



FIRE INSTRUCTOR I

Student Presentation Lesson Plan

15-Respiratory Hazards

Outline of Instruction

Objective

Upon successful completion of this lesson, the student shall be able to:

- Identify respiratory hazards. [NFPA® 1001, 5.3.1]

Instructor Directions

1. Set up non-projectable training aids
 - a. Chart pad to include:
 - i. Title Page
 - ii. Acronym
 - iii. Summary
 - iv. 1 Application scenario
 - v. 2 Evaluation questions
2. Set up projectable training aids (LCD projector & computer)
3. Present lecture utilizing this outline of instruction, non-projectable and projectable audio visual aids.
 - a. Overall time 18 min. (set up, present topic, and take down of audio visuals)
 - b. Presentation time 8-12 min. (presentation time is part of the 18 min)
4. Breakdown of projectable training aids.

Reference Stowell, F.(2013). Essentials of Fire Fighting and Fire Department Operations (6th ed.). Upper Saddle River, N.J.: Brady Pub.; ISBN# 978-013-314080-4

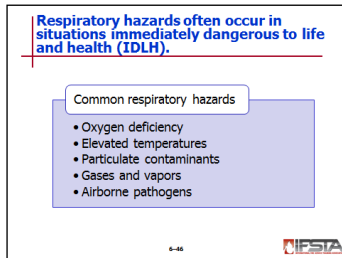
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Preparation

Introduction

- Instructor introduction
- Objectives
- Preparation Step

Presentation



Respiratory Hazards

Found in situations that produce immediate, irreversible, debilitating effects on health, may result in death

Defined by NFPA® 1500 and OSHA as immediately dangerous to life and health (IDLH)

Must don correct level of protective clothing and respiratory protection before entering IDLH area



Particulate contaminants

Small particles may be suspended in air

Sources – Vehicle exhaust emissions, chemical reactions, heated metals or metal compounds, combustion

Exposure causes asthma, lung cancer, cardiovascular disease, premature death

Encountered during

Wildland fires

Welding and metal cutting operations

Operation of fire apparatus and small engines

Operations following explosion or building collapse

Structural fires

Protection provided by air-purifying respirators and powered air-purifying respirators

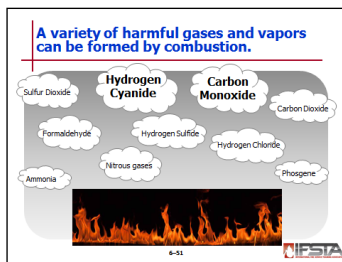
Gases and vapors

Gases exist at standard temperature and pressure

Vapors result from temperature or pressure changes that affect solid or liquid

Both may be inhaled, ingested, or absorbed into body – Resulting in illnesses and death

Exposure may cause – Cancer, cardiovascular disease, thyroid damage, respiratory problems, eye irritation



Fire gases and vapors created by combustion

Carbon monoxide, Carbon dioxide, Hydrogen cyanide, Hydrogen chloride, Hydrogen sulfide, Nitrous gases, Phosgene, Sulfur dioxide, Ammonia, Formaldehyde

Carbon monoxide (CO) and hydrogen cyanide (HCN) responsible for majority of fire-related fatalities

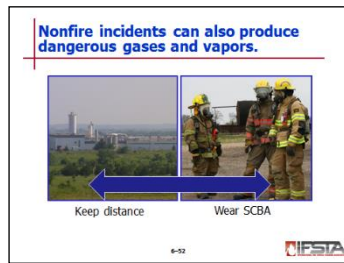
Carbon monoxide

Colorless, odorless gas present in every fire, released when organic material burns

CO poisoning – Sometimes lethal condition when CO molecules attach to hemoglobin, decreasing blood's ability to carry oxygen

Hydrogen cyanide

Produced by incomplete combustion of nitrogen and carbon containing substances



Released during off-gassing as object heated

Can be inhaled, ingested, absorbed in to body – Targets heart and brain

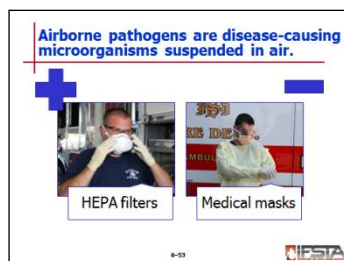
Nonfire gases and vapors

Can be produced during incidents involving – Industrial, commercial, or warehouse occupancies, spills resulting from transportation accidents, leaks from storage containers or pipelines

Always remain at safe distance until risk analysis completed – SCBAs must be worn until atmosphere determined safe

Common types produced – Carbon dioxide, ammonia, sulfur dioxide, chlorine, pesticides

May also be found in sewers, storm drains, caves, trenches, storage tanks, tank cars, bins, other confined spaces – Search, rescue, recovery in these areas require SCBAs and SARs



Airborne pathogens

Disease-causing microorganisms suspended in air

Encountered when assisting during medical responses, vehicle extrications, rescue and recovery operations, terrorist attacks

Cause infection after being inhaled or directly contacted

Can result in – Meningitis, influenza, methicillin-resistant Staphylococcus aureus (MRSA), pneumonia, tuberculosis (TB), severe acute respiratory syndrome (SARS), measles, chickenpox, smallpox

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Protection provided by high-efficiency particulate air (HEPA) filters, APR/PAPRs, SCBA/SAR

HEPA – Single use masks are certified by NIOSH; designated N95, N99, N100

Designations indicate percentage of particles that the masks remove

Surgical masks not approved – May be used on patients to prevent spread of disease by exhaling, sneezing, coughing

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Chart Pad:

Title Page

- Name, Department, Title of Presentation

Acronym

- **L.I.P.** (Life Safety, Incident Stabilization, Property Conservation)
instructor relates these priorities to the lecture

Summary (2-4 key points)

- Instructor reviews 2-4 key points of the lesson plan to clarify uncertainties, prevent misconceptions, increase learning and improve retention

Application (1 scenario)

- The student is given a scenario where the student will apply all of the knowledge that was given in the lecture. *This is not a question*, it is merely the explanation of the scenario.

Evaluation (2 questions)

- Instructor should ask students 2 direct questions that were presented during the lesson. *Answer to the questions must be give after asking the question.*