ARMA

AUSTIN REGIONAL MANUFACTURERS ASSOCIATION

Welcome!

ARMA Environmental, Health & Safety Seminar

03-10-2020

www.arma-tx.org

Deep Dive Into OSHA's Respiratory Protection Standard (29CFR1910.134)

Berg Compliance Solutions

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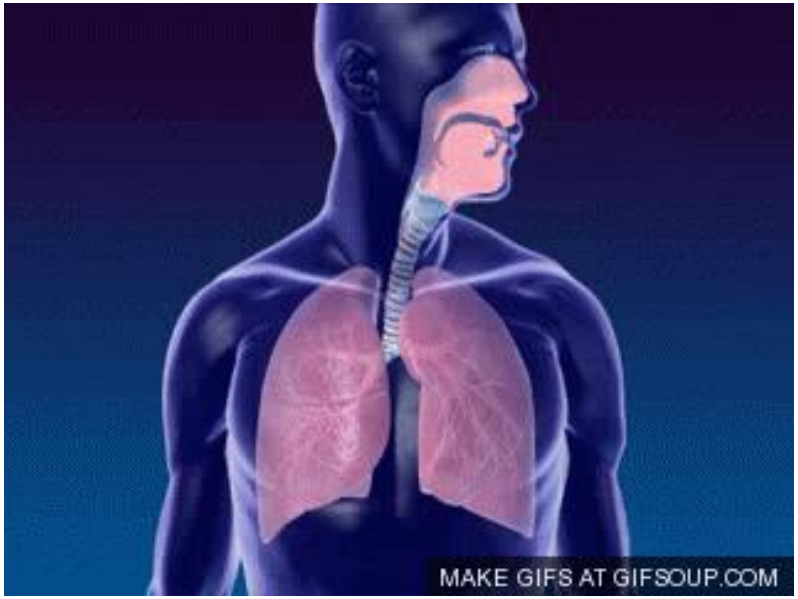
Routes of Chemical Exposure

What is the most common route of exposure to chemicals in the workplace?



Inhalation

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PPE FAIL

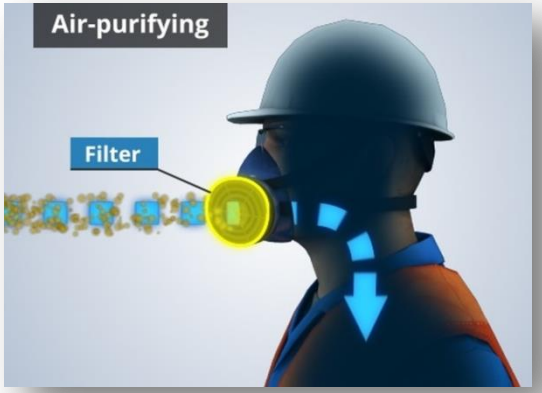
Objectives

What goes into a respiratory protection program?

- Key Definitions
- Key OSHA Terms
- Purpose of Program
- Essential Written Program Components
- Major Steps to Comply with Standard
- Respiratory Program Administrator (RPPA)
- Respirator Considerations – The Numbers
    - Assigned Protection Factors (APFs)
    - Maximum Use Concentration (MUCs)
- Voluntary Use of Dust Masks (Appendix D)
- Training Requirements

Key Definitions

- PEL – Permissible Exposure Limit
- AL – Action Level
- TWA – Time Weighted Average
  - **PPM** = Parts Per Million
  - **mg/m3** = Milligrams per Cubic Meter
- APR – Air Purifying Respirator
- SAR – Supplied Air Respirator
- SCBA – Self-Contained Breathing Appratus
- LEV – Local Exhaust Ventilation



Regulatory VS Non-Regulatory Limits

Regulatory (**OSHA**)

1. Permissible Exposure Limit (8-hour Time Weighted Average)
2. Action Level (8-hour Time Weighted Average)
3. Short Term Exposure Limit (~15 minute Time Weighted Average)
4. Ceiling Limit

Non-Regulatory (**ACGIH** & **NIOSH**)

- **ACGIH** - Threshold Limit Value (8-hour Time Weighted Average)
- **NIOSH** – Recommended Exposure Limit (8-hour Time Weighted Average)

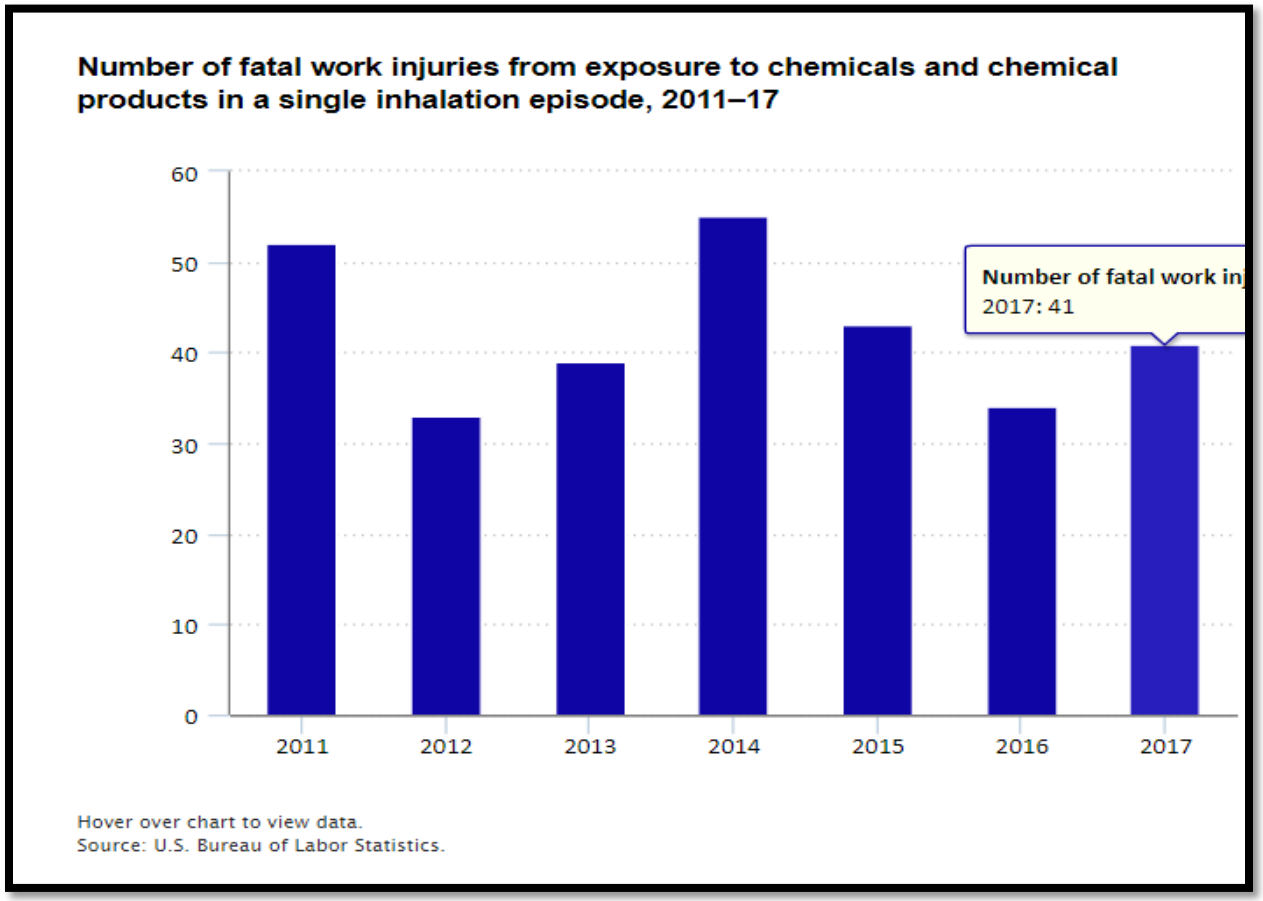
Respiratory Protection Program Purpose

Respiratory Protection

- This program is designed to assist employees with protection from airborne hazards related to chemicals and processes in the workplace.
  - Like Hearing Conservation, an exposure assessment **OR** sufficient, detailed research must take place!

FACT CHECK

How many workplace fatalities directly resulting from single exposure to inhalable chemicals in 2017???



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Required Program Components

OSHA Regulation (29 CFR 1910.134)

- Written Program
- Air Sampling/Determination
- Administrator Assignment
- Respirator Maintenance/Storage
- Employee Training
- Surveillance/Fit Testing
- Voluntary Usage

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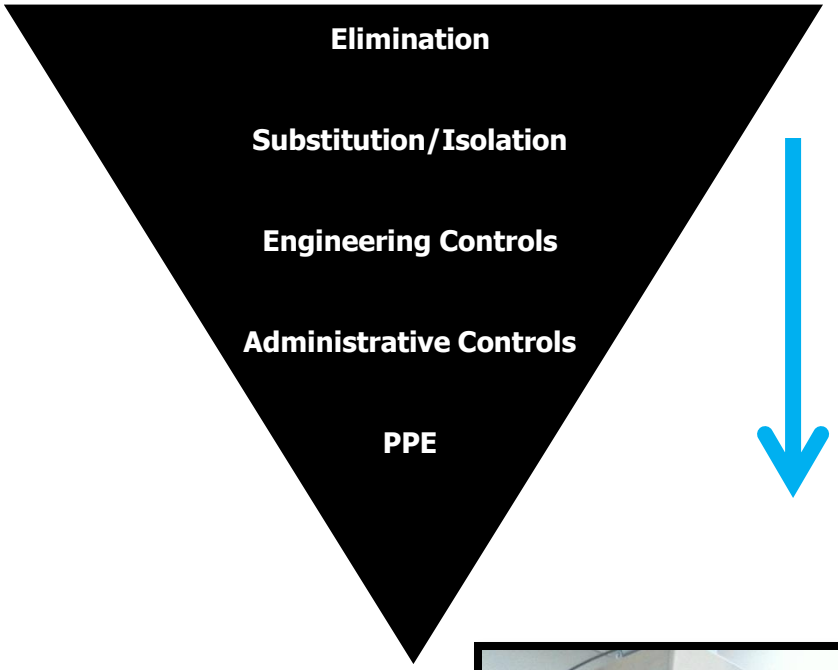
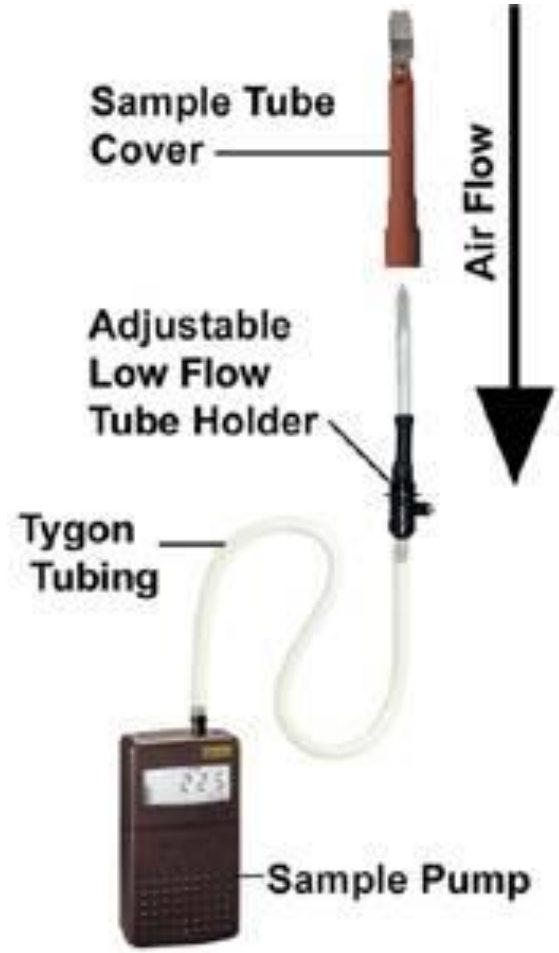
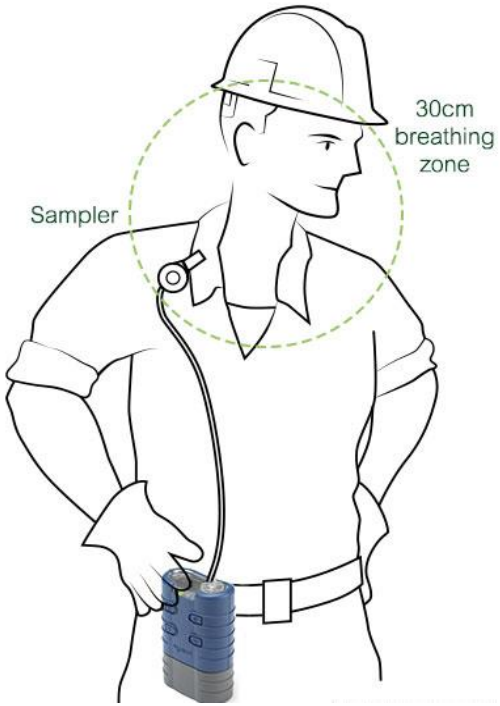
Step 1: Determine Controls



Step 2: Determining Worker Exposure





Step 3: PPE Distribution

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Step 3: Types of Respirators

- Three basic types:
  - Air Purifying
  - Air-Supplied
  - Oxygen-Demand

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FACT CHECK

QUESTION

What requirements are there to certify a breathing air facility line for a supplied air?

TABLE: OSHA 1910.134 COMPRESSED AIR QUALITY[3]	
Oxygen Content (v/v)	19.5 - 23.5%
Hydrocarbon (condensed)	5 mg/m3
Carbon Monoxide	10 PPM
Carbon Dioxide	1000 PPM
Lack of Noticeable Odor	
Moisture	Dewpoint 10 °F below ambient

OSHA 1910.134(i)(5) states, "the employer shall ensure that compressors used to supply breathing air to respirators are constructed and situated so as to **prevent entry of contaminated air into the air-supply system."**

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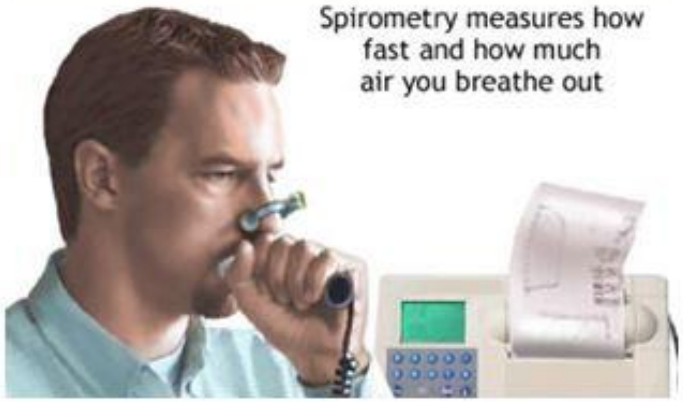
Step 3: Models of Respirators

- Several models of the different types
  - Half/full face
  - Hood
  - Helmet
- Each type has an **assigned protection factor (APF)**

Step 4: Medical Evaluations

- Medical Evaluations:
  - Critical in identifying underlying medical conditions that might make wearing a respirator harmful to your health
  - Fill out a **questionnaire** and see an occupational health doctor
  - Must be completed to use a tight-fitting respirator
    - Required or voluntary use

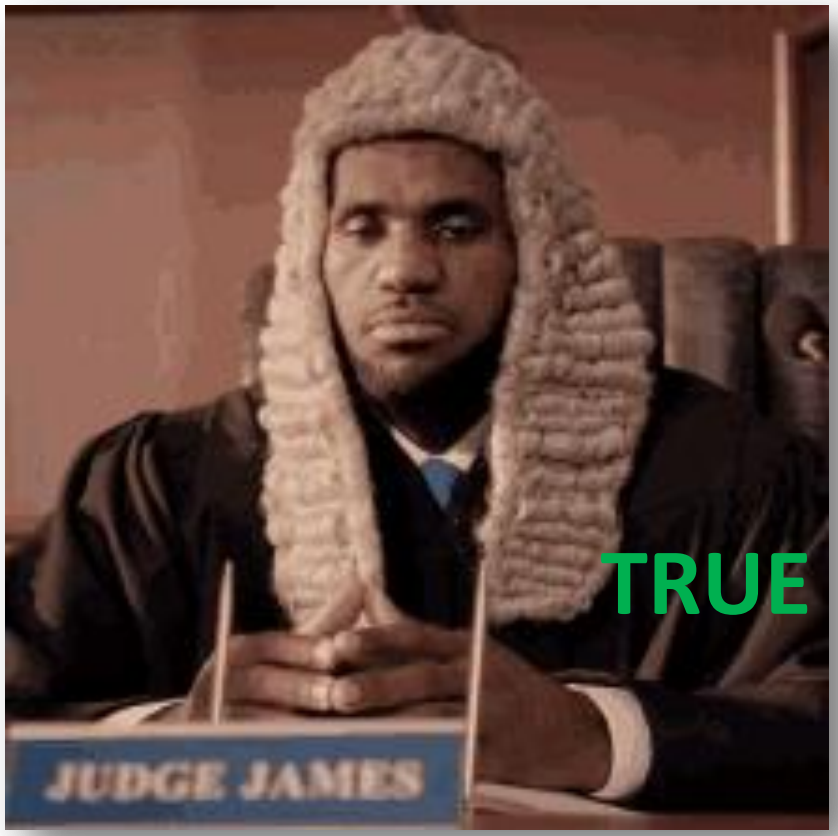
Medical Evaluation for Silica Exposure includes Spirometry Test/Lung Function



FACT CHECK

TRUE OR FALSE

Medical evaluations of employees can be done in person OR online



FACT CHECK

TRUE OR FALSE

Medical evaluations are only required for tight fitting respirators

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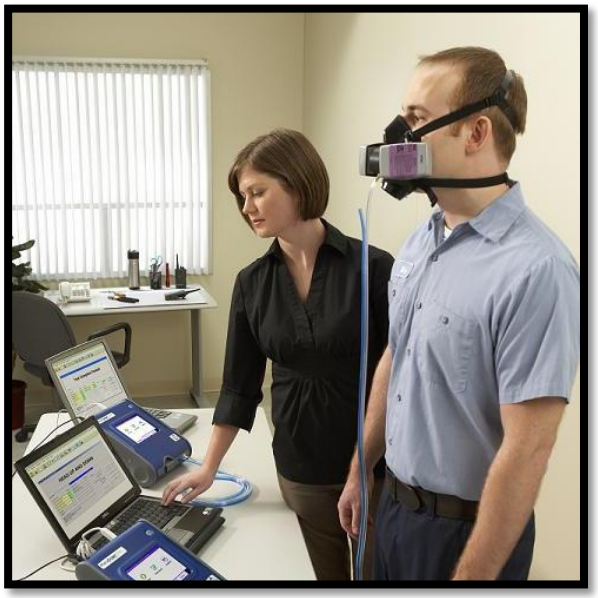
Step 5: Fit Testing



- Fit Testing:
  - **Required for employees:**
    - A fit test must be completed before using a respirator
    - Quantitative VS Qualitative Fit Test
      - "The Rainbow Passage")
    - Required annually by OSHA (annual training required, too – per OSHA).

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Step 6: Cartridge Changeout Schedules

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FACT CHECK

TRUE OR FALSE

Within OSHA Respiratory Protection standards cartridge changeout schedules are only required for vapors and not for particulate matter.

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Step 6: Cartridge Changeout Schedules

- **There are 3 valid means for calculating a cartridge's service life:**
  1. Conducting experimental tests
  2. Use of the manufacturer's recommendations
  3. Use of a math model
  4. …

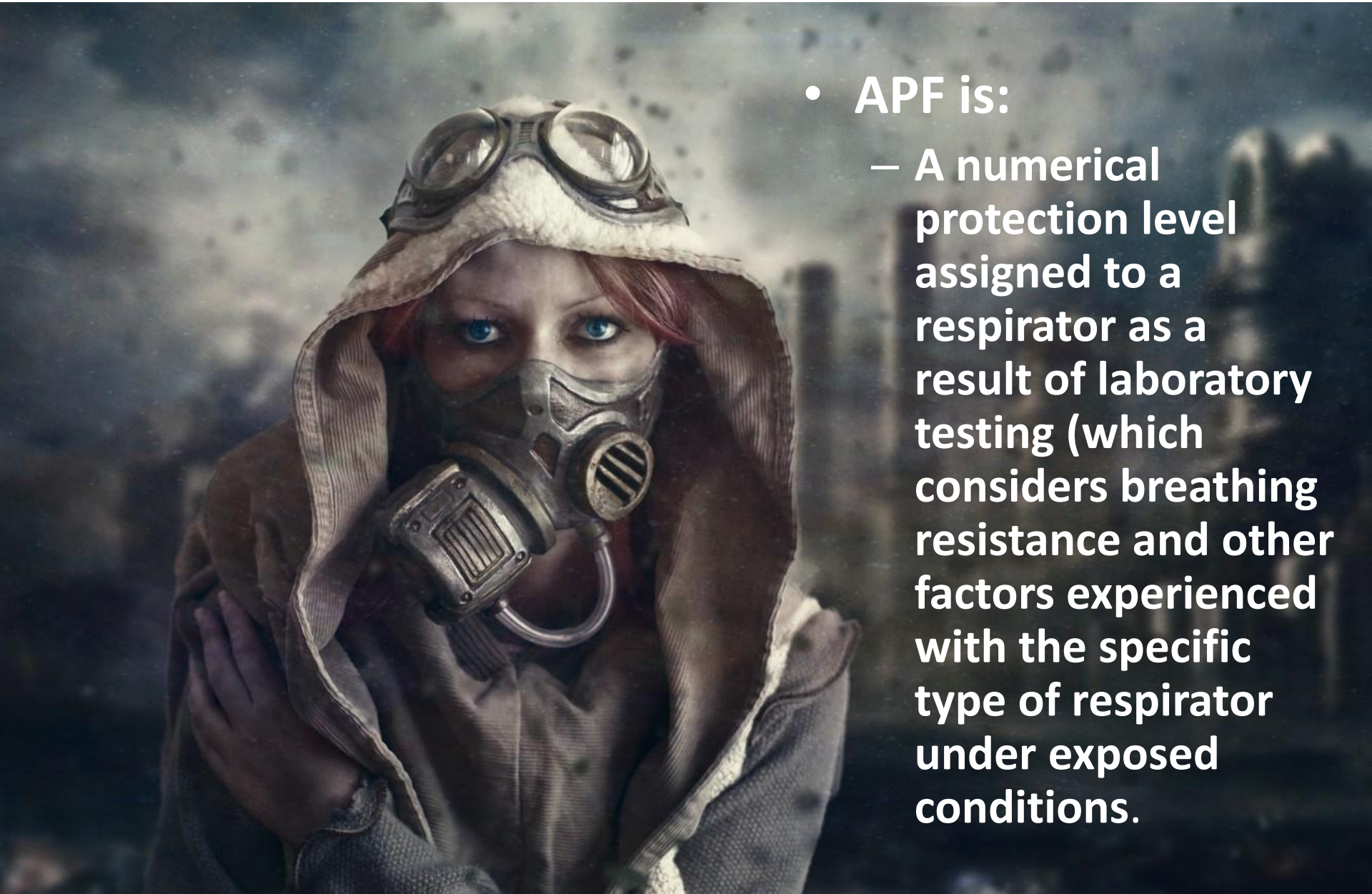
Respiratory Protection Program Administrator (RPPA)

- Paragraph **29CFR1910.134(c)** states:
  - '*…The program must be administered by a suitably trained program administrator…*'

According to **OSHA 3384 Small Entity Compliance Guide for Respiratory Protection Program**:

"OSHA only requires the program administrator to have an adequate level of training or experience to deal with the complexity of the respiratory protection program at the worksite."

Assigned Protection Factors



- **APF is:**
  - **A numerical protection level assigned to a respirator as a result of laboratory testing (which considers breathing resistance and other factors experienced with the specific type of respirator under exposed conditions.**

APFs of Different Respirators

APF accurate if worn correctly!!!

APF = 10

APF = 25 to 1000*

APF = 10 to 1000*

APF = 50*

APF = 10000

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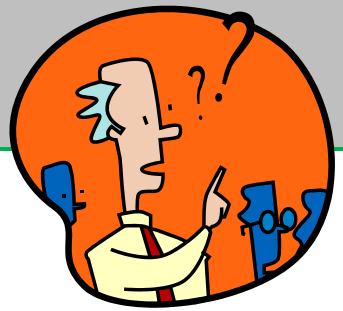
***Only under specific circumstances –**

qualitative fit vs. quantitative fit, OSHA-approved manufacturer

Maximum Use Concentration

- **Maximum Use Concentration (MUC):**
  - The maximum atmospheric concentration of a hazardous substance from which an employee can be expected to be protected when wearing a respirator
  - Determined by the assigned protection factor of the respirator and the exposure limit of the hazardous substance.
  - Can be determined mathematically by multiplying the assigned protection factor specified for a respirator by the exposure limit used for the hazardous substance.
- **Multiple Components MUC**
  - For multi-component mixtures the MUC can be calculated by:
    $C_1/MUC_1 + C_2/MUC_2 + \ldots C_n/MUC_n = 1$



MUC QUIZ!

- The **PEL** for Nitric Acid is **2ppm**
- You are wearing a full-face tight-fitting respirator (**APF 50**)
- You measure the Nitric Acid concentration in the area to be 26ppm.

In this scenario will your respirator work?

*Assuming you are wearing the correct filters.

✓**Definitely!!**
✓Full face APF= 50
✓**2ppm** x **50** = 100ppm

Would a half-face respirator work?

*Assuming you are wearing the correct filters.

✓**Nope!** Half Face APF= 10
✓**2ppm** x **10** = 20ppm

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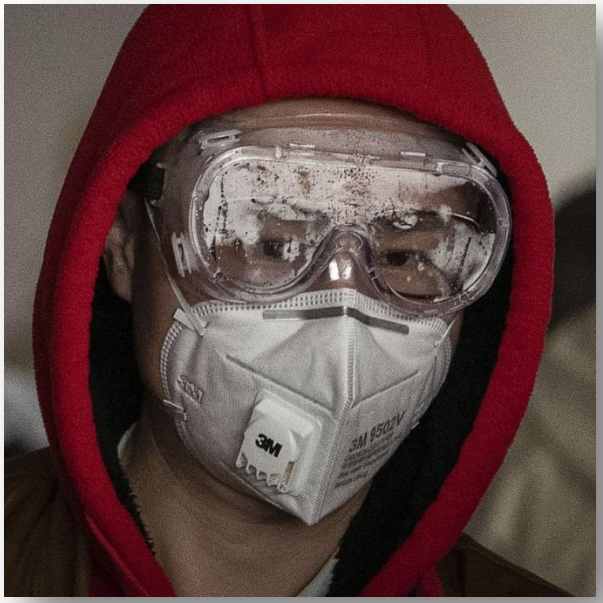
Voluntary Use

- Sometimes desired to wear filtering face-piece (N95) or other type of protection to:
  - Minimize odors
  - Minimize dust levels (although below the PEL)
- Appendix D must be reviewed and signed – OSHA



FACT CHECK

TRUE OR FALSE

This face piece protects the wearer from respiratory hazards.

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Step 6: Respiratory Protection Training

- **The employer shall ensure that each employee can demonstrate knowledge of at least the following:**
  - **1910.134(k)(1)(i) – Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator;**
    - To protect from inhalable fumes/particulates/vapors/etc.
    - Improper storage can reduce effectiveness of cartridges and can lead to contamination of inside of mask in some cases
  - **1910.134(k)(1)(ii) – What the limitations and capabilities of the respirator are;**
    - They have specific APFs
    - Cartridges must be specific to the type of inhalable compounds
    - APFs NOT meant for IDLH environments
    - PPE is always the last option as it is a last line of defense
  - **1910.134(k)(1)(iii) – How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions**
    - EXIT work area immediately if respirator malfunctions or if seal is compromised
    - Get to well ventilated area
    - Check respirator for issues; change cartridges if necessary (Based on ESLI and on particulate filter visual inspection)
  - **1910.134(k)(1)(iv) – How to inspect, put on and remove, use, and check the seals of the respirator;**
    - Remove parts of respirator
    - Inspect for cracks, tears, loose straps, ensure proper cartridge is on and secured
    - Clean inside of respirator with alcohol wipes and clean/dry towel
  - **1910.134(k)(1)(v) – What the procedures are for maintenance and storage of the respirator;**
    - Clean
    - Dry
    - Closed container and/or bag
  - **1910.134(k)(1)(vi) – How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators; and**
    - Odors, Taste, Dizziness, Nausea, Headache, sudden change in mood, weakness, etc.
  - **1910.134(k)(1)(vii) – The general requirements of this section.**
    - Medical evals, fit testing, and respiratory protection training
    - Respiratory Protection Program Administrator (RPPA)

Summary

- Respirators are chosen based on employee exposure and exposure limits to protect respiratory health both in single exposures and over long term exposure

- The Respiratory Protection Standard requires:
  - Medical evaluations
  - Fit tests
  - Training

- ALWAYS perform positive and negative pressure checks prior to wearing a respirator

- Train employees on how to: keep respirator clean, store it properly and always inspect it before use

Questions & Answers

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