# VIRGINIA TECH SHORT SCHOOL LEVEL B, YEAR 2

Steve Nichols
Fleet/Safety Coordinator
Steve.Nichols@westernvawater.org

Western Virginia Water Authority

# Who is a water treatment plant operator?

- a worker who controls treatment plant machinery and equipment to purify and clarify water for human
- consumption and for industrial use

(International Hazard Data Sheets on Occupation)

https://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/publication/wcms_190172.pdf

## What is dangerous about this job?

- Falls, slips, and trips on the level on floors made wet and slippery during the handling of water.
- Exposure to hazardous substances because of a sudden release of toxic materials due to a work related accident, or as a result of human error such as addition of chemicals to an unsuitable device.
- Electric shock caused by contact with “live” wires or defective electrical installations.
- Exposure to high levels of noise from electro-mechanical equipment.
- Exposure to various disinfectants intended for disinfection of water and known as toxic substances.
- Psychological stress and pressure due to environmental factors: annoying noise, water splashing, odors, high humidity, etc.

# A few of the safety issues we face

**Confined Spaces**

**Electrical Safety**

**Fall Protection**

**Ladders**

**Chemical Handling**

**Personal Protective Equipment**

**** This class is a refresher of safety issues Water Operators may face. This class is not a certification in presented safety topics. Steve and Neil are not responsible for you passing a VOSH inspection more training needed.**

# CONFINED SPACE ENTRY

**Purpose:** To protect employees from confined space hazards through proper training and controlled entry.

# Confined Spaces

OSHA's Definition:

- Is large enough and so configured that an employee can bodily enter and perform assigned work; and

- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and

- Is not designed for continuous employee occupancy

# Permit-Required Confined Space

**OSHA's Definition**:

- ***Has one or more*** of the following characteristics:
  - Contains or has a potential to contain a hazardous atmosphere;
  - Contains a material that has the potential for engulfing an entrant;
  - Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
  - Contains **any other** recognized serious safety or health hazard

# Non-Permit Confined Space

A confined space that does not contain, or with the respect to atmospheric hazards, has the potential to contain any hazard capable of causing death or serious physical harm.

# Confined Space “Entry”

- The action by which a person passes through an opening into a PRCS and includes work activities in that space.
- Occurs as soon as **any part** of the entrant’s body **breaks the plane** of an opening into the space
- *If the opening is large enough for the employee to fully enter the space*, **a permit is required-even for partial body entry.**
- Permits are not required for partial body entry *where the opening is not large enough for full entry.*

# Hazards of Confined Spaces

- Oxygen Deficient Atmospheres
- Oxygen Enriched Atmospheres
- Flammable Atmospheres
- Toxic Atmospheres
- Internal Configuration
- Engulfment Hazards

- Other Hazards:
  - Mechanical hazards
  - Energy sources
  - Extreme temperatures
  - Internal parts or equipment
  - Falling tools or objects
  - Uneven or wet surfaces
  - Amplified noise levels
  - Mold, mildew, bacteria, rodents, and insects
  - Personal failure (fatigue, health condition, etc.)

# Unfavorable Natural Ventilation

Lack of air movement in and out of the space can create an atmosphere much different than the outside atmosphere.

Deadly gases can be trapped inside.

Organic materials can decompose.

May not be enough oxygen due to presence of other gases or chemical reactions such as rusting.

# Atmosphere Hazard

- Oxygen Level 19.5% - 23.0% (23.5)
- $H_2S$ 0ppm - 10ppm

  Hydrogen sulfide is a chemical compound that is colorless, toxic, and flammable. Has foul rotten egg smell. Results from chemical breakdown of organic matter.

- LEL 0% - 10%
- Carbon Monoxide 0ppm – 25ppm (35ppm)

# Atmosphere Hazard

- **Oxygen** levels that are too low or too high:
  - < 19.5% can cause suffocation.
  - > 23.5% can be extremely flammable.
- **Flammable gases**:
  - Methane or Hydrogen.
- **Toxic air contaminants**:
  - Hydrogen Sulfide or Carbon Monoxide.

| % Oxygen | Symptoms |
|---|---|
| 19.5 - 16 | Fatigue, mild impaired coordination |
| 16-12 | Increased breathing rate and pulse; impaired coordination, perception, or judgement |
| 12 - 10 | Further increased breathing rate, blue lips, mental confusion |
| 10 - 8 | Fainting, nausea, vomiting, mental confusion within a few minutes |
| 8 - 6 | Collapse, DEATH within 8 minutes |
| 6 - 0 | Coma within 40 seconds... DEATH |

# Hydrogen Sulfide

Decomposition of materials.  Human waste.

Rotten egg odor at low concentrations.

Possibly no warning at high concentrations.

Heavier than air-will settle

| PPM | Effect | Time |
|---|---|---|
| 10 ppm | Permissible Exposure Level | 8 Hours |
| 50 - 100 | Mild Irritation - eyes, throat | 1 Hour |
| 200 - 300 | Significant Irritation | 1 Hour |
| 500 -700 | Unconsciousness,  Death | 1/2 - 1 Hour |
| >1000 | Unconsciousness,  Death | Minutes |

# Carbon Monoxide

Odorless, Colorless Gas.
Combustion By-Product and Breathing
Quickly collapse at high concentrations.

| PPM | Effect | Time |
|---|---|---|
| 50 | Permissible Exposure Level | 8 Hours |
| 200 | Slight headache, discomfort | 3 Hours |
| 600 | Headache, discomfort | 1 Hour |
| 1000-2000 | Confusion, nausea, headache | 2 Hours |
| 1000-2000 | Tendency to stagger | 1 1/2 Hours |
| 1000-2000 | Slight heart palpitation | 30 Min. |
| 2000-2500 | Unconsciousness | 30 Min. |

# Flammable Atmospheres

- Critical Factors:
  - Oxygen content in the air.
  - Presence of a flammable gas, or vapor
  - Presence of dust  (visibility of 5’ or less)
- Proper air/gas mixture can lead to explosion
- Typical Ignition Sources:
  - Sparking or electric tool.
  - Welding / cutting operations.
  - Smoking

METHANE-lighter than air

# Entrapment

- Space has an internal configuration that might cause an entrant to be trapped:
  - Sloping floors
  - Inwardly converging walls
    - Examples:
      - Bulk storage tanks
      - hoppers

# Engulfment

- The space contains or has the potential for engulfing an entrant
  - Liquid –
    - Storm water
    - Sewage
    - Process liquids
  - Solid –
    - Sludge
    - Sand (trenches)
    - Lime silos

# Entry Team

- **Authorized Entrant**: Enters the permit space to perform work.
- **Attendant**: Remains outside the space and monitors the entrant.
- **Entry Supervisor**: Reviews and signs the entry permit, authorizes entry, and supervises the entry operation.

Each team member:

- Must have the appropriate understanding, skills, and knowledge to perform their jobs safely in a permit space.
- Must be trained on the permit space hazards.
- Has the legal responsibility to know the signs and symptoms of exposure to hazards
- The entry team must work together to ensure a safe entry!

# Two Options for Entering Confined Spaces:

- Permit-required confined space entry
  - For hazardous or potentially hazardous confined space work
- Non-permit confined space entry
  - For non-hazardous confined space work

# Permit-Required Confined Space Entry Procedure

**CONFINED SPACE ENTRY PERMIT**
**Sample 1**

| | | | | | |
|---|---|---|---|---|---|
| Date: | | | | | |
| Site location or description: | | | | | |
| Purpose of entry: | | | | | |
| Supervisor(s) in charge of crews: | Type of crew (welding, plumbing, etc) | Phone #: | | | |
| | | | | | |
| | | | | | |
| Permit duration: | | | | | |
| Communication procedures (including equipment): | | | | | |
| Rescue procedures (also see emergency contact phone numbers at end of form): | | | | | |
| **REQUIREMENTS COMPLETED (Put N/A if item doesn't apply)** | **DATE** | **TIME** | **REQUIREMENTS COMPLETED (Put N/A if item doesn't apply)** | **DATE** | **TIME** |
| Lockout/De-energize/Try-out | | | Supplied Air Respirator (N/A if alternate entry) | | |
| Line(s) Broken-Capped-Blank | | | Respirator(s) (Air Purifying) | | |
| Purge-Flush and Vent | | | Protective Clothing | | |
| Ventilation | | | Full Body Harness w/ "D" ring | | |
| Secure Area (Post and Flag) | | | Emergency Escape Retrieval Equip | | |
| Lighting (Explosive Proof) | | | Lifelines | | |
| Hotwork Permit | | | Standby safety personnel (N/A if alternate entry) | | |
| Fire Extinguishers | | | Resuscitator—Inhalator (N/A if alternate entry) | | |
| **Add other specific information, if needed, or attach additional instructions or requirements. See the following examples in bold print.** | | | | | |
| **Line(s) to be bled/blanked:** | | | | | |
| **Ventilation equipment:** | | | | | |
| **PPE clothing:** | | | | | |
| **Respirator(s):** | | | | | |
| **Fire extinguisher(s):** | | | | | |
| **Emergency retrieval equipment:** | | | | | |

- Isolate the space
- Test the atmosphere
- Ventilate the space
- Conduct Pre-Entry Briefing
- Complete permit
- Enter the space

# Isolate the Space from all hazards

- **Close Valves**
  - Double block & bleed, or
  - Blank flange
- **Empty the Space**
  - Depressurize, vent & drain
- **Lockout/Tagout Equipment**
  - Electrical sources
  - Rotating/reciprocating parts
  - Hazardous materials
- **Clean residue from the space**

# Test the Atmosphere

- **Prior to every entry**
- **Test multiple levels-at least 3**
- **After a 5 minute ventilation period (if ventilation is necessary);**
- **Continuous monitoring.**
- **Any time a limit is exceeded, no matter what the reason, all personnel shall immediately exit the space, and no others shall enter until atmospheric conditions are returned to safe levels.**

# Equipment

- Air monitor
- Blower
- Tripod
- Harness
- Work Zone/Barrier Equipment-make site safe
- PPE, Hard Hat, Safety Glasses, Flashlight

# IMPORTANT

**All confined spaces are considered dangerous until PROVEN otherwise.**


Questions?

Or

Comments?

# Electrical Safety

# Lockout-Tagout

- AWWA Video Clips

# Electrical Cycle

- From This….

To This….

- To This……

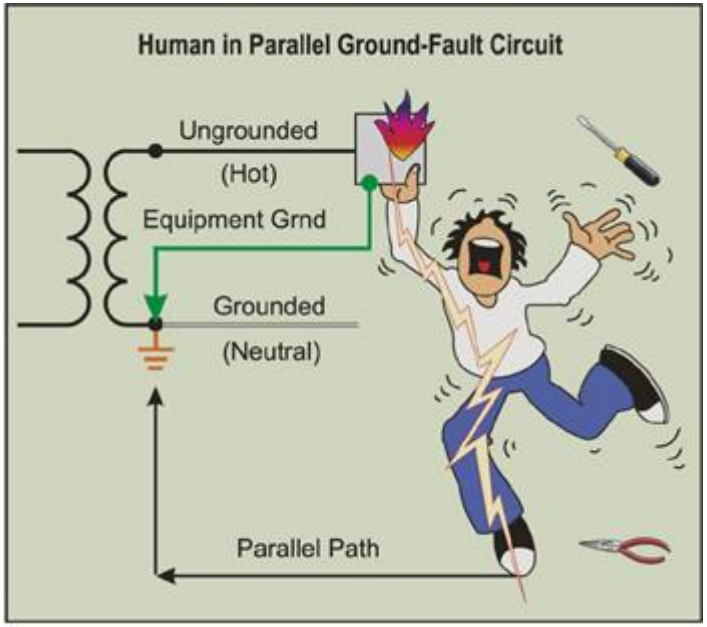
# Electrical Hazards

## Key concerns

- Clear access to electric panels
- Labeling of electric circuits
- Condition and use of extension cords
- Grounding of cords and devices

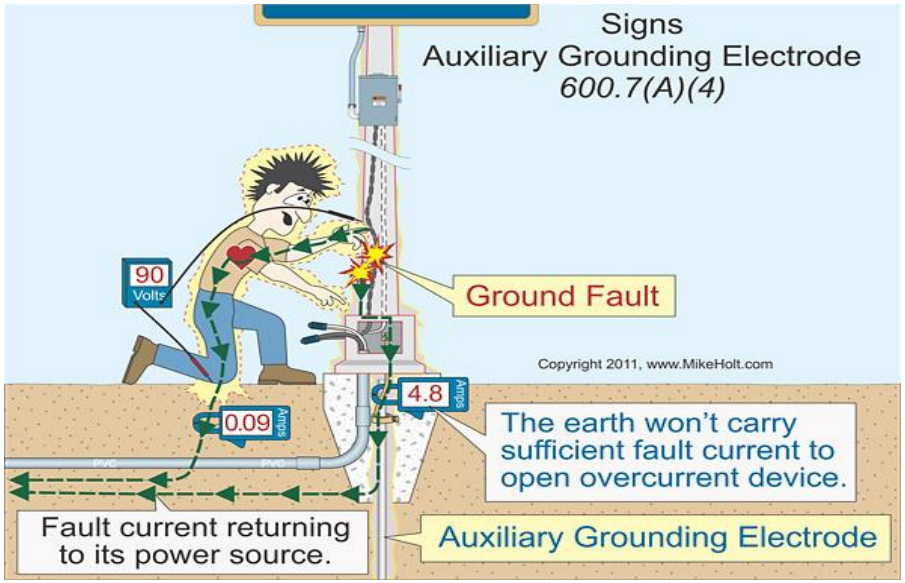
# Some Facts

- 300 deaths and over 3,500 injuries annually.
- For every 13 injuries there is one death
- 70% are in non-electrical job positions
- 68% under age 45



# Electrical Safety

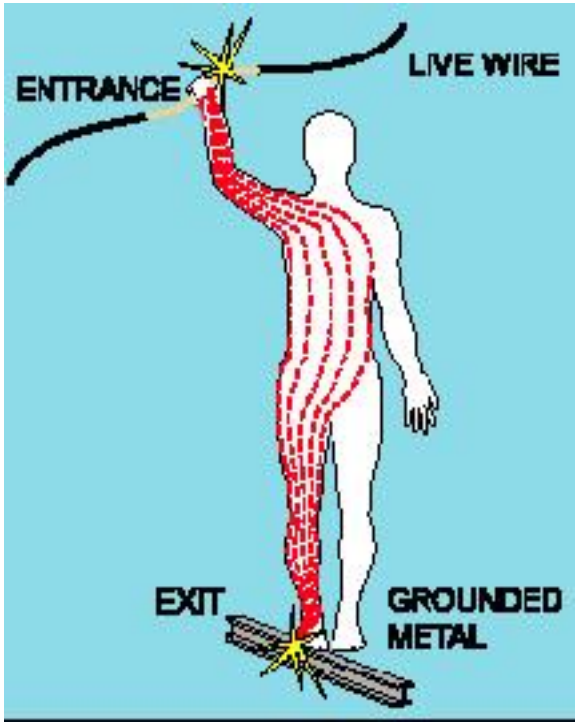
- There are four main types of electrical injuries:
  - Electrocution (death due to electrical shock)
  - Electrical shock
  - Burns
  - Falls



# Electrical Shock

- Received when current passes through the body

- LOW VOLTAGE DOES NOT MEAN LOW HAZARD



# Overload Hazards

# Electrical Protective Devices

- These devices shut off electricity flow in the event of an overload or ground-fault in the circuit
- Include fuses, circuit breakers, and ground-fault circuit-interrupters (GFCI's)

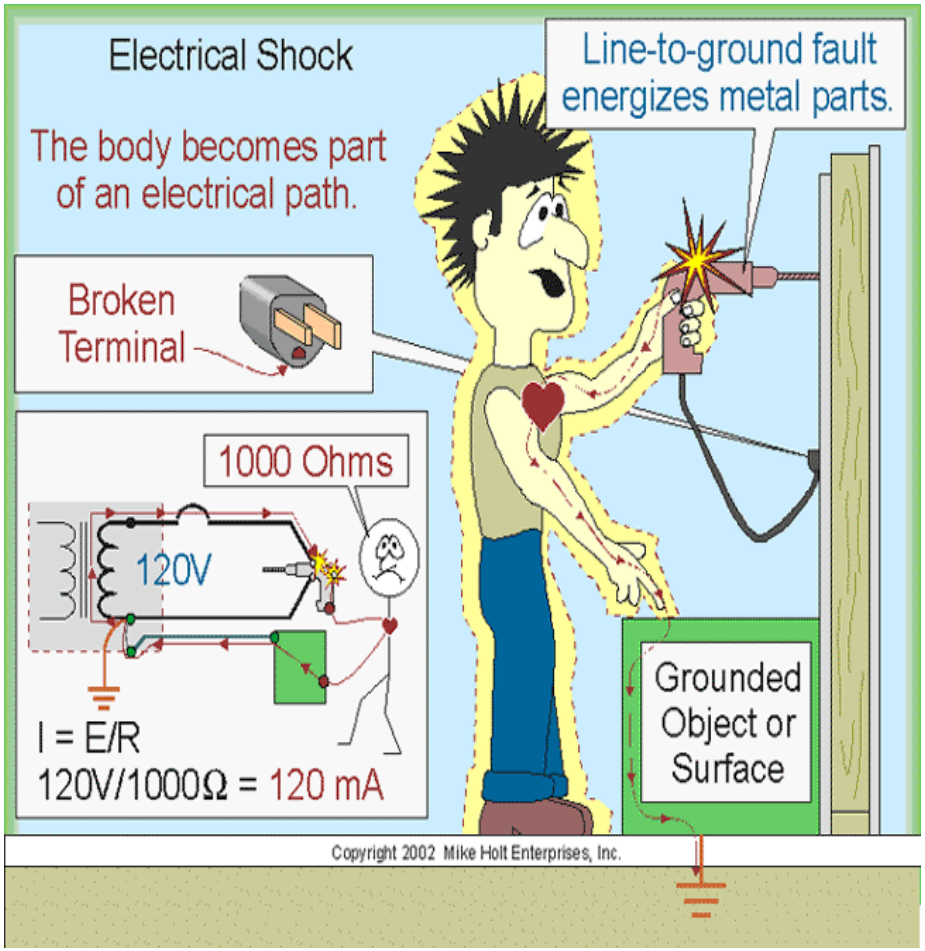
# What's Wrong With These Pictures?


# Grounding Path

- Violation shown here is an extension cord with a missing grounding prong

# Hand-Held Electric Tools

- Have a three-wire cord with ground and be plugged into a grounded receptacle, or
- Be double insulated, or
- Be powered by a low-voltage isolation transformer

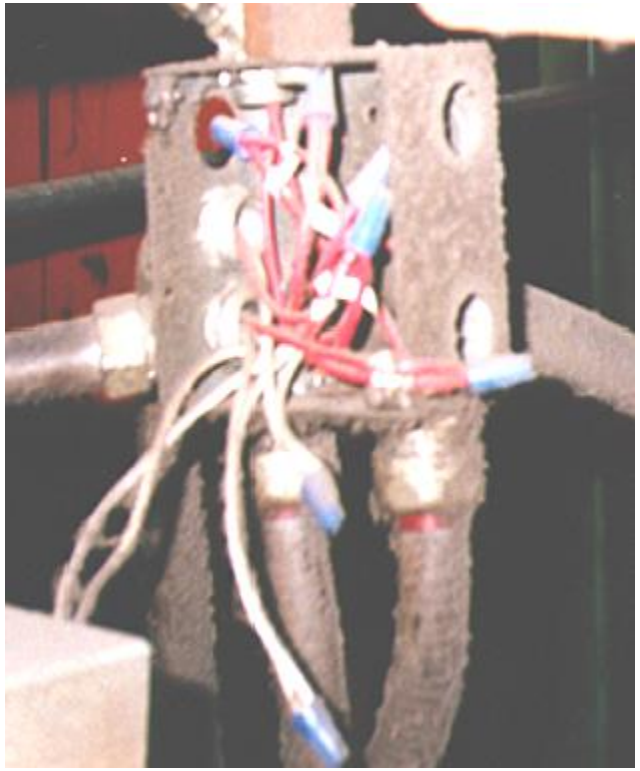


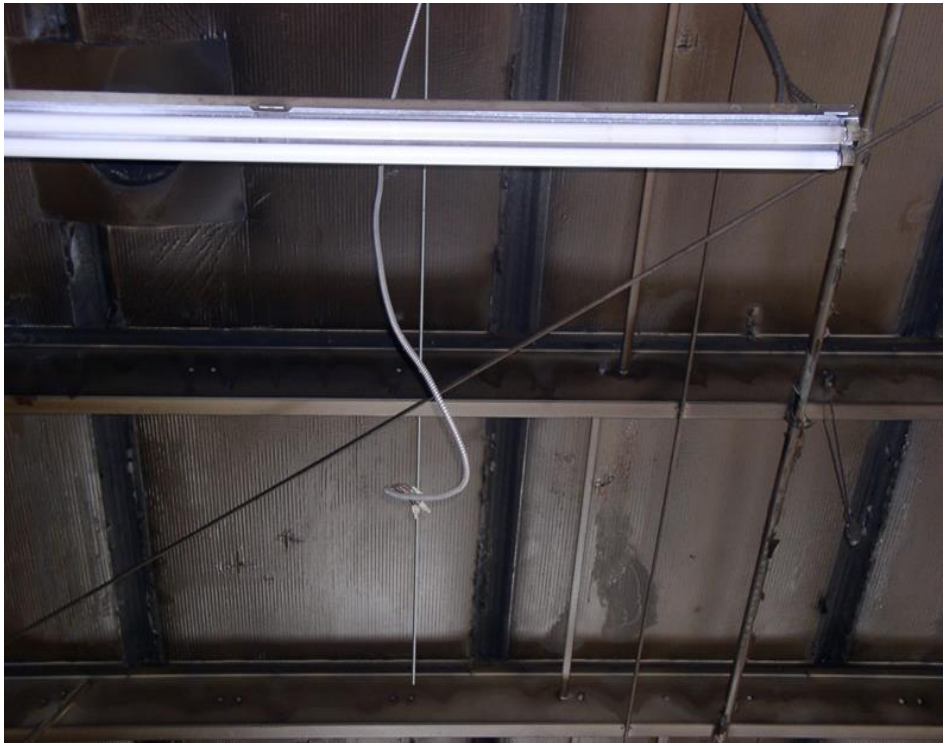
# Guarding of Live Parts

- Violation shown here is physical damage to conduit

# Cabinets, Boxes, and Fittings

- Unused openings in cabinets, boxes and fittings must be closed (no missing knockouts)

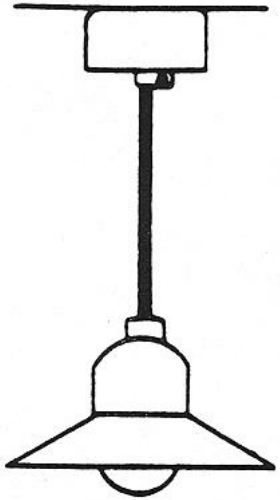




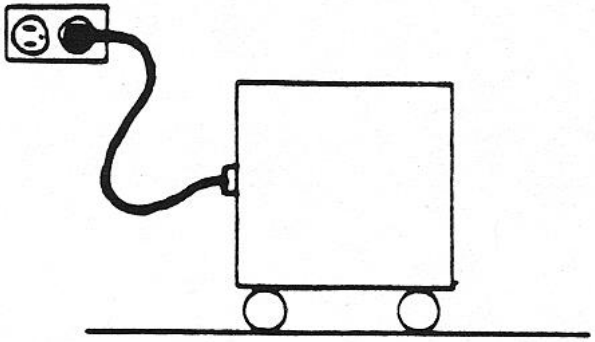
# Use of Flexible Cords

- Flexible cords can be damaged by:
  - Aging
  - Door or window edges
  - Staples or fastenings
  - Abrasion from adjacent materials
  - Activities in the area
- Improper use of flexible cords can cause shocks, burns or fire

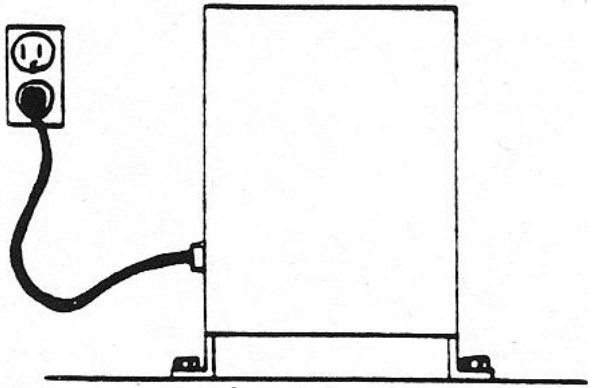
# Permissible Uses of Flexible Cords Examples



Pendant, or
Fixture Wiring

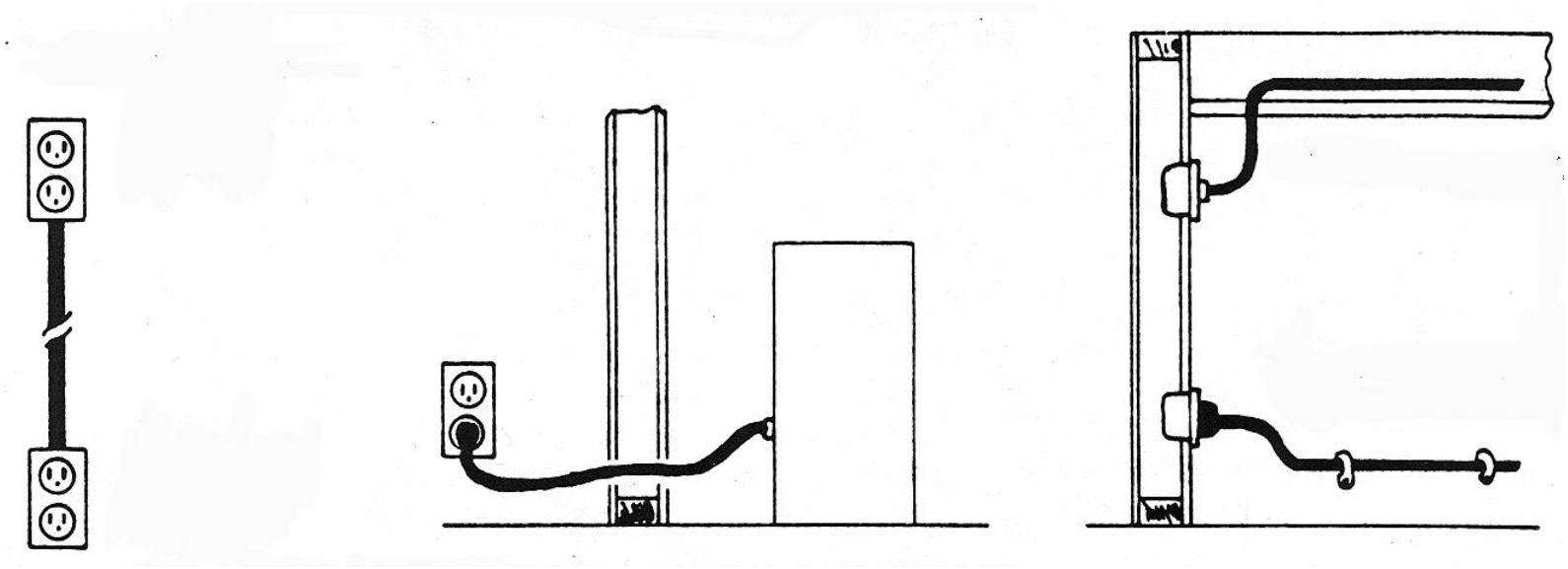


Portable lamps,
tools or appliances



Stationary
equipment-to
facilitate
interchange

# Prohibited Uses of Flexible Cords
## Examples



Substitute for fixed wiring

Run through walls, ceilings, floors, doors, or windows

Concealed behind or attached to building surfaces

# Clues that Electrical Hazards Exist

- Tripped circuit breakers or blown fuses
- Warm tools, wires, cords, connections, or junction boxes
- GFCI that shuts off a circuit
- Worn or frayed insulation around wire or connection

# Lockout/Tagout

Lockout is a technique used to prevent the release of hazardous energy, or to prevent the energy from escaping.

Some form of locking device is used to lock/secure the energy source.


# Types of energy

- Electrical
- Mechanical
- Thermal
- Hydraulic
- Gravity
- Springs
- Water pressure

# Key Terms

**Authorized Person**-individual specially trained and authorized to use a Lockout Device or Tagout process.

**Affected Person**-an individual who may be affected when a Lockout/Tagout process is in place.

**Other Persons**-any one else

**WHY DO YOU THINK THEY LIST EVERYONE THIS WAY?**

# Why lockout/tagout is necessary?

- Prevents injury due to unexpected startup of equipment or released energy

- Maintenance/ servicing operations often require employee to place part or all of his/her body into machine's point of operation

# Fatal Five Causes of Injuries

- Failure to stop equipment
- Failure to disconnect from power source
- Failure to dissipate residual energy
- Accidental restarting of equipment
- Failure to clear work area

# Arch Flash

What is an Arch Flash? (Arch Blast, Electrical Explosion)

AWWA Video Clip “Avoiding Arc Flash”

# Arch Flash Facts

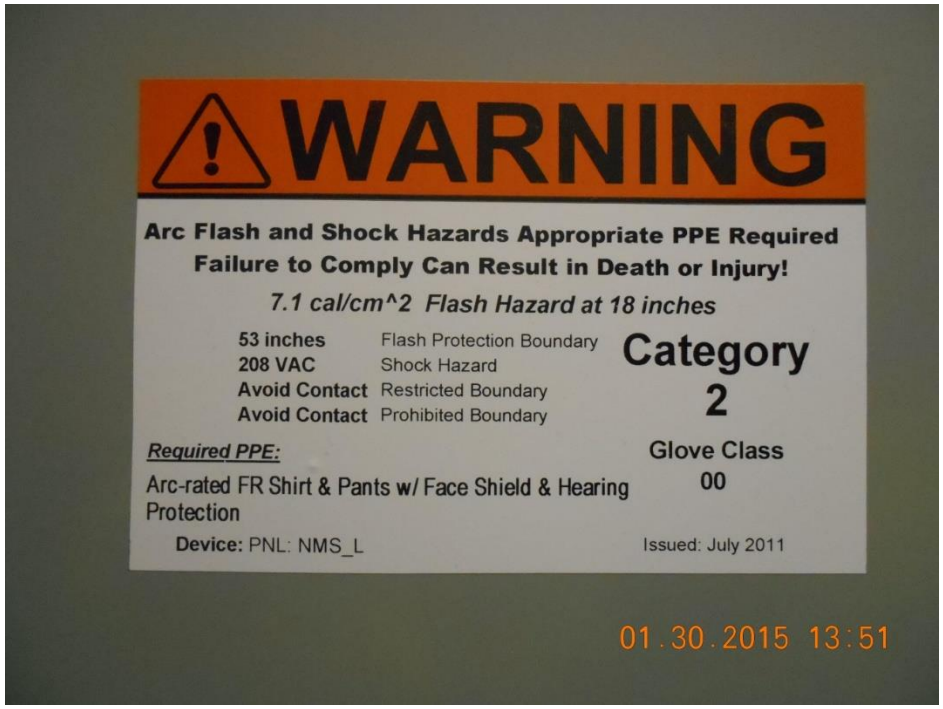
- 5-10 a Day (so how common are they)
- 2000 people treated each year for burns due to arch flash
- 3-4 deaths every week
- Hotter than the sun
- Vaporized metals, 700 mph at 10 ft from source
- Burns 10 ft away
- Sound level 140 decibels-can make your deaf.
- 2 of every 3 injuries due to worker error

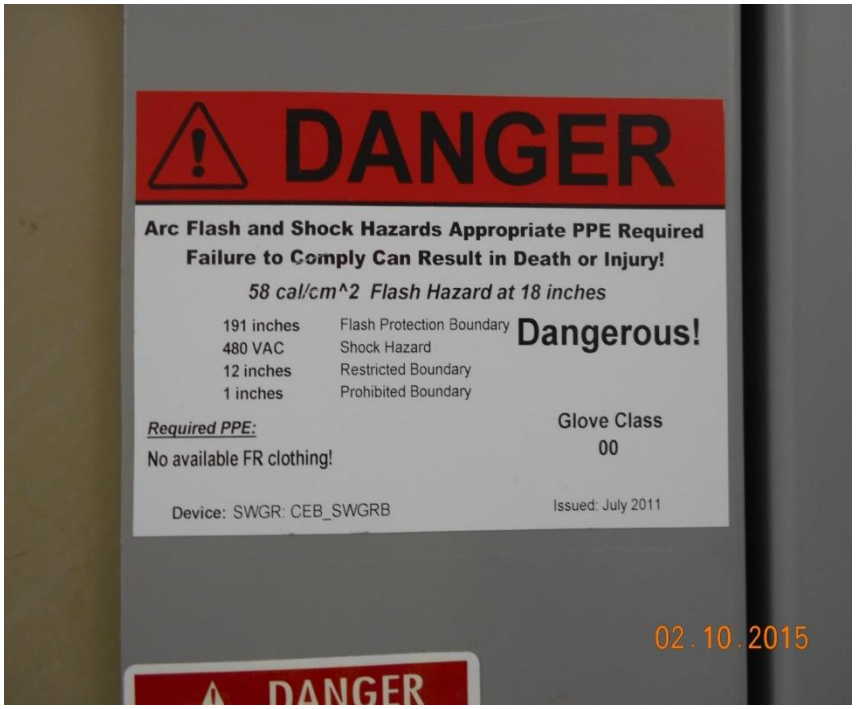
# Personal Protective Equipment

- NOT designed to protect people!!!!
- Designed to limit injuries to 2nd degree burns.

HRC 0, 1 & 2

HRC 3 & 4


WARNING
Arc Flash and Shock Hazards Appropriate PPE Required
Failure to Comply Can Result in Death or Injury!
7.1 cal/cm^2 Flash Hazard at 18 inches
53 inches Flash Protection Boundary
208 VAC Shock Hazard
Avoid Contact Restricted Boundary
Avoid Contact Prohibited Boundary
Category 2
Required PPE:
Arc-rated FR Shirt & Pants w/ Face Shield & Hearing Protection
Glove Class 00
Device: PNL: NMS_L
Issued: July 2011
01.30.2015 13:51


DANGER
Arc Flash and Shock Hazards Appropriate PPE Required
Failure to Comply Can Result in Death or Injury!
58 cal/cm^2 Flash Hazard at 18 inches
191 inches Flash Protection Boundary
480 VAC Shock Hazard
12 inches Restricted Boundary
1 inches Prohibited Boundary
Dangerous!
Required PPE:
No available FR clothing!
Glove Class 00
Device: SWGR: CEB_SWGRB
Issued: July 2011
02.10.2015

## Electrical PPE: Safety Glasses & Hearing Protectors


100% cotton long sleeve shirt

Questions?

Or

Comments?

# FALL PROTECTION


# AWWA Video Clips

- Don’t Fall into Danger – Climbing Elevated Tanks

# Work surface and walkway hazards

## Key concerns

- Obstructions
- Clutter
- Slippery surfaces
- Damage
- Falls from elevation

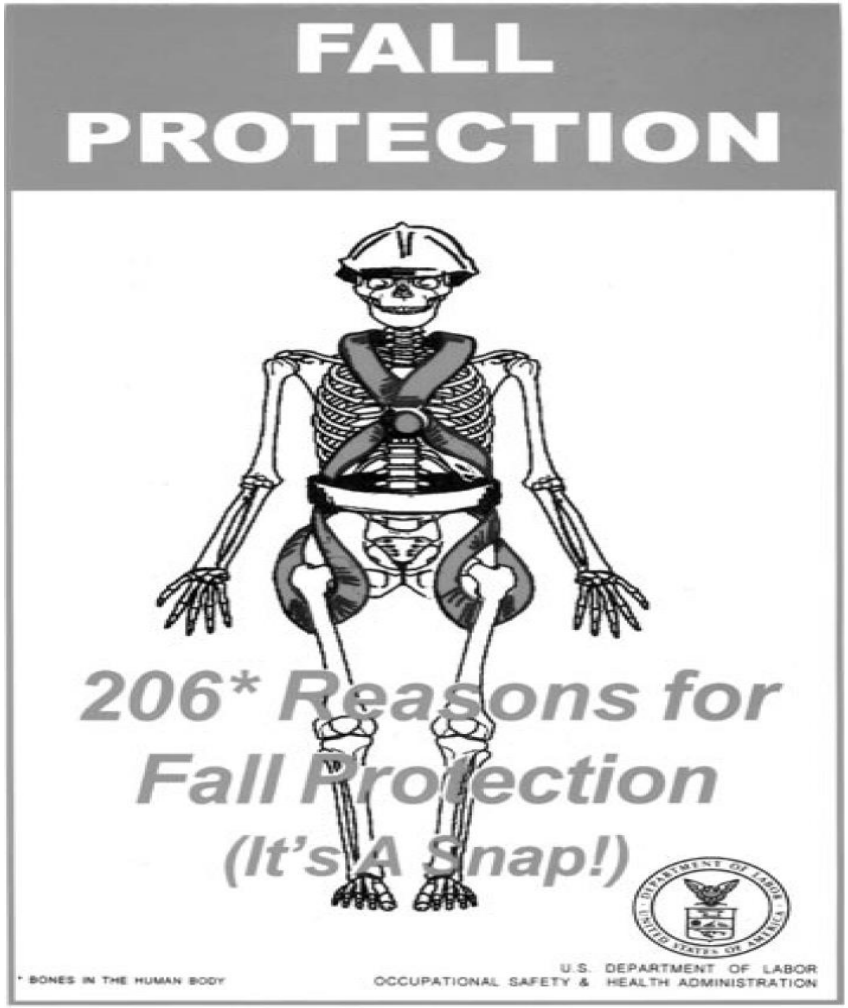
# This is *not* TRAINING


"You weren't listening. I said, 'Don't fall.'"

# Fall Protection

- Major area of emphasis by OSHA.  For years has been addressed in commercial building operations and minimally in general industry.
- However, new regulations hitting the construction industry have been implemented to strengthen everything.

It is a whole new game!



# Complicated

- Fall Protection-There is no single definition for Fall Protection. There are just places where we must require fall protection. It is up to the competent person to make the determination.

General Industry-4 ft rule
Construction-6 ft rule
Scaffolding-10 ft rule
Ladders –portable vs fixed
Cranes and Derricks
Confined Spaces-5 ft rule
Wall and Floor Openings
Steel Erection
Communication Towers
Powered Platforms/Manlifts
Vehicle Mounted Lifts
Underground Work
Roofs-Commercial and Residential
Leading Edge Work

# Competent Person

- Used in many OSHA standards and documents. An OSHA "competent person" is defined as "one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them". By way of training and/or experience, a competent person is knowledgeable of applicable standards, is capable of identifying workplace hazards relating to the specific operation, and has the authority to correct them. Some standards add additional specific requirements which must be met by the competent person.


THE NEW YORK COLLECTION

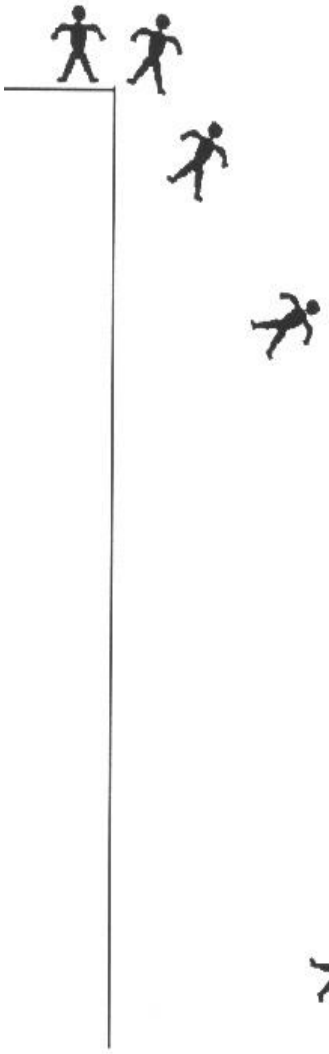
**“I’m not going to fall” is not Fall Prevention either.**

# Key point for Fall Protection

- We are a little misleading.  Sometimes it is designed to be fall prevention-to not let you fall.

- Other times it is just intended to protect you from impacting, not falling.

# When you fall



**.33sec./2 feet**

**.67 sec./7 feet**

**1 sec./16 feet**

**20 MPH at this point-20 ft**

**2 sec./64 feet**

- It takes most people about 1/3 of a second to become aware.
- It takes another 1/3 of a second for the body to react.

A body can fall up to 7 feet in 2/3 of a second.

# When required

Fall protection required for walking / working surfaces over 4’ in height in general industry

- Open-sided floors
- Holes
- Leading edges

# When required

Fall protection required for walking / working surfaces over 6’ in height in construction

Roofs

Leading Edges (exposed)

Elevated Edges

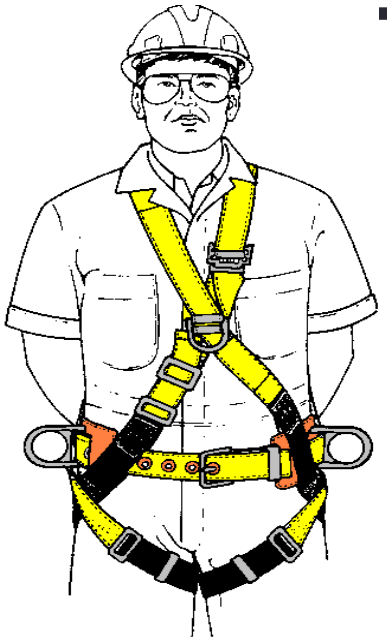
# When required

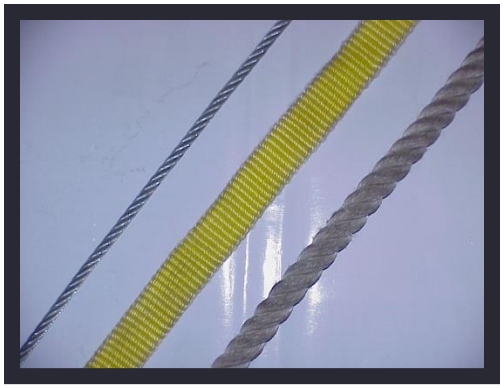
- Fall prevention is required for falls onto dangerous equipment. Zero fall distance is allowed.

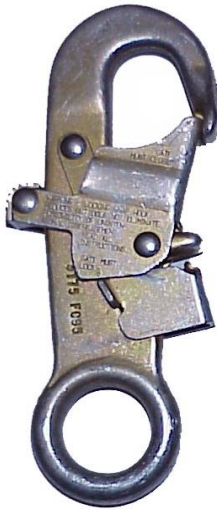
- Fall protection is required for scaffolding over 10’ in height.

# FALL PROTECTION

## Equipment Selection







# Fall Protection

Components include:

**A,B,C,D**

Anchorage point

Body harness

Connectors – lanyards, rope grabs, anchorage connectors

Descent/Rescue

# Anchor Points

- Fall arrest anchor points must support 5000 lbs per employee attached
- Fall restraint anchor points must support at least 1000 lbs per employee attached

Handrails are not typically rated anchor points.

# Harness

Chest strap tightened at mid chest

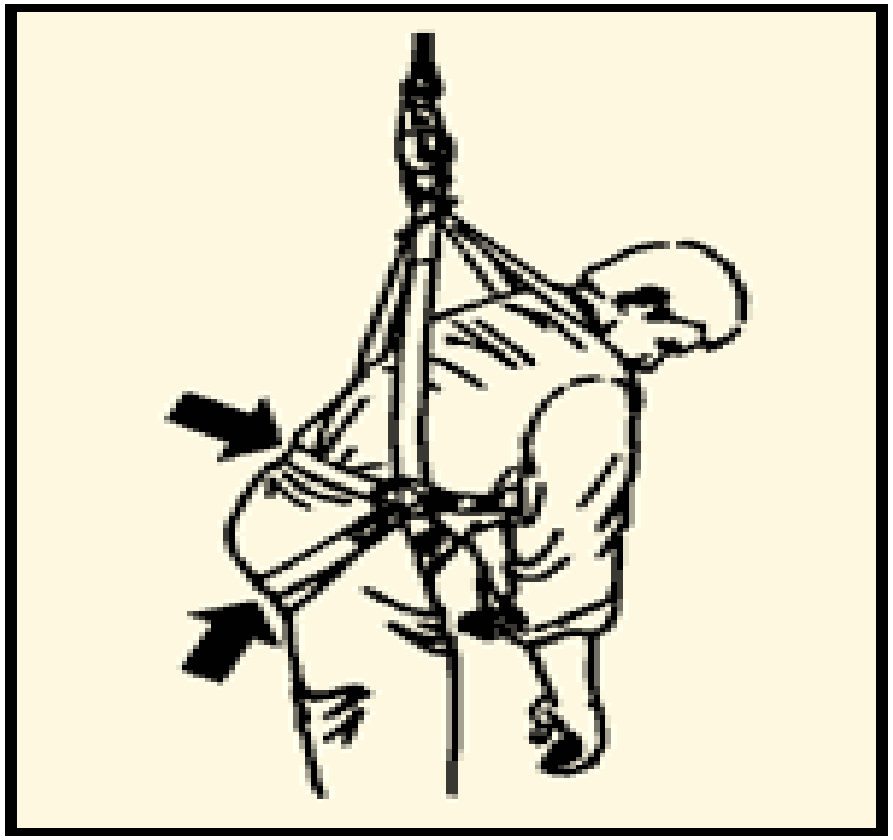
Proper snugness shoulder to hips

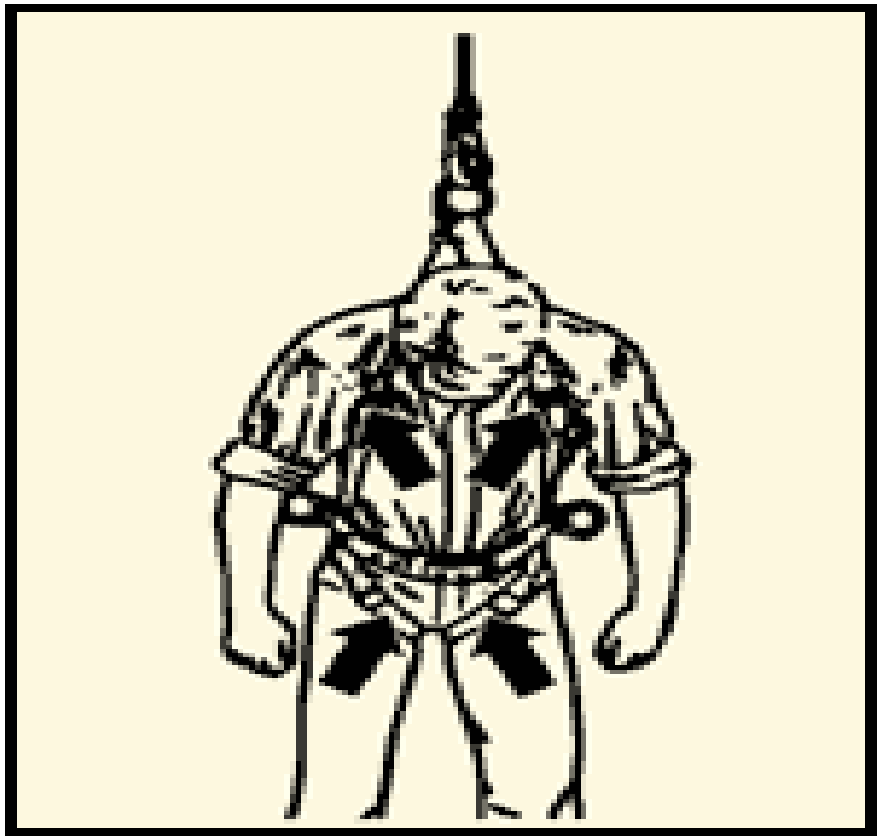
Leg straps snug but not binding

D” ring between shoulder blades

Butt strap supports the load

***Some studies have indicated permanent damage to the lower extremities when the worker hangs for more than twenty (20) minutes***



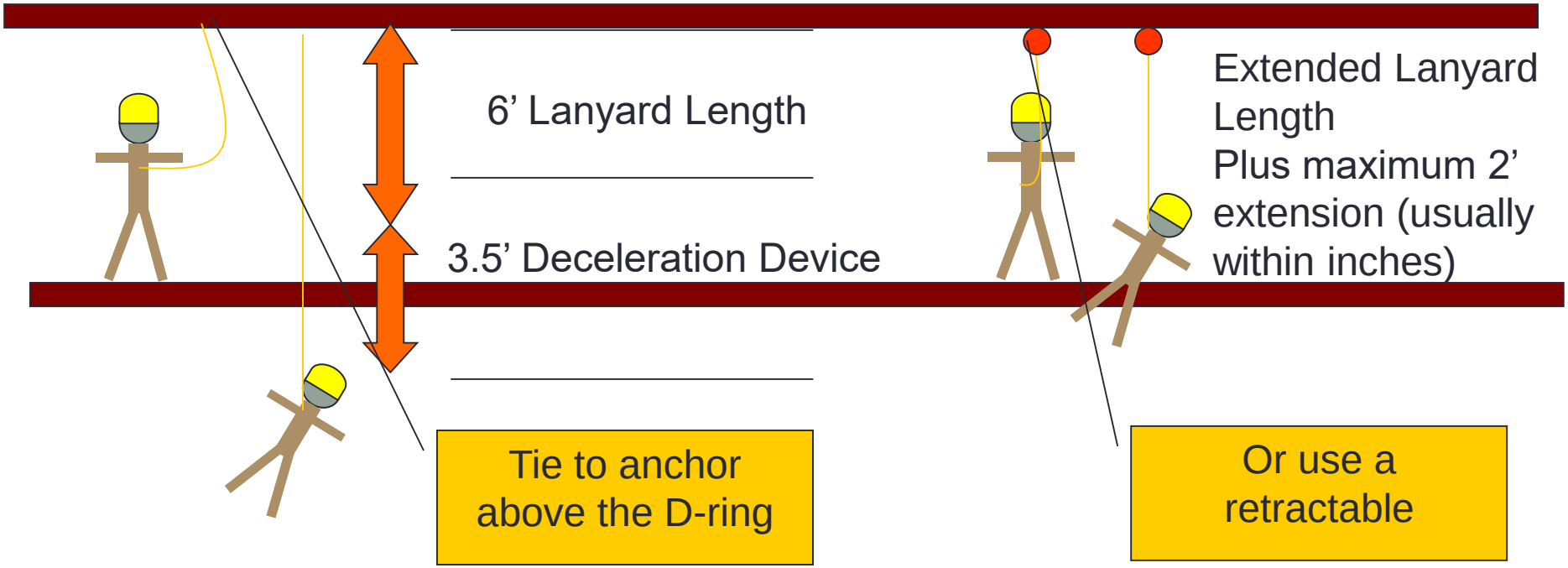


# Harness

- Need to be inspected before use by the worker, and at least annually (documented) by a Competent Person
- Should never be modified
- Do not write on or paint harnesses unless material is approved for use
- Should be taken out of service immediately if defective or exposed to an impact

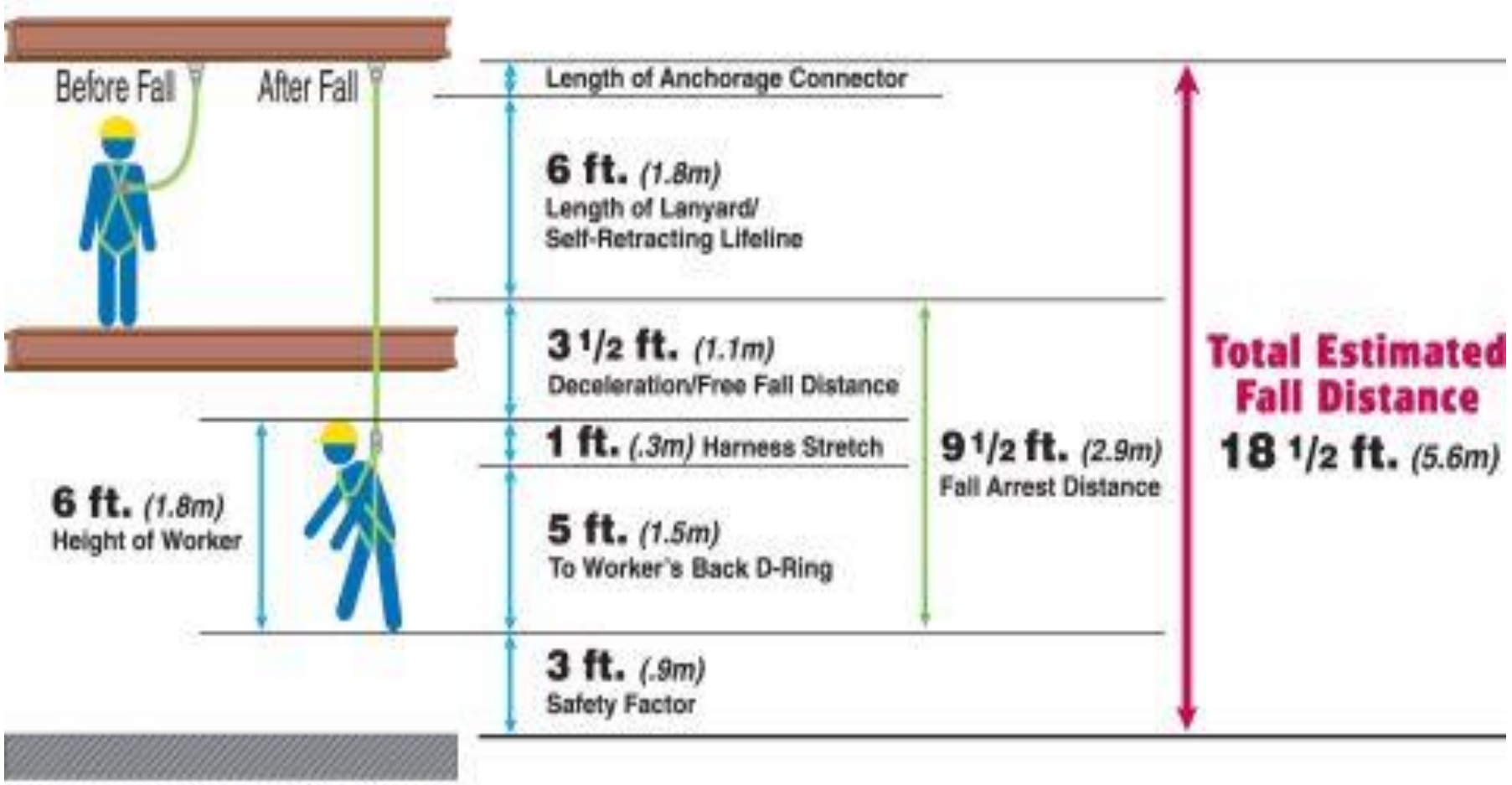
# Connectors

Various types of energy absorbing lanyards and like harnesses, inspected before each use and removed from service if any issues develop.




Using an anchorage above the D-ring and a standard lanyard may still allow an employee to fall a distance that may be difficult to rescue from. Using a retractable minimizes forces on the body, and may make rescue easier (and therefore more timely)

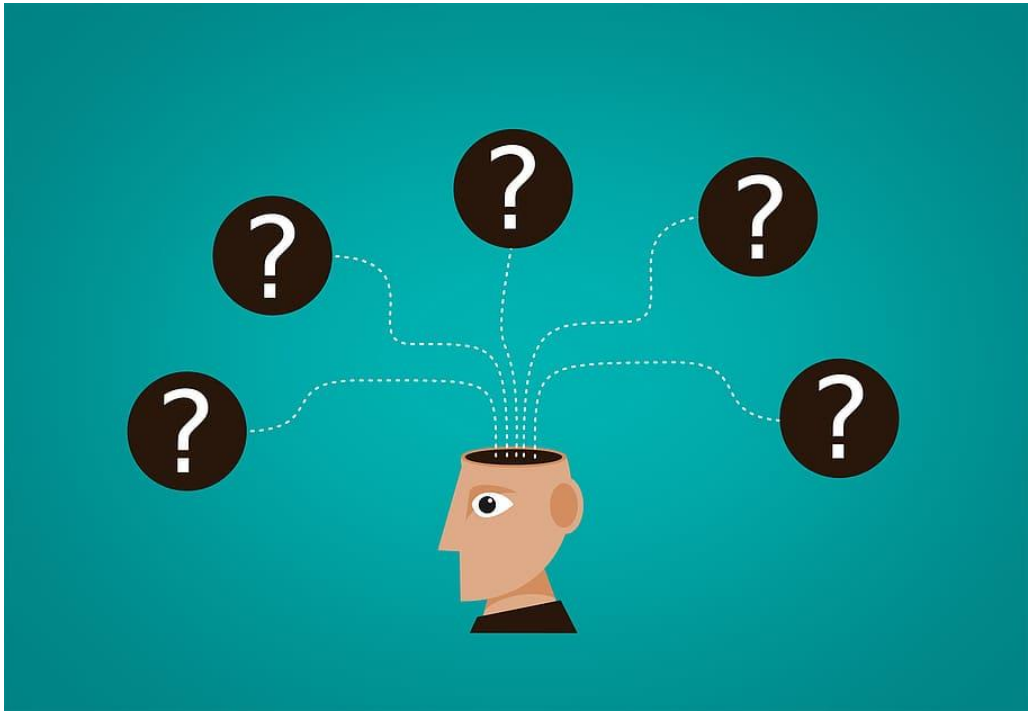
# Looking at total fall distance



# Planning For A Rescue

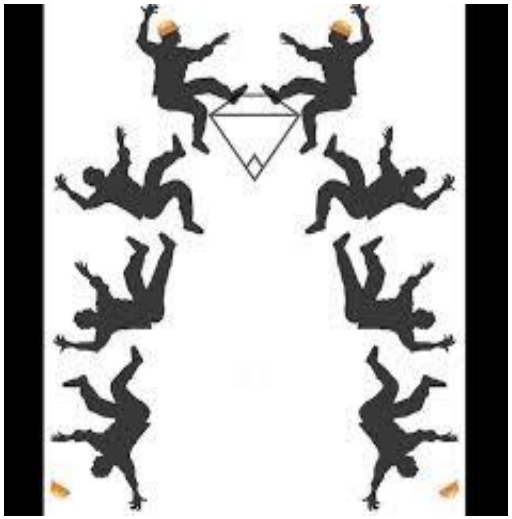
- Whenever working with the potential of hanging by a harness, a rescue plan **must** be in effect.

# Fall Protection



# Ladders

- Almost 49,500 nonfatal injuries
- Among construction workers, an estimated 81% involve a ladder
- In 2013, 700 **deaths** occurred involving ladders



Step ladders, extension ladders, and fixed ladders. They can range in a variety of sizes, shapes, and have different mechanisms that allow them to function properly.


Stepladder


Extension Ladder

# Ladder Selection and Rating

Be sure the ladder being used has the proper duty rating to carry the combined weight of the user and the material being installed.

A **ladder's duty rating** tells you its maximum weight capacity. There are five categories of duty ratings:


Light Duty
Household use
Type III


Medium Duty
Painter & Handyman
Type II


Heavy Duty
Industrial
Type I


Extra Heavy Duty
Industrial
Type IA


Special Duty
Rugged Professional
Type IAA

The American National Standards Institute (ANSI) requires that a duty rating sticker be placed on the side of every ladder so users can determine if they have the correct type ladder for each task/job.

# Type 3 Ladder

- Duty Rating  200lbs  light –duty household ladder

# Type 2 Ladder

- Duty Rating 225lbs  medium-duty commercial ladder

# Type 1 Ladder

- Duty Rating 250lbs heavy-duty Industrial ladder

# Type 1A Ladder

- Duty Rating 300lbs  Heavy-duty industrial ladder

# Type 1AA Ladder

- Duty Rating 375lbs Extra heavy-duty industrial ladder

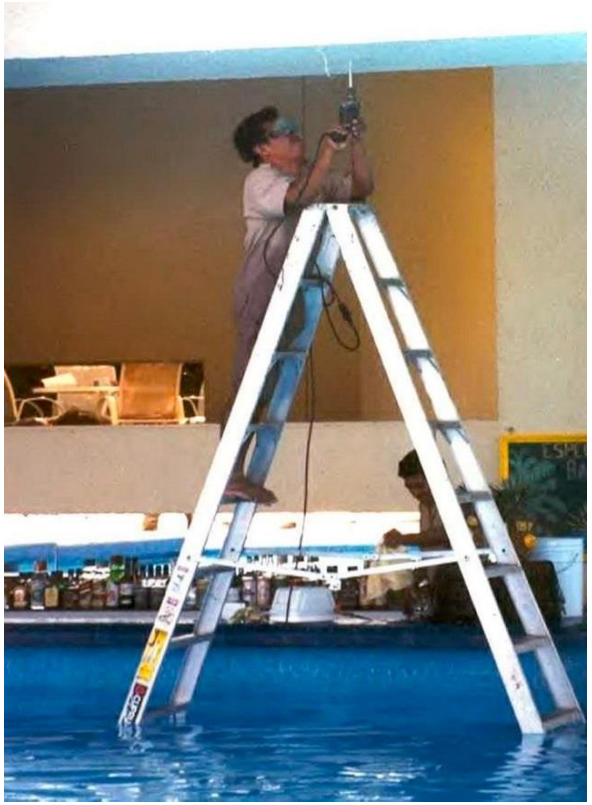
# Ladder Fact

- **Is the ANSI label required to be visible on the ladder?**

- **YES…**Ladders must be marked with size, type, maximum length, highest standing level, model number, manufacturer's name, manufacturer's location, and date of manufacture.

# What not to do…..

## STEP LADDERS



# DO'S & DON'T'S WORKING WITH STEP LADDERS

## Do's:

Always open a stepladder completely and make sure the spreader is locked open before using the ladder

Keep area around the top and bottom of ladder clear

Use ladders only for the purpose for which it was designed to be used. (Refer to ladder manufacturer's labeling and recommendations)

## Don'ts:

Do not stand higher than second step from the top

Do not straddle the top of the ladder

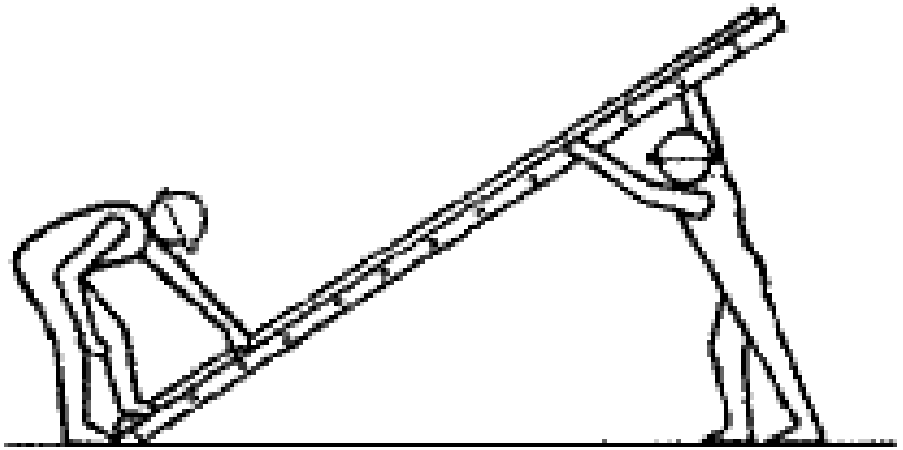
Do not over reach from the ladder. Keep your belt buckle centered.

# Extension ladders

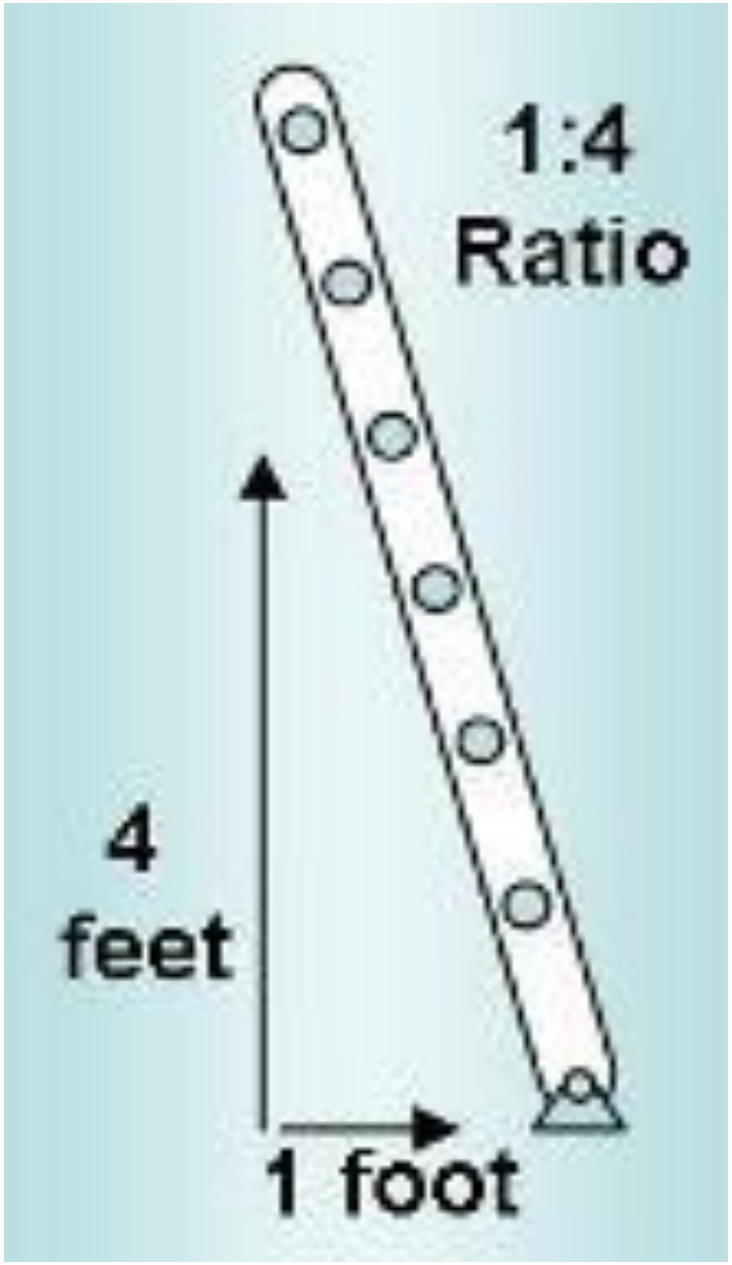
When using an extension ladder, the sections of the ladder should overlap enough to retain the strength

Setting up the extension ladder at the correct angle is one of the most important steps.  Too steep-could tip over backward. Too much angle-could bend or the bottom could slide out.

Always have 3 rungs over the top of the area you are working in.



Non-self-supporting ladders, which must lean against a wall or other support, are to be positioned at such an angle that the horizontal distance from the top support to the foot of the ladder is about 1/4 the working length of the ladder.

# Three Points of Contact

When climbing a ladder, it is safest to utilize **Three (3) Points-of-Contact** because it minimizes the chances of slipping and falling from the ladder.

**At all times during ascent or descent**, the climber must face the ladder and have two hands and one foot, or two feet and one hand in contact with the ladder cleats and/or side rails.

# Never use a damaged ladder.

## Tag it out as being "Defective“. Report it to the Safety Office.

- Items that would render a ladder as being damaged include:
  - Broken or missing rungs
  - Broken or missing steps
  - Corroded components
  - Defective components

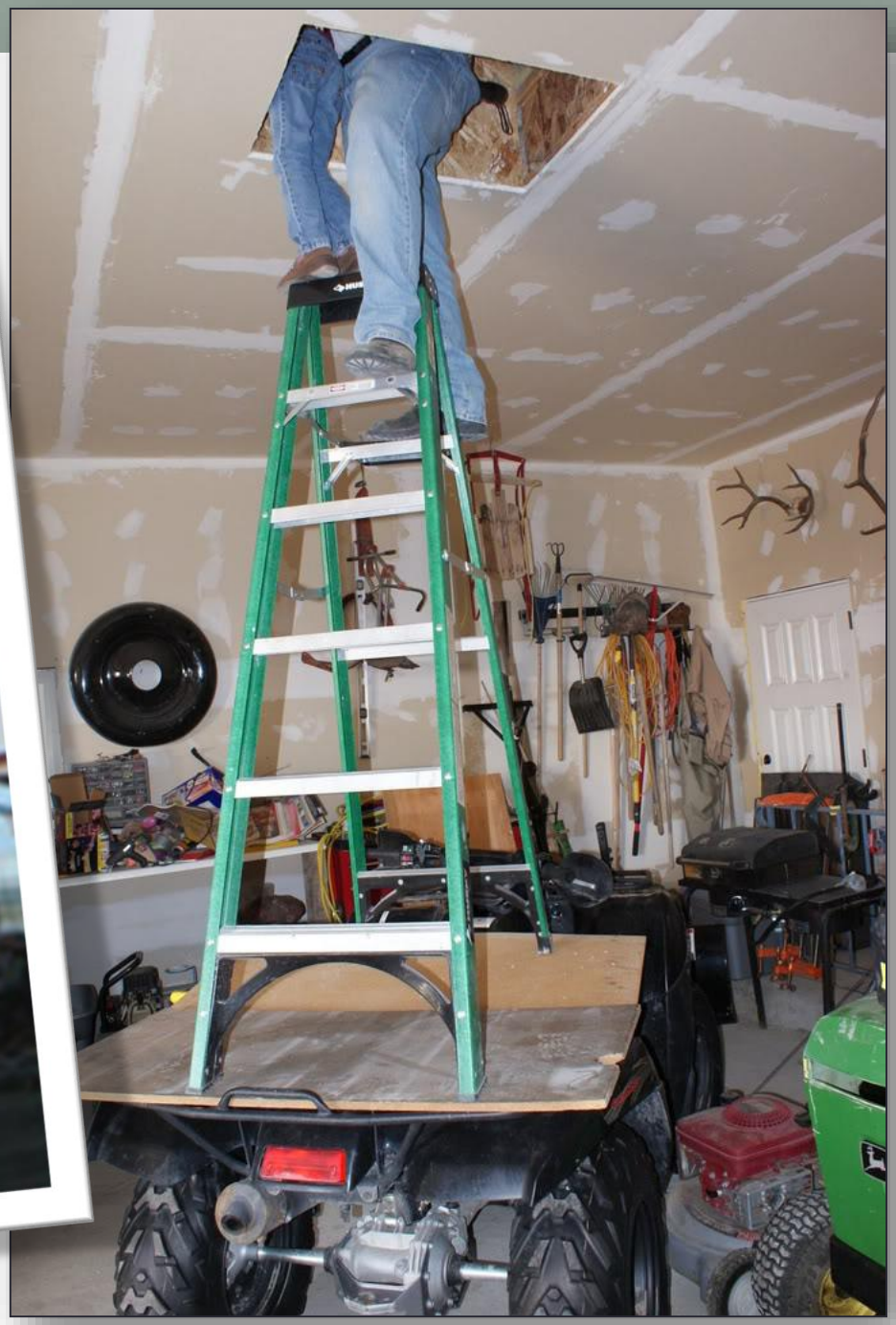
# Ladder fact

- **If a ladder is damaged should it be taken out of service or repaired?**

- **YES,** It is impossible to restore a ladder back to the original design and criteria.

# Samples of Damaged Ladders

# Always Inspect your ladders


HEAT &
WATER PAID

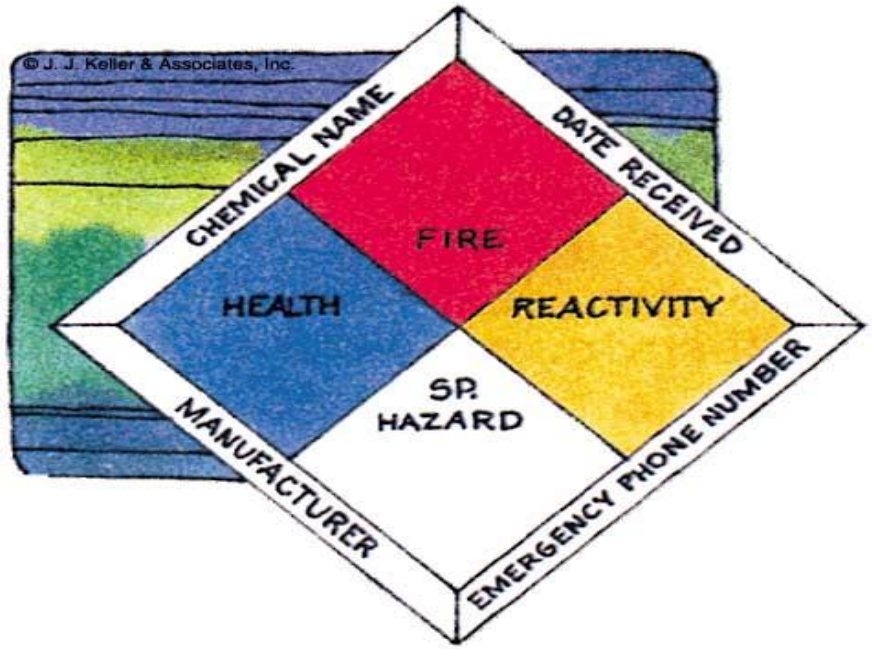

NEW MOTION

Questions?

Or

Comments?

# CHEMICAL SAFETY

# Buildings


05/14/2009


DANGER
HAZARDOUS CHEMICALS
DANGER
EYE PROTECTION REQUIRED IN THIS AREA
Warning
Eye protection required while in the Chemical Building
SULFURIC ACID
CAUSTIC LIQUID
SODIUM HYPOCHLORITE
05/14/2009

# Totes and Drums


# Cabinets and Shelves


# Tanks


CAUTION
MANNICH
SOLUTION
POLYMER TANK T-1
05/14/2009


1-2
05/14/2009

# SHELVES


# Chemical Hazards

## Key concerns

- Safety data sheets
- Container labeling
- Storage of chemicals

# WHAT TO DO!


# How can chemicals harm you?

**Direct contact:**

-burns

-vision

-absorption

**Ingestion**

-large quantity

-very small amounts over time

**Respirator/Inhalation**

-vapors or fumes

-dust

**What do you carry home in your clothes?**

# Written hazard communication program

**Employers:**

- Must have a written program describing how the rule will be implemented, including a list of hazardous chemicals, methods for informing employees about non-routine tasks.
- Must make sure the program is current when the new provisions are implemented (e.g., list of hazardous chemicals may have to be updated).

# Safety Data Sheets

- Under the new Haz Com Standard, Material Safety Data Sheets (MSDS) are now called Safety Data Sheets (SDS).
- All SDSs will have a consistent 16-section format.
- Employers must ensure that SDSs are readily accessible to employees.

# Notable Changes

- Labels are more defined and will now require:
  - Product identifier
  - Pictogram
  - Signal word
  - Hazard statement(s)
  - Precautionary statement(s)
  - Name, address, and phone number
- Safety Data Sheet (not Material Safety Data Sheet)
  - Uses a 16 section format

# Safety Data Sheets (SDSs)

**New 16-section standardized SDS format required (ANSI Z400.1)**

Section 1 – Identification

Section 2 – Hazard(s) identification

Section 3 – Composition / Information on Ingredients

Section 4 – First-aid Measures

Section 5 – Fire-fighting Measures

Section 6 – Accidental Release Measures

Section 7 – Handling and Storage

Section 8 – Exposure Controls / Personal Protection

Section 9 – Physical and Chemical Properties

Section 10 – Stability and Reactivity

Section 11 – Toxicological Information

Section 12 – Ecological Information*

Section 13 – Disposal Consideration*

Section 14 – Transport Information*

Section 15 – Regulatory Information*

Section 16 – Other information including date of preparation of last revision

# SDS (continued)

**Section 1 – Identification:**

Identifies the chemical on the SDS as well as the recommended uses. It also provides the essential contact information of the supplier.

**Section 2 - Hazards Identification:**

Hazards of the chemical presented on the SDS

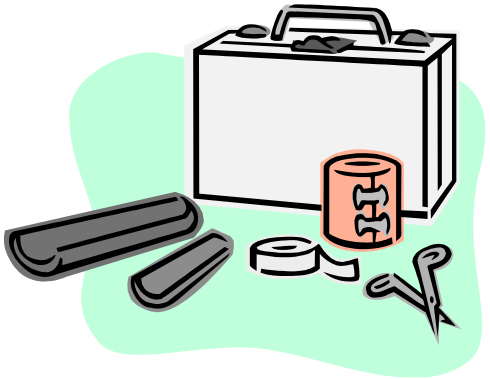
Appropriate warning information associated with those hazards.

# Safety Data Sheets

**Section 3 – Composition / Ingredients:**

Identifies the ingredient(s) contained in the product indicated on the SDS, including:

- impurities and stabilizing additives.
- information on substances, mixtures, and all chemicals where a trade secret is claimed.



**Section 4 - First-Aid Measures:**

Describes the initial care that should be given by untrained responders to an individual who has been exposed to the chemical.

# Safety Data Sheets

**Section 5 – Fire-Fighting Measures:**

Provides recommendations for fighting a fire caused by the chemical.

**Section 6 - Accidental Release Measures:**

Provides recommendations:

- Appropriate response to spills, leaks, or releases, (e.g. containment and cleanup practices)
- Response for large vs. small spills, if different.

# Safety Data Sheets

**Section 7 – Handling and Storage:**

Provides guidance on the safe handling practices and conditions for safe storage of chemicals.

**Section 8 – Exposure Controls /**

**Personal Protection:**

Indicates the exposure limits, engineering controls, and personal protective measures that can be used to minimize worker exposure.

# Safety Data Sheets

**Section 9 – Physical and Chemical Properties:**

Identifies physical and chemical properties associated with the substance or mixture.

**Section 10 – Stability and Reactivity**

Describes the reactivity hazards of the chemical and the chemical stability information.  Includes:  reactivity, chemical stability,

and other.

# Safety Data Sheets

**Section 11 - Toxicological Information:**

Identifies toxicological and health effects information or indicates is data unavailable.

**Section 12 – Ecological Information***

**Section 13 – Disposal Consideration***

**Section 14 – Transport Information***

**Section 15 – Regulatory Information***

# Safety Data Sheets

**Section 16 – Other Information**

Indicates when the SDS was prepared or when the last known revision was made.

The SDS may also state where the changes have been made to the previous version.

# Labels: Pictograms

**There are 9 pictograms**

Health Hazards

Physical Hazards

Environmental Hazards

# Labels: Pictograms – Health Hazards

Acute toxicity (Severe)

Acute toxicity (Less Severe):
Irritant
Dermal sensitizer
Acute toxicity (harmful)
Narcotic effects
Respiratory tract irritation

Acute = short-term effect

# Labels: Pictograms – Health Hazards

Skin corrosion
Serious eye damage/
Eye irritation

Carcinogen
Respiratory sensitizer
Reproductive toxicity
Target organ toxicity
Mutagenicity
Aspiration Hazard

# Labels: Pictograms – Physical Hazards

Explosives
Self reactive
Organic peroxides

Flammables
Self reactives
Pyrophorics
Self heating
Emits flammable gas
Organic peroxides

# Labels: Pictograms – Physical Hazards

Corrosive to Metals

Gases under Pressure

Oxidizer

# Labels: Signal Word

These are words used to indicate the severity of the hazard and alert employees to the potential hazard.

Only 2 signal words will appear:

- **“DANGER”** (more severe hazard)
- **“WARNING”** (less severe hazard)

Not all labels will have a signal word. Some chemicals are not hazardous enough to require that a signal word  appear on the label.

# Labels: Hazard Statement

There are specific hazard statements that must appear on the label based on the chemical hazard classification.

Examples:

- Flammable liquid and vapor
- Causes skin irritation
- May cause cancer

# Labels and other forms of warning – Precautionary Statements

- Recommended measures related to:
  - Prevention
  - Response
  - Storage
  - Disposal
- Examples:
  - Wear respiratory protection
  - Wash with soap and water
  - Store in a well ventilated place
- Not a mandate for employers/employees to follow.

# Label: Identification

Product identification (i.e. name of product)

Supplier identification:

- Address
- Telephone number

# Label: Other information

Other information that may be included on the label:

- Physical state
- Color
- Hazards not otherwise classified
- Route of exposure
- Storage and disposal
- Hazard prevention and emergency response instructions

# What is in here?



# Environmental Hazards

## Key concerns

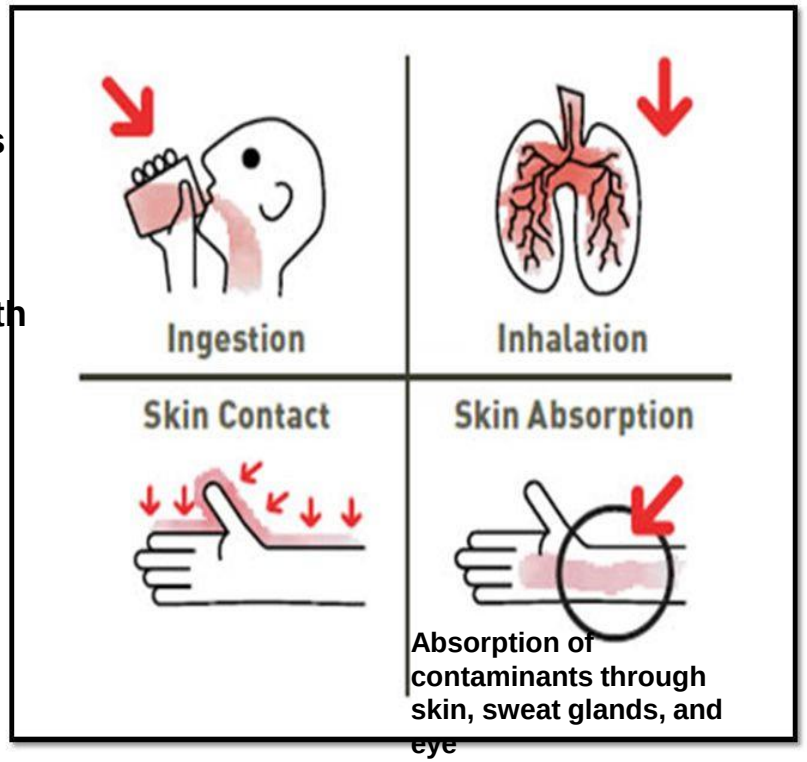
- Routes of exposure
- Types of contaminants
- Noise and other contaminants
- Environmental controls

# Routes of exposure

- The ways a hazardous substance may enter the body.

High noise levels through ears

Inhalation of airborne contaminants through nose and mouth




Ingestion of contaminants on food, fingers, and cigarettes through mouth

Absorption of contaminants through skin, sweat glands, and eye

Questions?

Or

Comments?

# What is PPE?

Personal Protective Equipment (PPE) is *clothing* or *equipment* that is designed to minimize exposure to a variety of hazards.

Examples of PPE include such items as gloves, foot & eye protection, protective hearing devices, hard hats, safety warning vest and respirators.

# HEAD PROTECTION

- Wear the right Type and Class of hard hat
- Wear your hard hat properly
- Don't wear your hard hat backwards, unless approved by the manufacturer

- Adjust the headband so it fits snugly around your head
- Only use approved liners
- Don't wear a baseball cap or bandana under your hard hat
- Inspect your hard hat daily for signs of damage
- Clean your hard hat with warm, soapy water, and then rinse clean
- Make sure all add-on protective equipment is securely in place
- Don't cut ventilation holes or use harsh cleaning materials
- Don't apply stickers, paint, adhesives, or coatings on the shell
- Don't store your hard hat in direct sunlight or near extreme heat.

# HEAD PROTECTION

According to OSHA, employees must wear a hard hat when any of the following apply:

- ✓ Objects might fall from above & strike them on the head;
- ✓ They might bump their heads against a fixed object, such as exposed pipe or beams; or
- ✓ There is a possibility of accidental head contact with electrical hazards.

# HEAD PROTECTION


Hard Hat being worn over –

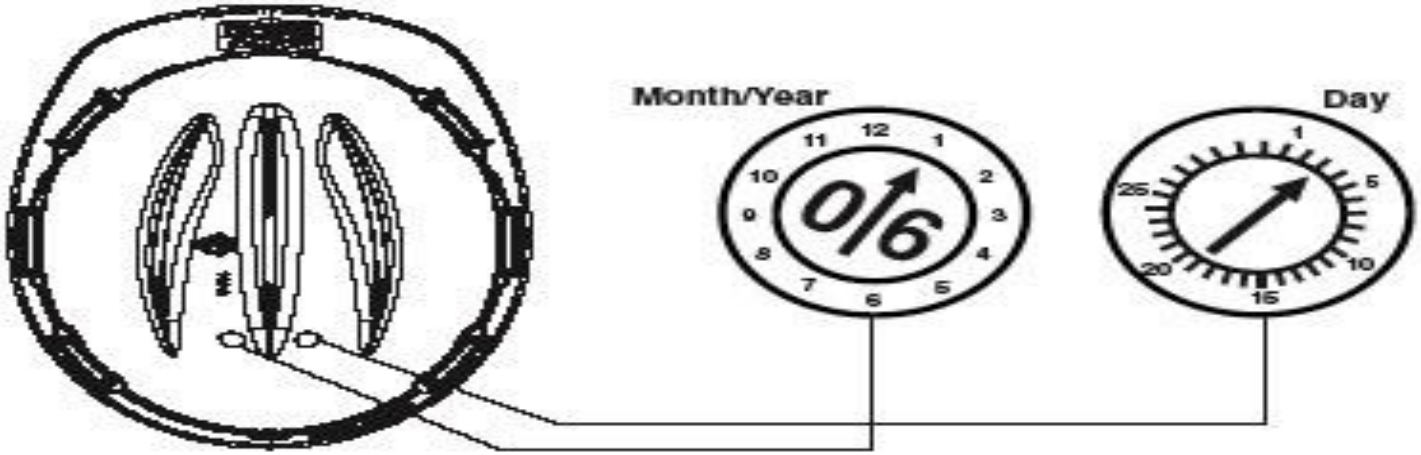
Ball Cap

Knitted Sweatshirt Hood

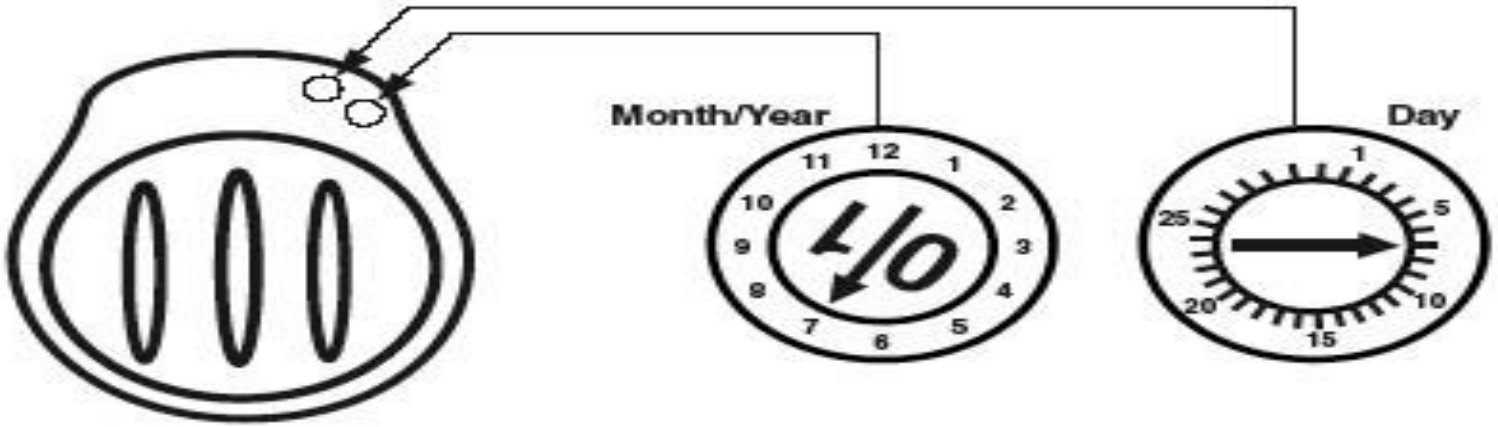
Is not allowed!

# HEAD PROTECTION

**Location #1: This example shows a cap that was molded on January 3, 2006.**




**Location #2: This example shows a cap that was molded on July 7, 2001.**



# HEAD PROTECTION

**Care and Maintenance**

- Perform daily inspections of the hard hat shell, suspension system and other accessories for holes, cracks, tears.
- Never drill holes or paint a hard hat.
- Always replace a hard hat if it sustains an impact, even if damage is not noticeable.
- Clean with mild soap and lukewarm water.

- **Life span of a hard hat?**

- **Questions to ask yourself:**
- Is your hard hat older than 4 years?
- Is your hard hat fading, chalky or brittle?
- Is your hat dented, cut or deeply scuffed?
- Has your hat suffered an impact?
- Do you leave your hard hat in your car/truck?

**If *Yes* to at least one question, then, it may be time to replace your hard hat**

# SAFETY SHOES

## Foot Protection

- **Safety shoes and boots**
  - **Steel toe footwear**
    - Protects your toes from falling objects and from being crushed
  - **Metatarsal footwear**
    - Special guards that run from your ankle to your toes and protect your entire foot
  - **Reinforced sole footwear**
    - Metal reinforcement that protects your foot from punctures
  - **Latex/rubber footwear**
    - Resists chemicals and provides extra traction on slippery surfaces

# SAFETY SHOES

- Wear protective footwear properly
- Make sure your footwear provides a good, comfortable fit
- Understand the purpose and limitations of your protective footwear
- Perform periodic inspections, to check for cracks, splits, and contamination
- Follow the manufacturer's instructions for cleaning and maintaining your footwear
- Wear add-on protection such as metatarsal guards or cleats as appropriate
- Don't alter the shoe or boot in any way.

# SAFETY SHOES

- The letters F2413 reference the performance requirement for foot protection. The additional digits following the standard designation indicate the year of the standard to which the protective footwear complies, for example: 05 refers to 2005.

M = Footwear designed for a male.
F = Footwear designed for a female.
I/75 = Impact rating of 75 (foot pounds)
C/75 = Compression rating of 75 (2500 lbs. of pressure)

# HAND & ARM PROTECTION

- Wear gloves that offer the grip and dexterity necessary for the work that you do
- Only wear gloves that properly fit you
- Keep gloves clean and dry between uses
- Inspect gloves for defects and excessive wear every time you put them on
- Wash your hands and keep cuts bandaged before putting gloves on
- Wash your hands after removing the gloves
- Never wear gloves that won’t properly protect you
- Contact your supervisor if you aren’t sure which type of glove to use.

# HAND & ARM PROTECTION

When selecting a work glove, keep this in mind –

- Type of any chemical or liquid you may be handling.
- Area requiring protection (hand only, forearm, arm)
- Grip requirement (dry, wet, oily)
- Size & comfort
- Abrasion/resistance requirements

# HAND & ARM PROTECTION

There are many types of gloves available today to protect against a wide variety of hazards.

In general, gloves fall into four groups

1. Gloves made from leather, canvas, or metal mesh
2. Fabric and coated gloves
3. Chemical and liquid resistant gloves
4. Insulating rubber gloves

# REFLECTIVE APPAREL

**According to OSHA, "Employees exposed to vehicular and equipment traffic shall be provided with and shall be instructed to wear warning vest marked with and made of reflectorized or high visibility material" (29CFR Part 1926.650 - Subpart P, f.)**

# HEARING PROTECTION

Employee exposure to excessive noise depends upon a number of factors, including:

- The loudness of the noise as measured in decibels (dB)
- The duration of each employee's exposure to the noise.
- Whether employees move between work areas with different noise levels or noise is generated from one or more multiple sources.
- The louder the noise, the shorter the exposure time is before hearing protection is required.

For the most part, if an employee is subjected to a noise at or above **85 dB** (over a period of time), some form of hearing protection is required.

# HEARING PROTECTION

# HEARING PROTECTION

- Select the type of hearing protection that's best suited for the type of work you do
- Read the manufacturer's instructions
- Make sure you're using it properly
- Make sure your hearing protection is clean, inserted correctly, and fits snugly
- Wear your hearing protection whenever and wherever it's required
- Don't remove your hearing protection in a noisy area
- Never underestimate the chronic, long-term effects of noise exposure
- Pay close attention to your other senses
- If you're hearing impaired, always wear hearing protection where it's required to protect your remaining hearing.

# Eye and Face Protection


- Safety Glasses: intended to shield the wearer's eyes from moderate **impact hazards** such as flying fragments, large and small chips and particles,
- Safety glasses with no side shield protection are not acceptable for impact hazardous and are not approved to be worn on the job!

# Eye and Face Protection

- Wear the right type of eye and face protection
- Adjust your eye protection so it fits properly and is comfortable
- Wear safety eyewear over your prescription glasses or contact lenses
- Don't wear regular glasses alone
- Wear prescription safety glasses if you have them
- Wear safety glasses with side shields or safety goggles if you're exposed to flying object hazards
- Keep your eye and face protection in good condition
- When not in use, store eye and face protection in a clean, dry place
- Inspect eye and face protection regularly for signs of damage.

# Safety Goggles

- Intended to shield the wearer's eyes and surrounding facial area from **impact hazards** such as flying fragments, large and small chips, and particles.
- Are intended to protect the eyes against a variety of **airborne particles** and **harmful dust**.
- Safety goggles are the **only** effective type of eye protection from nuisance dust because they create a protective seal around the eyes.

# Face Shields/Visors

- Conform to ANZI  Z87 standard for eye and face protection when used in combination with headgear or faceshield brackets.

# Regular Corrective Lenses

Everyday use of prescription glasses and/or contact lenses will not provide adequate protection from work hazards.

Therefore, these devices cannot be utilized as a substitute for eye protection devices. Employees, whose vision requires the use of corrective lenses, shall wear appropriate eye protection.

# Respiratory Protection

## TYPES OF RESPIRATORY PROTECTION

**Elastomeric Half Facepiece Respirators** are reusable and have replaceable cartridges or filters. They cover the nose and mouth and provide protection against gases, vapors, or particles when equipped with the appropriate cartridge or filter.

**Elastomeric Full Facepiece Respirators** are reusable and have replaceable canisters, cartridges, or filters. The facepiece covers the face and eyes, which offers eye protection.


**Filtering Facepiece Respirators** are disposable half facepiece respirators that filter out particles such as dusts, mists, and fumes. They do NOT provide protection against gases and vapors.

**Powered Air-Purifying Respirators (PAPRs)** have a battery-powered blower that pulls air through attached filters, canisters, or cartridges. They provide protection against gases, vapors, or particles, when equipped with the appropriate cartridge, canister, or filter. Loose-fitting PAPRs do not require fit testing and can be used with facial hair.

**Supplied-Air Respirators** are connected to a separate source that supplies clean compressed air through a hose. They can be lightweight and used while working for long hours in environments not immediately dangerous to life and health (IDLH).

*Example of an open-circuit SCBA*

**Self-Contained Breathing Apparatus (SCBAs)** are used for entry into or escape from environments considered to be IDLH. They contain their own breathing air supply and can be either open circuit or closed circuit.

*Example of an SAR/SCBA*

**Combination Respirators** can be either a supplied-air/SCBA respirator or supplied-air/air-purifying respirator. The SCBA type has a self-contained air supply if primary airline fails and can be used in IDLH environments. The air-purifying type offers protection using both a supplied-air hose & an air-purifying component and cannot be used for entry into IDLH environments.

CDC NIOSH
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

September 2019

# Respiratory Protection

- Wear respiratory protection in all areas required by your employer
- Wear the correct respirator for the work you do

- Make sure the respirator fits you properly
- Conduct a seal check every time you wear your respirator
- Change cartridges and canisters according to the change schedule for the equipment
- Change filters when it becomes more difficult to breathe through them
- Keep your respirator clean and check your mask routinely for damage or excessive wear
- Clean the face-piece and components in warm water with mild detergent

- Do store your respirator in a clean, dry place, with nothing on top of it

- Don't wear another person's respirator unless it's been disinfected and is the same size and model you wore during your fit test
- Don't use cleaning agents that could damage the lens or rubber portion of the apparatus
- Don't wear a damaged respirator or use a respirator beyond its designated service life
- Never enter a contaminated atmosphere unless you're wearing the proper respirator for that area, and are sure you're wearing it properly
- Never remove your respirator in any contaminated environment.

# J.J. Keller Video

Personal Protective Equipment
Employee Essentials

# Remember….

- No one loves you, like you love you☺
- Using PPE is ultimately your responsibility!
- Learn when, where and why to use PPE
- Learn the proper way to use PPE
- Respect the dangers that come with your work
- The life you save or the body you protect may be your own…..

- Be Smart! Be Safe! Wear Your PPE!