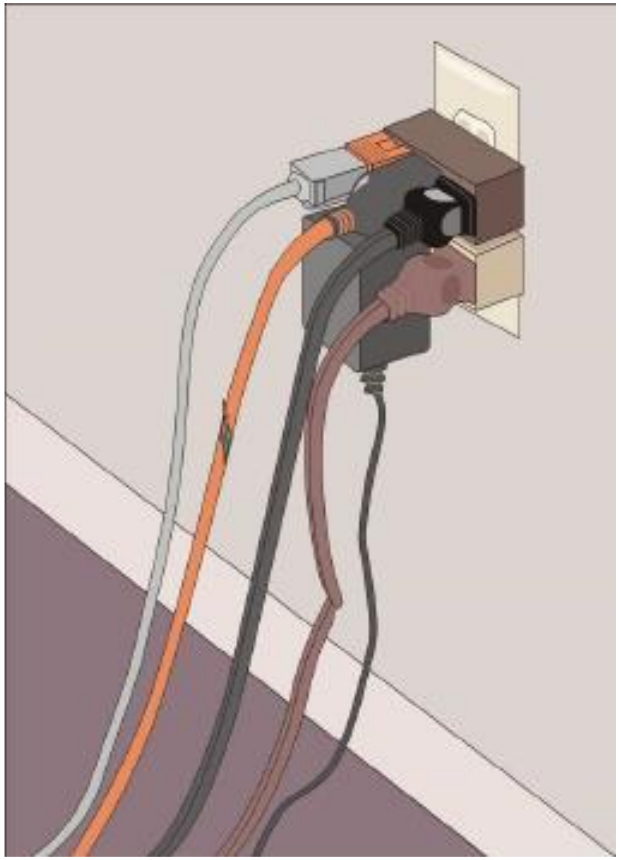
Unit Objectives

1. Identify proper utility management as a CERT
2. Identify potential hazardous materials situations at home and in the community
3. Explain how to recognize the dangers of hazardous materials, how to stay safe, and the proper CERT response

PM 6-1

Reducing Electrical Hazards

- Avoid the “electrical octopus”
- Don’t run cords under the carpets
- Check for and replace broken or frayed cords
- Maintain appliances



PM 6-14

When to turn off the electricity?

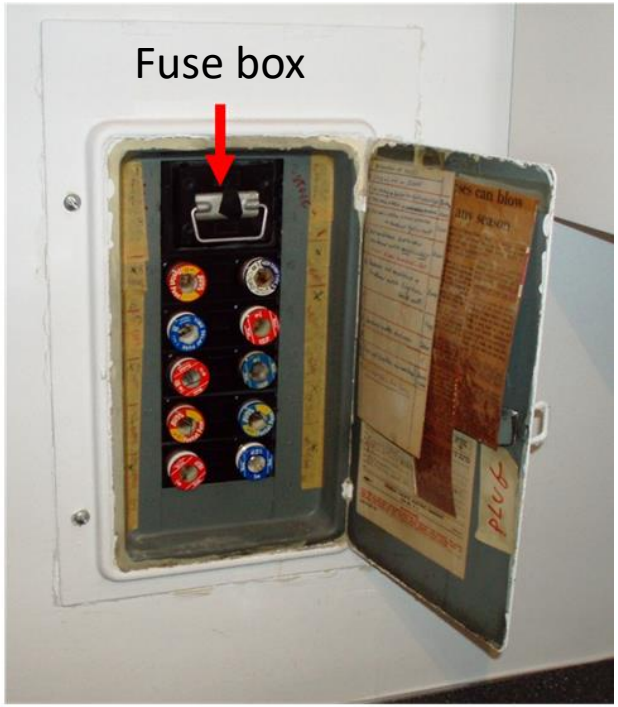
- Structural damage
- Power outage
- Probable gas leaks in the neighborhood

Where is your electrical service panel located?

Circuit box with shutoff
(most common)

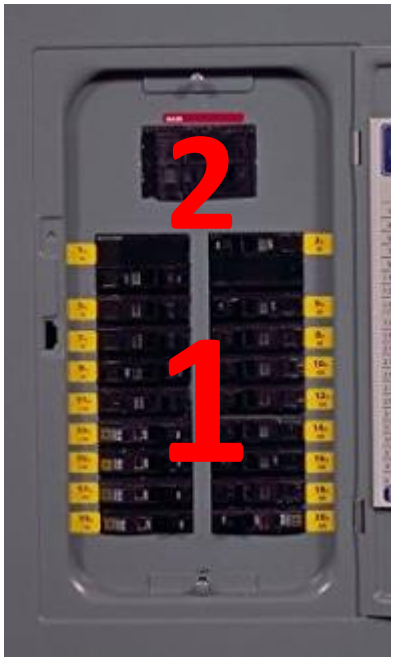
Main switch

Fuse box with shutoff
(not common)



How to turn electricity On and Off

OFF



OFF

1) Turn off each Individual switch first

2) Turn off the Main switch

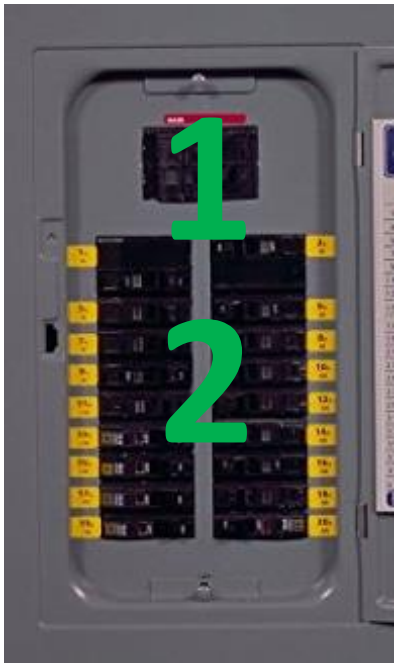
ON

First, verify that all individual switches are off

1) Turn on the main switch first

2) Turn on each individual switch

ON



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WARNING!

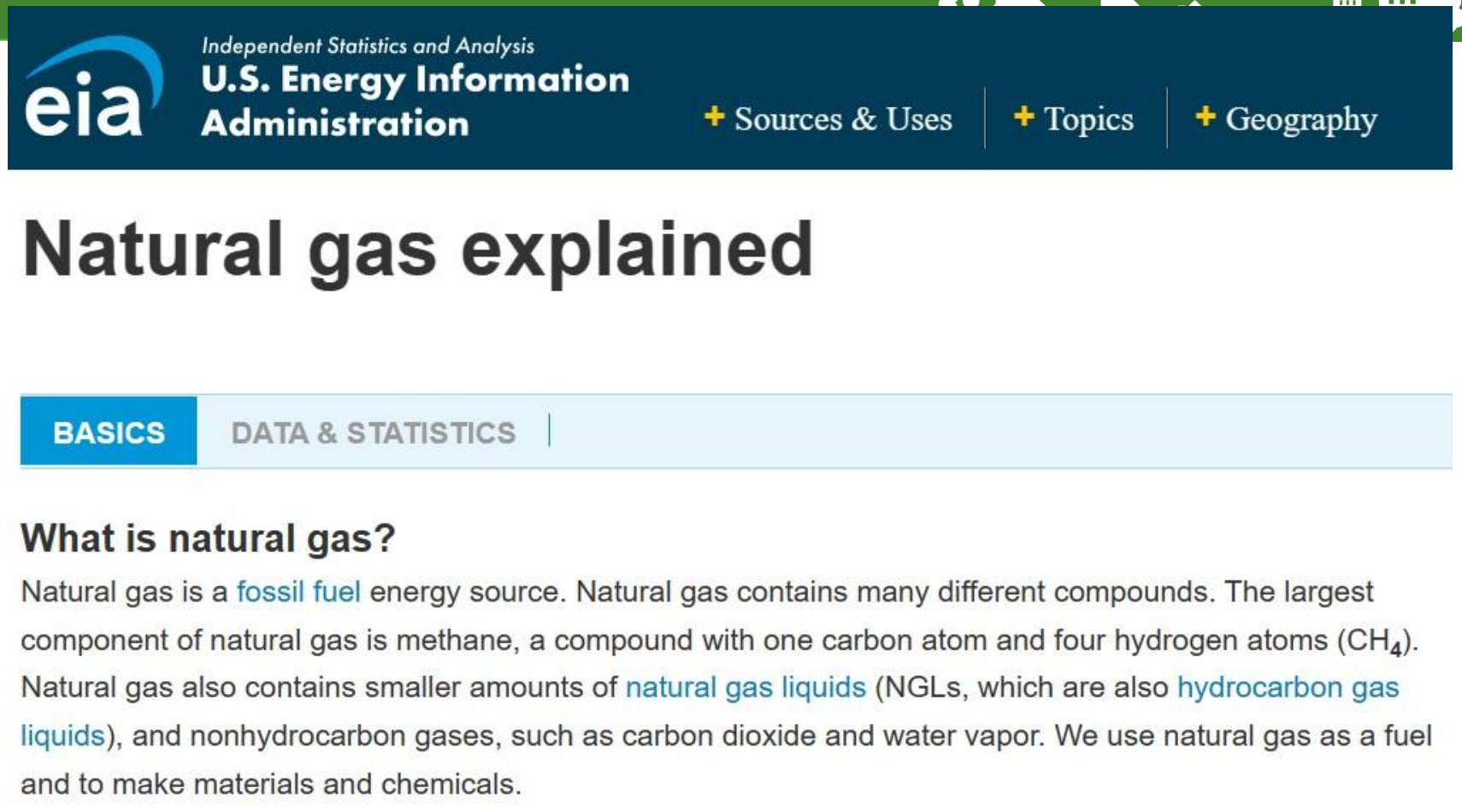
- Never touch the box with wet hands
- Never touch the box while standing on a wet floor
- Never remove the cover
- Do not touch the connections of the plugs

Natural Gas Hazards

- Lighter than air, odorless
- Smells like rotten eggs
  - Mercaptan is added to natural gas to give it a distinctive odor.
  - It is noticeable at 0.4%
- Explosive
  - Can readily ignite under the right conditions (5-15%)
- Asphyxiant
  - Displaces oxygen in the body

PM 6-15

Natural Gas Hazards



Natural Gas Hazards

- Asphyxiant
  - Displaces oxygen in the body

$$CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O$$

Methane and Oxygen Gases Reaction | $CH_4 + O_2$

Methane, a combustible and toxic gas, is used to generate heat by burning with oxygen gas. As products, carbon dioxide and water are given if complete combustion is achieved. Otherwise, carbon monoxide can be given as another product if the supplied oxygen gas amount is not sufficient.

Natural Gas Hazard Awareness

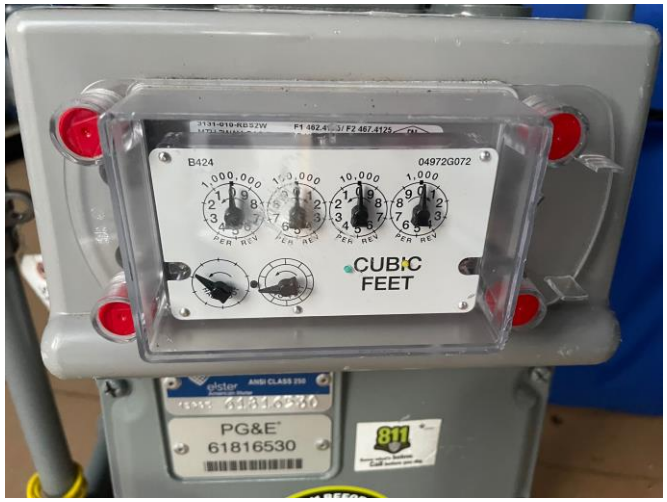
- Install natural gas detector
- Install carbon monoxide detector in home
- Test batteries for natural gas and carbon monoxide detectors every month
  - Change batteries every six months
- Locate and label gas shutoffs
  - Have proper non-sparking tool
  - Make sure the valve isn't stuck shut from paint or rust

When to turn off the gas?

- Smell it
  - Rotten eggs, sulfur

- Hear it
  - Whistling or hissing
  - Roaring

- See It
  - Structural damage
  - Gas meter dials spinning faster than normal
  - You see dust blowing in one spot
  - Continuous bubbling in water outdoors
  - Dying plants indoors or outdoors



Gas leak inside

- Gas accumulation can lead to a fire or explosion

- ✓Get Out
  - Leave the doors open when you leave
  - Shut off the gas at the meter
  - Do not turn electricity on or off—can generate a spark!

- ✓Can't shut off the gas?
  - Evacuate immediately
  - Call 911 from a safe place where you don't smell gas

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Gas Shutoff – types of valves

Types of Gas Valves

There are many types of gas valves, including:

- **Angle** valves admit gases at an angle and allow for maximum
- **Balancing** valves maintain a consistent temperature and com
- **Ball** valves provide tight shut-offs, but are not suitable for sani
- **Butterfly** valves permit flow in only one direction.
- **Block-and-bleed**, **blow-off**, **cartridge**, **check**, and **control** va
- **Diaphragm** valves separate the flow of gases from the closure
- **Directional** valves steer flow through selected passages.
- **Diverter** valves also redirect gas flow.
- **Drain** valves reduce surplus media.
- **Gate** or **knife** valves are linear motion valves in which a closu
- **Globe** and **pinch** valves are other types of linear motion devices.
- **Metering** and mixing valves are used in specialized applications.
- **Needle** valves have a slender, tapered point at the end of a valve stem.
- **Plug** or **stop-cock** valves are designed for both on/off and throttling functions.
- **Other** types include poppet valves, pressure relief valves, regulators, safety valves, and sampling valves. Compressor valves as well as servo, shut off, solenoid, spool, toggle, underwater, and vacuum relief or anti-siphon gas valves are also available.

PM 6-16

Gas Shutoff – Locate and label gas shutoff valves

- If not automatic, know procedures for shutting off gas
- DO NOT turn on the gas yourself!
- Service must be turned on by a qualified utility professional!

PM 6-16

To shut off the gas:

- Use an adjustable wrench – no longer than 12 inches
- Keep it close to the gas meter

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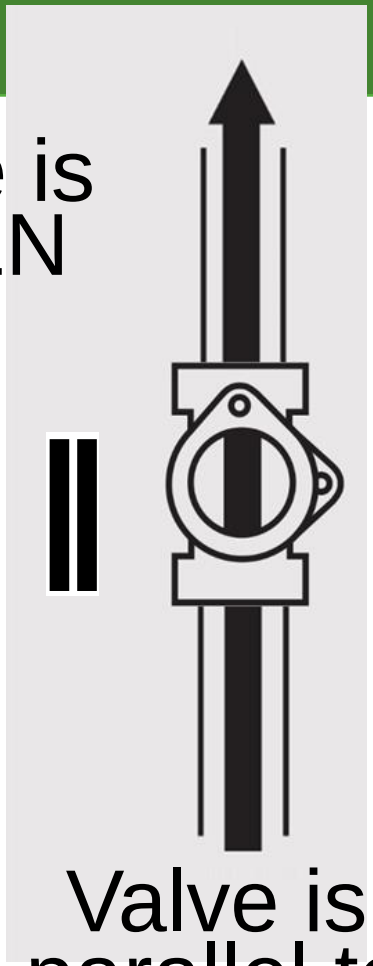
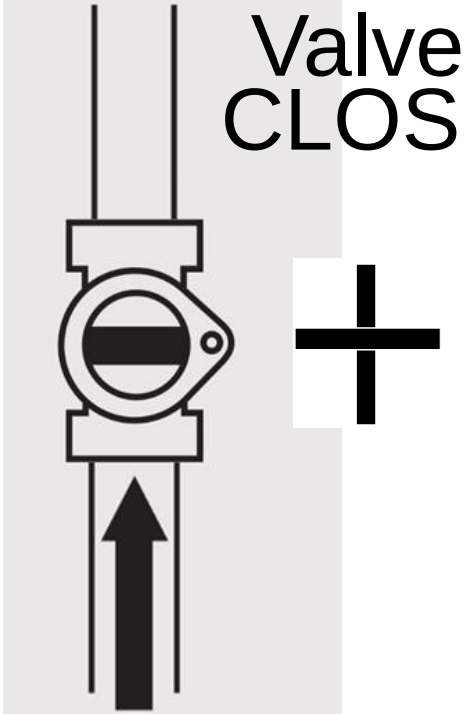
Gas Valves – an Introduction

Valve is OPEN



Valve is parallel to the pipe

Valve is CLOSED



Valve is perpendicular to the pipe

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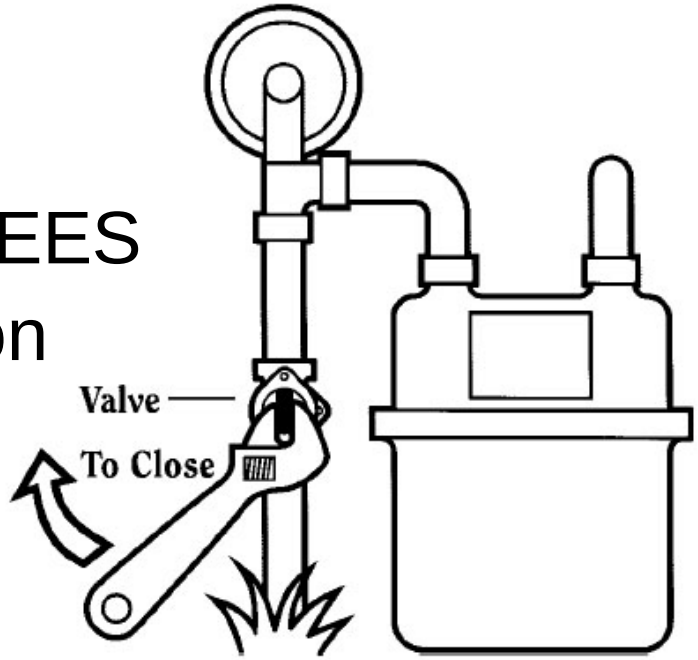
How to shut off the gas

To CLOSE

- Turn the valve 90 DEGREES (1/4 turn) in either direction



DO NOT OPEN

- DO NOT turn on the gas yourself!
- Service must be turned on by a qualified utility professional!

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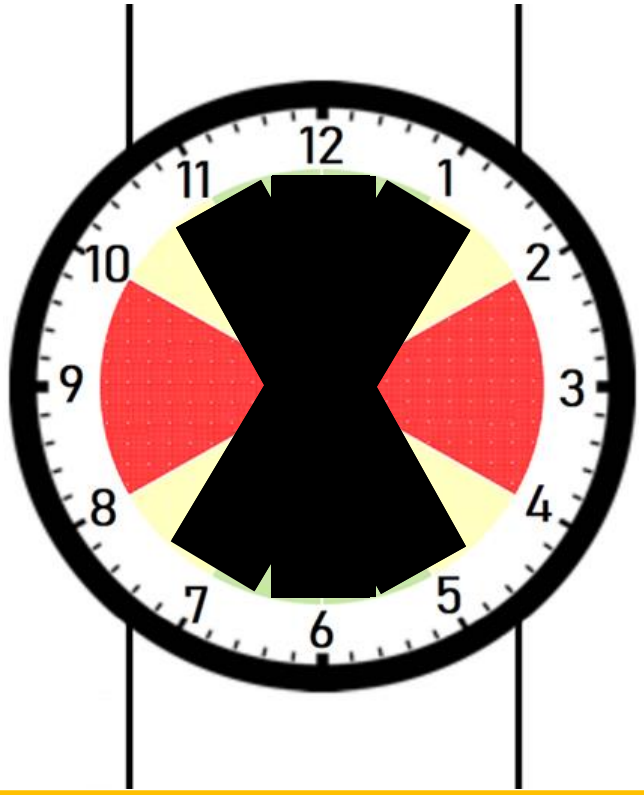
To test the valve:

Move the valve between 11 and 1



L.I.E.S. – Hazardous Materials

- Always read labels
- Use L.I.E.S. storage procedures
  - (**L**imit, **I**solate, **E**liminate, **S**eparate)

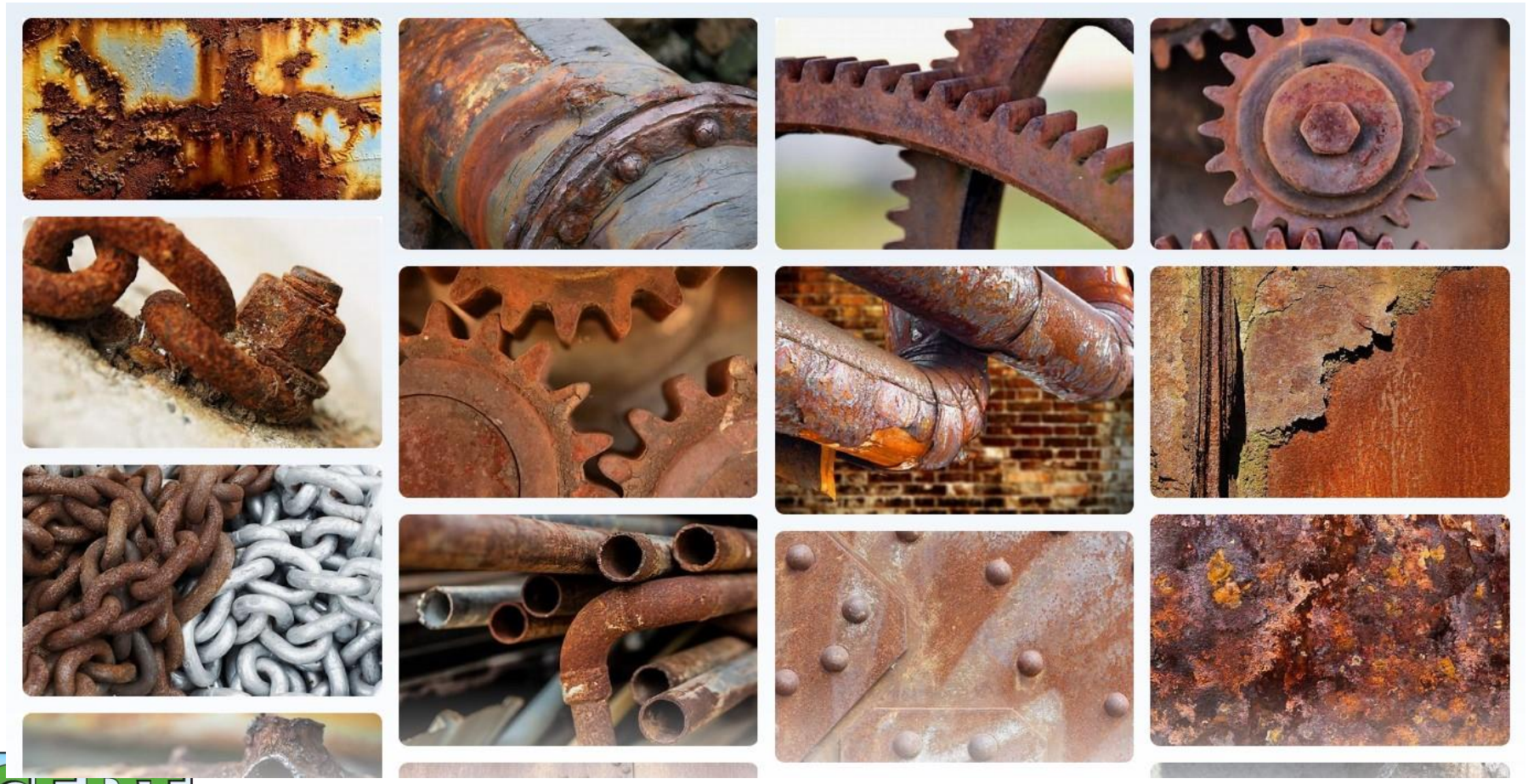
STOP!

Hazardous Materials

- Corrode other materials
- Can explode or are easily ignited
- React strongly with water
- Are unstable when exposed to heat or shockwave
- Are otherwise toxic to humans, animals, or the environment through absorption, inhalation, injection, or ingestion

PM 6-18

Hazardous Materials Corrode Other Materials



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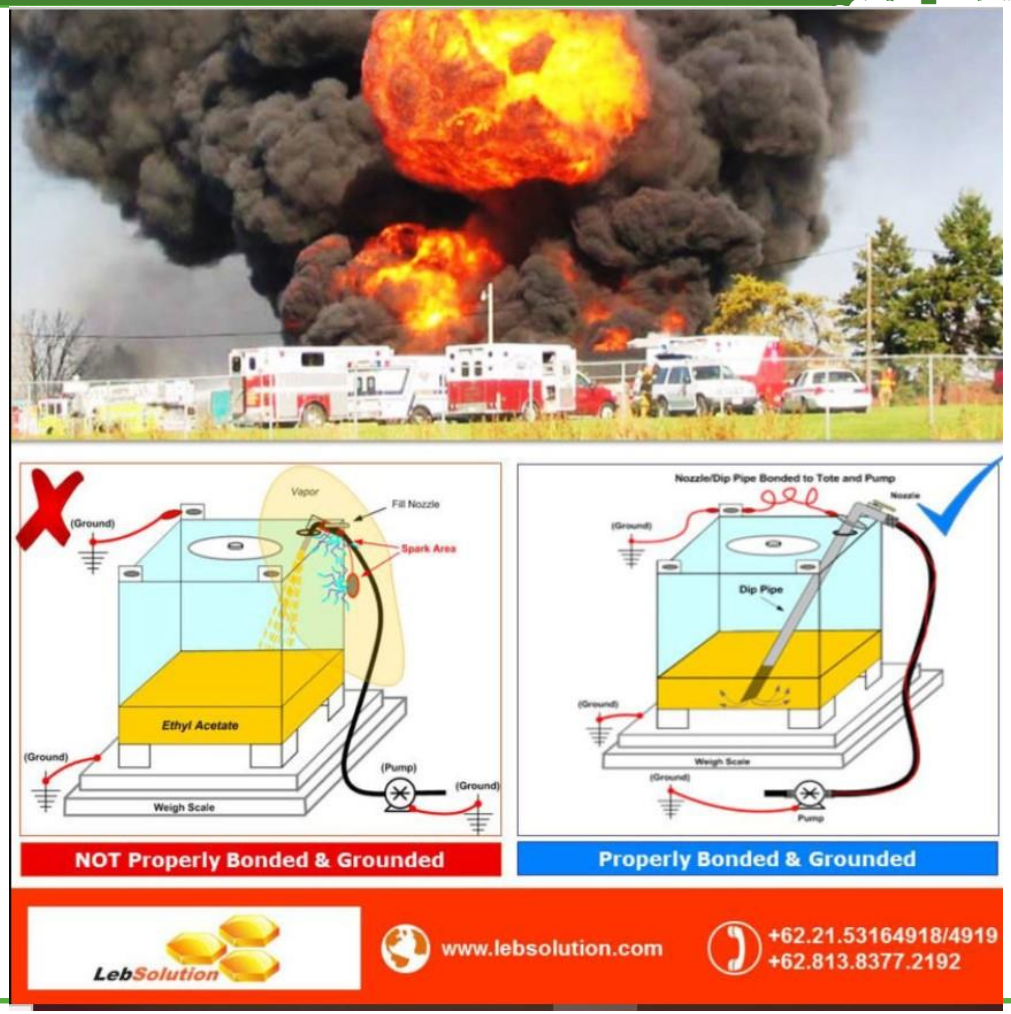
Hazardous Materials Can Explode or Are Easily Ignited



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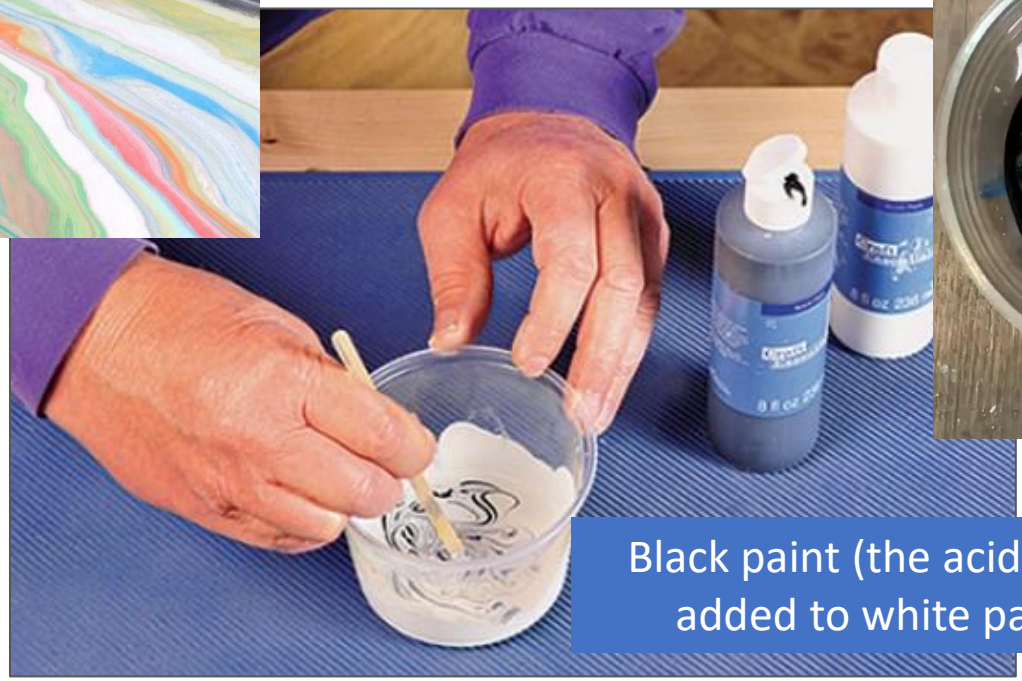
Hazardous Materials React Strongly With Water

Internet searches for “paint mixed accidentally”

White paint (the water) being added to black paint (the acid or base)



Black paint (the acid or base) being added to white paint (the water)

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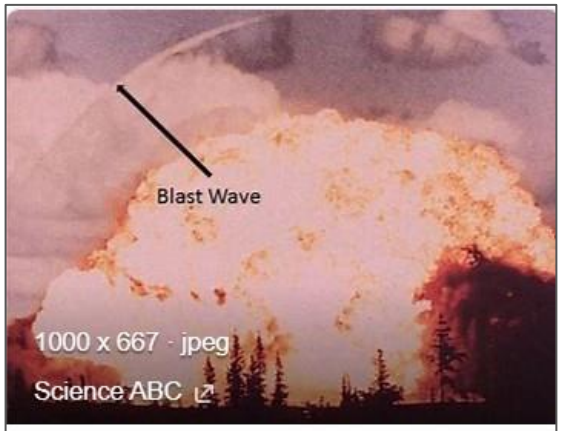
Hazardous Materials Are Unstable When Exposed To Heat Or Shockwave



Why is nitrogen used in explosives?

Visible shock wave : Damnthatsinteresting

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Hazardous Materials Are Toxic To Humans, Animals, & the Environment

Train derailment in East Palestine, Ohio, February 3rd, 2023. It was primarily carrying vinyl chloride and released Acrolein into the environment.

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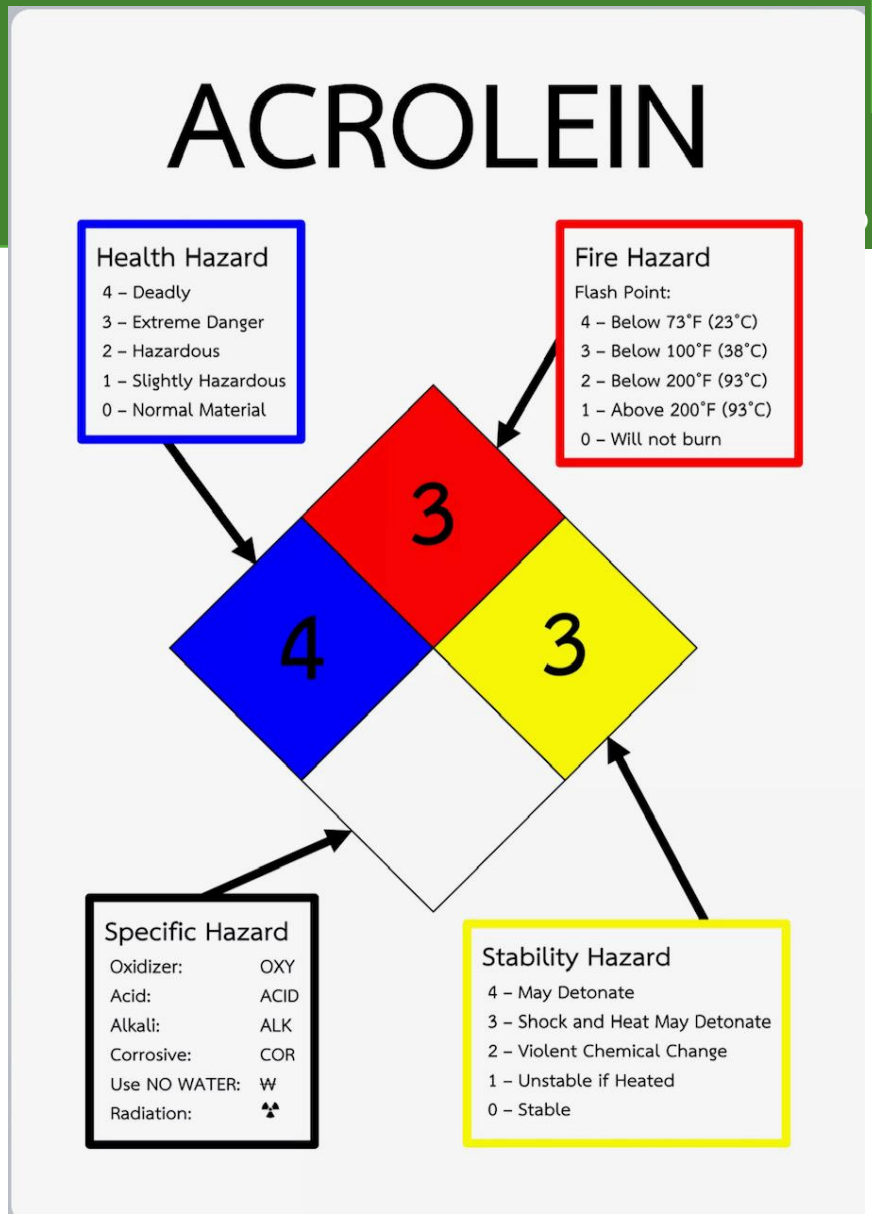
Identifying Stored Hazardous Materials

NFPA 704 Diamond



Identifying Stored Hazardous Materials

Nope, aliens haven't invaded earth, that's just PSO Isaacs and PSO Rybak dressed up in their fully encapsulated level A chemical suits participating in the Santa Clara County Hazardous Materials (Hazmat) Quarterly Training.

The training, which included fire personnel from agencies throughout Santa Clara County, was focused on train derailments, specifically discussing the recent East Palestine, Ohio train derailment, and other types of hazardous materials mitigation operations for rail cars.

We're always training so that we're always ready to serve our community in any type of situation.

Hazardous Materials Are Toxic To Humans, Animals, & the Environment

VINYL CHLORIDE (MONOMER)

SDS No.: M9192 **SDS Revision Date:** 06-Apr-2015

pH:	Not applicable
VOC Content (%):	100%
Volatility:	100%
Evaporation Rate (ether=1):	>15
Partition Coefficient (n-octanol/water):	Log Kow = 1.36
Flash point:	-108 °F (-78 °C)
Flammability (solid, gas):	No data available
Lower Flammability Level (air):	3.6%
Upper Flammability Level (air):	33.0%
Auto-ignition Temperature:	882 °F (472 °C)
Viscosity:	Not applicable

10. STABILITY AND REACTIVITY

Reactivity: Not reactive under normal temperatures and pressures.

Chemical Stability: Stable at normal temperatures and pressures.

Possibility of Hazardous Reactions:
Avoid air and sunlight. Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat.

Conditions to Avoid:
(e.g., static discharge, shock, or vibration) -. Electrostatic charges may build up during handling and may form ignitable vapor-air mixtures in storage containers. Ground equipment in accordance with industry standards and best practices such as NFPA 77 [Recommended Practices on Static Electricity (2007)] and American Petroleum Institute (API) RP Recommended Practice 2003 [Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents (2008)].

Incompatibilities/ Materials to Avoid:
oxidizing agents. oxides of nitrogen. metals. aluminum. aluminum alloys. copper. metal alkyl complexes and alkali metals such as sodium, potassium and their alloys.

Hazardous Decomposition Products: oxides of carbon, chlorine, hydrogen chloride, phosgene

Hazardous Polymerization: Polymerization can occur. Avoid elevated temperatures, oxidizing agents, oxides of nitrogen, oxygen, peroxides, other polymerization catalysts/initiators, air and sunlight.

11. TOXICOLOGICAL INFORMATION

M9192 - ANSI - EN

VINYL CHLORIDE (MONOMER)

SDS No.: M9192 **SDS Revision Date:** 06-Apr-2015

STATE REGULATIONS

Component	California Proposition 65 Cancer WARNING:	California Proposition 65 CRT List - Male reproductive toxin:	California Proposition 65 CRT List - Female reproductive toxin:	Massachusetts Right to Know Hazardous Substance List	New Jersey Right to Know Hazardous Substance List	New Jersey Special Health Hazards Substance List
Vinyl chloride 75-01-4	Listed	Not Listed	Not Listed	Listed	2001	carcinogen; flammable - fourth degree; mutagen

Component	New Jersey - Environmental Hazardous Substance List	Pennsylvania Right to Know Hazardous Substance List	Pennsylvania Right to Know Special Hazardous Substances	Pennsylvania Right to Know Environmental Hazard List	Rhode Island Right to Know Hazardous Substance List
Vinyl chloride 75-01-4	Listed	Listed	Present	Present	Not Listed

CANADIAN REGULATIONS
• This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations

WHMIS - Classifications of Substances:
• A - Compressed Gas
• B1 - Flammable Gas
• D2A - Poisonous and Infectious Material; Materials causing other toxic effects - Very toxic material
• D2B - Poisonous and Infectious Material; Materials causing other toxic effects - Toxic material
• F - Dangerously reactive material

16. OTHER INFORMATION

Prepared by: OxyChem Corporate HESS - Product Stewardship

Rev. Date: 06-Apr-2015

HMIS: (SCALE 0-4) (Rated using National Paint & Coatings Association HMIS: Rating Instructions, 2nd Edition)

Health Rating: 2* **Flammability Rating:** 4 **Reactivity Rating:** 1

NFPA 704 - Hazard Identification Ratings (SCALE 0-4)

Health Rating: 2 **Flammability:** 4 **Reactivity Rating:** 2

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Hazardous Materials Are Toxic To Humans, Animals, & the Environment

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent
107-02-8	Acrolein	97
123-31-9	Hydroquinone	> 0.1

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear colorless to slightly yellow liquid. Flash Point: -26 deg C.
Danger! May be fatal if swallowed. May polymerize explosively on loss of inhibitor. May be fatal if absorbed through the skin. Causes eye and skin burns. Causes digestive and respiratory tract burns. May be fatal if inhaled. E
cause flash fire. Lachrymator (substance which increases the flow of tears). May form unstable peroxides. Keep refrigerated. (Store below 4℃/39℉.)
Target Organs: Lungs, eyes, skin, mucous membranes.

Potential Health Effects
Eye: May result in corneal injury. Contact with eyes may cause severe irritation, and possible eye burns. Lachrymator (substance which increases the flow of tears).
Skin: May be fatal if absorbed through the skin. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. May cause severe irritation and possible burns.
Ingestion: May be fatal if swallowed. May cause severe gastrointestinal tract irritation with nausea, vomiting and possible burns.
Inhalation: May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bro
edema.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid immediately.
Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.
Ingestion: If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.
Inhalation: POISON material. If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Clos
heated. Extremely flammable liquid and vapor. Vapor may cause flash fire. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Fight fire from maximum distance or use unmanned hose hold
air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.
Extinguishing Media: Use water spray, dry chemical, "alcohol resistant" foam, or carbon dioxide.
Flash Point: -26 deg C (-14.80 deg F)
Autoignition Temperature: 235 deg C (455.00 deg F)
Explosion Limits, Lower:2.8%
Upper: 31%
NFPA Rating: (estimated) Health: 4; Flammability: 3; Instability: 3

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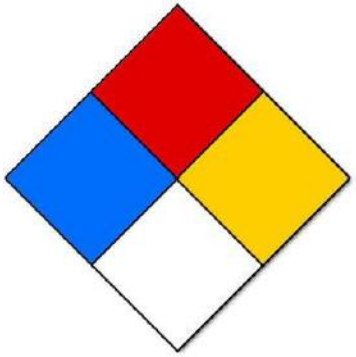
Identifying Stored Hazardous Materials

NFPA 704 Diamond

The White Quadrant

- NFPA 704 Diamond White Quadrant:
  - W: Shows unusual reactivity with water
  - OX: Possesses oxidizing properties



Global Harmonized System

HazMats in Transit

PM 6-21

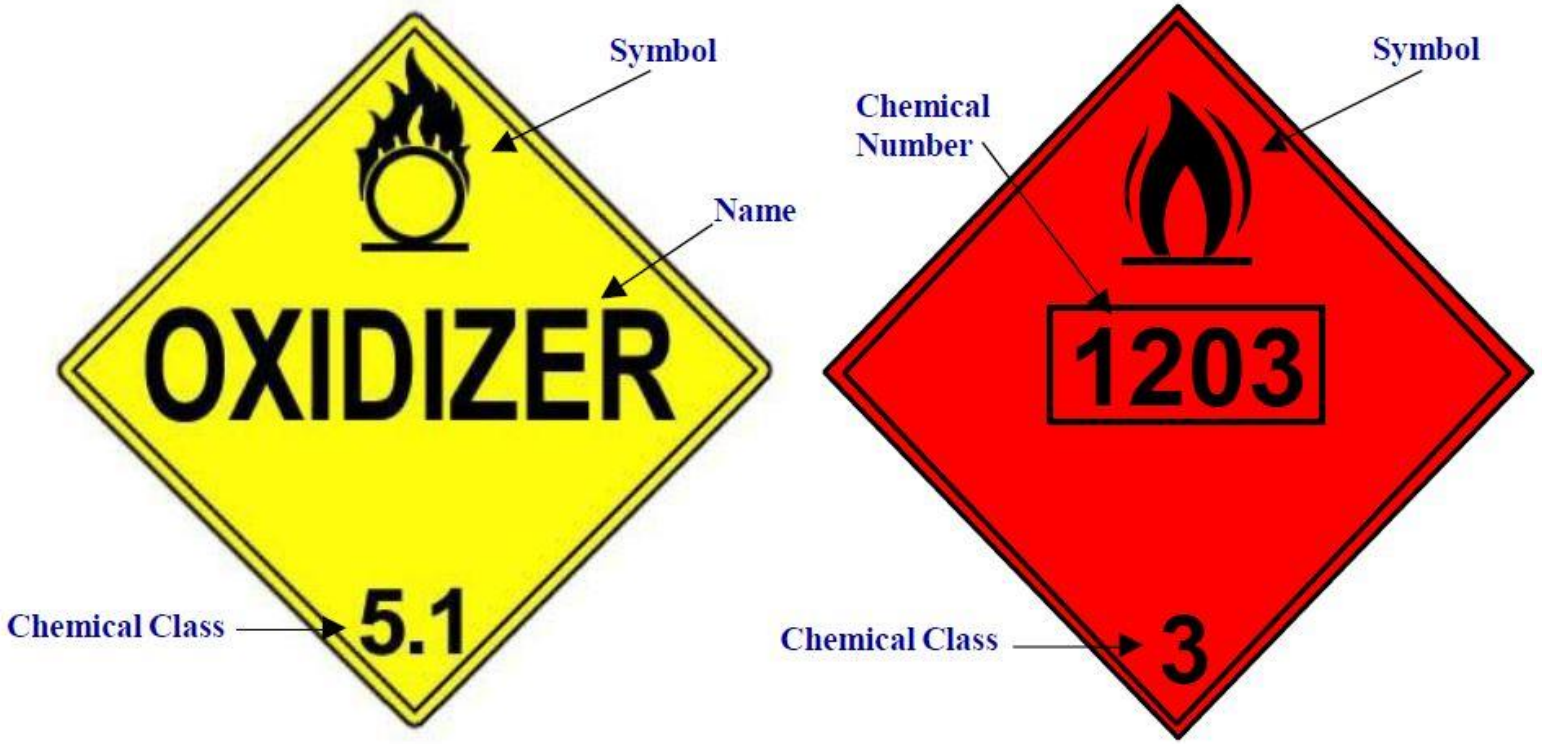
HazMats in Transit

Complaint or Compliant?

HazMats in Transit

HazMats in Transit

UN and DOT Placards



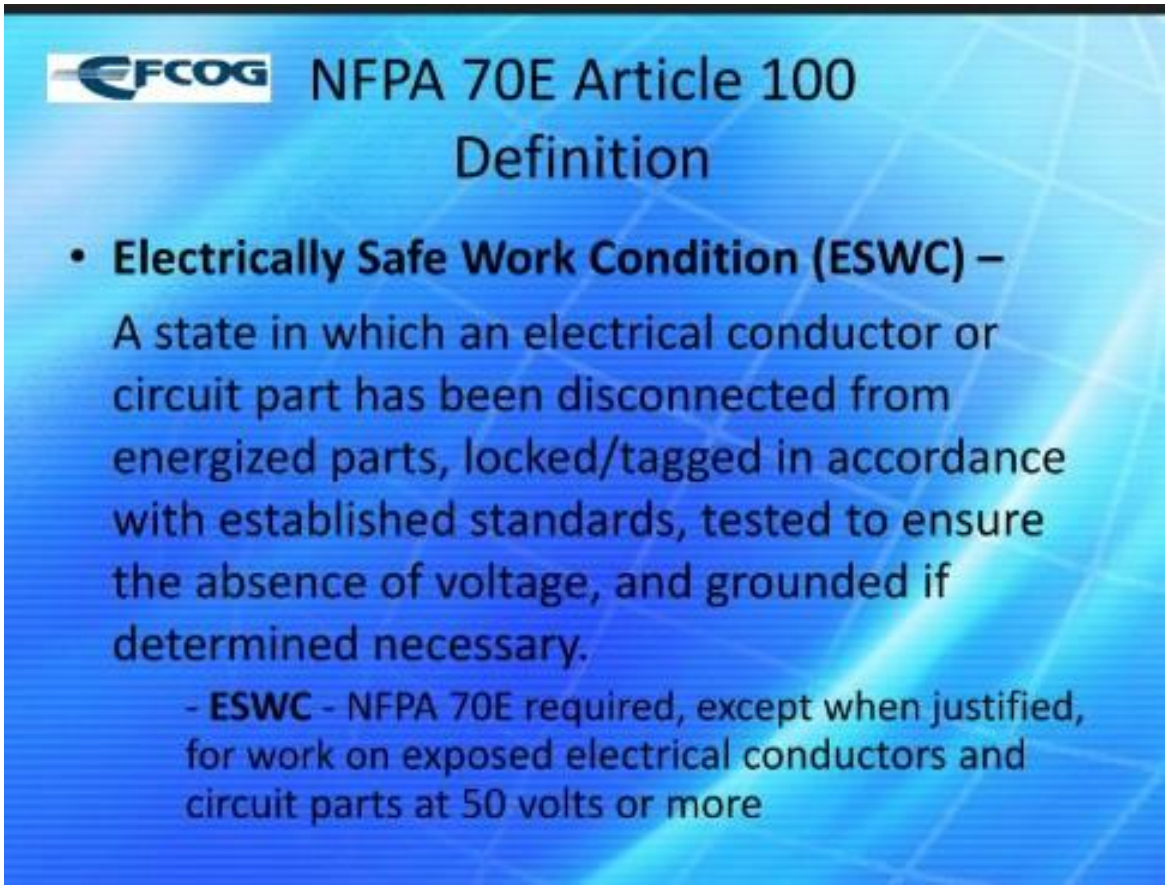
PM 6-21

Greater Than 1?

Remember:

All hazardous material placards are a stop sign for CERT volunteers!

NFPA and Power Lines



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Downed Powerlines

- If it's down, it's a danger. Call 911
- Stay away and do not touch it
- Assume all downed power lines are active!
  - The responsibility of public services is to maintain the flow of energy!
- CERTs: Keep others away!

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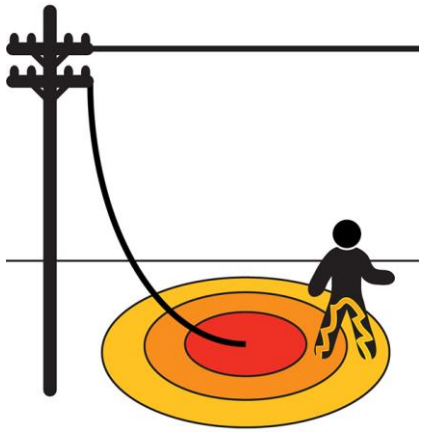
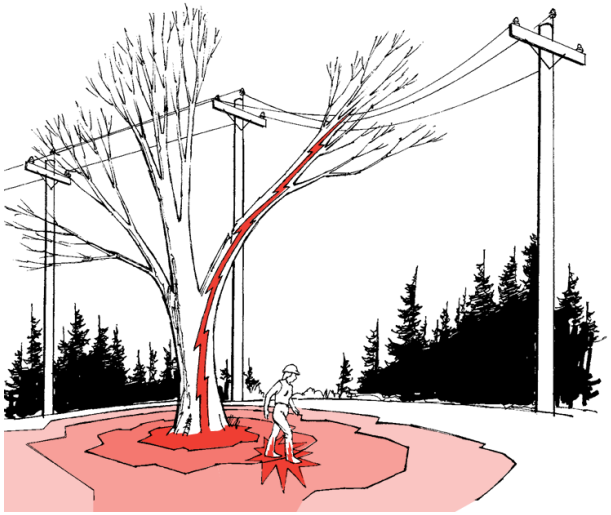
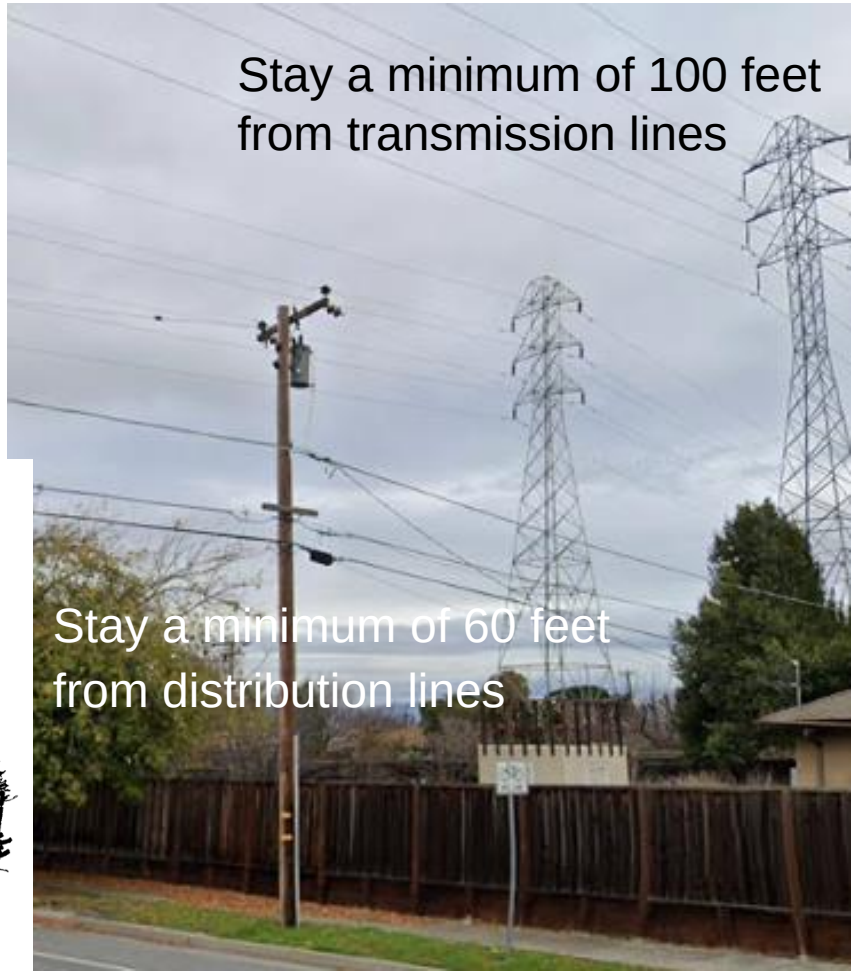
Powerlines

- **Sunnyvale Distribution Lines are 12,000 volts**
- **Lines are weather-proofed, but are not insulated**







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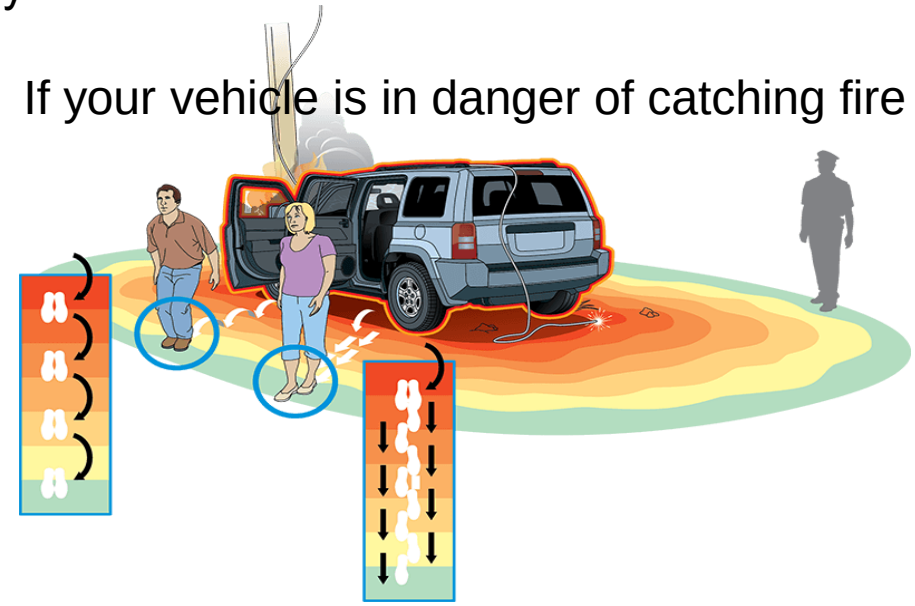
Power line over your vehicle

Stay inside your vehicle!

- The car is energized, but the tires act as insulators
- Sit still with your hands inside the car
- Call 911
- Warn people to stay away and don't let anyone touch the car or the line
- Follow first responders' instructions

If your vehicle is in danger of catching fire



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Unit Summary

Always follow the safety rules established for CERTs. Personal safety comes first!


Questions