This Month's "Working Fire"...

Volume 96-12: December 1996
Approx. Program Length 60:00

FIRELINE

Wildland Blaze Injures Firefighters **Approx. Length: 11:40**
Malibu, CA

Firefighters from LA City, County and Glendale battled this blaze that followed a similar path as a blaze in 1993. But in this case, six firefighters working structure protection near Malibu were overrun by a fire that shot up the ridge. Two had to run through the fire to safety, suffering significant burns, while four others crowded into one fire shelter to escape death. This segment includes interviews with the injured firefighters and the incident commander. For more information on this incident, contact: Capt. Steve Valenzuela, P.I.O., LA County Fire Dept. 1320 N. Eastern Ave., Los Angeles, CA 90063. Or call: (213) 881-2411.

Welding Facility Fire **Approx. Length: 5:06**
South Portland, ME

The Portland Welding Facility had been around for 65 years. Firefighters knew it and the managers well. When this fire started, firefighters knew their water supply, apparatus placement and mutual aid, including the use of a fire boat, in advance. Their biggest concern was for exploding gases in pressurized cylinders. They placed large master streams then backed out of the area. This segment shows several explosions. For more information on this incident, contact: Chief John True, South Portland Fire Dept., 684 Broadway, South Portland, ME 04106. Or call: (207) 799-3314. Look *for discussion questions on this segment following this summary print material.*

DISCUSSION QUESTIONS FOR WELDING FACILITY INCIDENT

1) What is your first priority upon arrival at a storage facility fire?

2) Discuss the necessary interaction between plant officials and firefighters.

3) Discuss the importance of pre-planning such a facility? What elements should such a pre-fire plan contain?

4) What action should you take to protect yourself and equipment from explosions and projectiles?

5) What is the biggest danger caused by the gases involved at this welding facility fire?

This Month's "Working Fire"

HANDS-ON

Confined Space Rescue **Approx. Length: 16:02**
Part II: Air Monitoring, Supply, Communications & Scenario #1

In the second of this multi-part series, the focus is on air monitoring, supply and communications. Then we'll take you down into a manhole to follow a team of rescuers through their first scenario involving sub-surface rescue. For more information on confined space rescue, contact: Carl Levon Kustin, Lee & Associates, P.O. Box 99, Boulder Creek, CA 95006. Or call: (408) 338-7692.

NOTE: Follow federal, state and local regulations for confined space rescue. Also, look for related training material with this month's print information.

Positive Pressure Ventilation **Approx. Length: 10:34**

In response to your suggestions, we offer this segment on positive pressure ventilation. Assistant Chief Ken Hines gives a thorough explanation and demonstration of how, when, and why positive pressure ventilation may be advantageous to your department. Look for enhanced training materials on this topic this month.

FIRE MEDICS

Mass-Casualty Incident Drill **Approx. Length: 4:29**

In this training segment we follow one department through a mass casualty incident drill involving a school bus with multiple school-aged victims. EMS command, record-keeping and the variables that MCIs present is stressed in this segment. For more information on this drill, contact: Dpty. Chief Steve Spiegel, Pattonville Fire Dist., 13900 St. Charles Rock Road, Bridgeton, MO 63044. Or call: (314) 739-3118.

UP TO CODE

"Question E" Referendum **Approx. Length: 6:07**
Montgomery County, MD

This past election put the volunteers against the paid firefighters in Montgomery County, MD. "Question E" would have created one paid fire chief for the predominantly private, volunteer county. The Maryland Department of Fire Rescue has paid firefighters who work beside the volunteers on any number of incidents on a daily basis. Their position was that one paid chief would eliminate bureaucracy and create a more centralized response. The volunteers believed the change would alienate volunteers and raise taxes. This segment explores both sides. Watch this segment for the final vote.

Enhanced Training

Confined Space Rescue, Part II

Objectives

After watching this program the student shall be able to:
1. Understand the hazards associated with a below-grade confined space rescue.
2. Identify the equipment necessary to perform a below-grade –entry and rescue.
3. Understand the use of entry permits and required positions to make a below-grade entry.

Standards and Regulations

This training is consistent with Federal OSHA section 29 CFR 1910.146, ANSI Z117.1 Guidelines, NIOSH Publication NO. 80-1106 Guidelines, Underwriters Laboratories Intrinsic Safety for Hazardous Locations and NFPA 1983, 1995 edition.

Training Outline

A. Introduction

In understanding the rules that govern our behavior during a confined space rescue, the fire department must be trained prior to the actual emergency. This training includes both classroom and hands-on skills. Hands-on training must include the opportunity for team members to be trained on the proper application of equipment and –be allowed to practice these skills in actual or simulated permit spaces.

As in live fire training, confined space rescue training at real permit spaces pose real dangers. All rules apply during training as they would during an actual emergency.

How much training a fire department needs depends upon their prior knowledge and skill level, coupled with the target hazards they could potentially face.

B. Selected Equipment

Atmospheric monitors, communication equipment and supplied air breathing systems are just three of a whole list of different and very important pieces of equipment needed and required for a confined space rescue team. Because of the potential for entry into a hazardous atmosphere it is recommended that all equipment brought into the permit space carry intrinsically safe approvals.

1. Atmospheric Monitors

Battery-powered single and multiple-gas instruments are the most common and practical pieces of equipment necessary to determine the common and practical pieces of equipment necessary to determine the present and potentially changing atmosphere in a confined space.

Confined Space Rescue, Part II

To perform air monitoring efficiently, one should follow a logical test sequence that employs, in part, a process of elimination. When testing confined spaces, always test in the following order:

a. Oxygen deficiency or enrichment
b. The presence of combustible gas
c. The presence of toxic gases

Comprehensive testing should be conducted in various locations within the confined space.

a. Some gases are heavier than air and tend to collect at the bottom of a confined space.
b. Others are lighter and are usually in higher concentrations near the top of the confined space.
c. Since some gases are the same molecular weight as air you can find layering and stratification at different levels throughout the space.

The key is to take samples vertically every four feet and try to monitor the entire space. The results of the atmospheric testing will have a direct impact on the level of protective equipment that will be required for entry. It may also determine if a rescue is still possible or if entry can be made at all.

Air monitoring instruments are a high-maintenance piece of equipment:

a. they are only as good as they have been maintained, and
b. how well the person using the monitor has been trained.

Fire departments should always follow manufacturer's recommendation on service and calibration.

2. Communication Equipment

Examples of communication equipment and systems include:

a. portable radios
b. hand signals
c. rope signals
d. direct voice contact
e. hard-line communication equipment

Even when a primary communication system is chosen, it is imperative that fire departments have a back-up system that all members know how to initiate it in the event of a primary system failure.

Hard-line communication systems have proven to be a valuable primary system.

a. They have the ability to operate by voice, allowing hands-free communication between support personnel and rescuers.

Answers to following quiz:

1. False 2. False 3. True 4. 1, 4, & 5

5. a. They are much lighter with a smaller profile.
   b. They can be supplied by an outside potentially unlimited air source.

Confined Space Rescue, Part II

b. These systems also shield the signal so as to not interfere with other equipment such as atmospheric monitors.
c. As with safety lines, communication lines can restrict movement if not managed correctly. It is recommended that back-up teams be on their communication system so they can not only monitor the progress of the primary team but gain a mental picture of the confined space they might enter.

C. Below-Grade Entry and Rescue

Underground or below-grade rescues pose special problems for fire department confined space rescue teams. Just some of the potential problems are:

1. a potentially contaminated atmosphere
2. fall hazards
3. engulfment hazards
4. noise problems
5. temperature and exposure problems
6. darkness
7. no rapid egress

The Confined Space Entry Permits (see detailed forms included in this training guide) is an official document which can help fire departments remember and record responsibilities during training or an actual emergency and should be REQUIRED if any fire department is going to enter a confined space during training or an actual emergency.

The IC Checklist for confined space rescue is a quick check-off list that can help remind Incident Commanders of their responsibilities before, during, and after a confined space rescue.

The Incident Command Organizational Plan is an example of a fire department command structure for a confined space rescue. This document illustrates the number of personnel and the job functions that can be utilized at a confined space rescue.

The forms provided are examples from fire departments that have customized the required information and record-keeping system to fit their own response plan. Training with these forms is just as necessary as with the equipment and systems to be used for entry.

For further information on equipment, contact: Lee & Associates Rescue Equipment Inc, at 408-338-7692; fax 408-338-2869 or at www.rescuenet.com.

For further information on training, contact: The Industrial Emergency Council at 415-508-9008 or fax 415-508-9091

Special thanks to the Milpitas (CA) Fire Department, Assistant Chief Bobby Dixon and to Santa Clara County Central Fire Protection District, Captain Randy Jones.

Confined Space Entry Permit

Atmospheric Tests - Test Gases in Order Shown

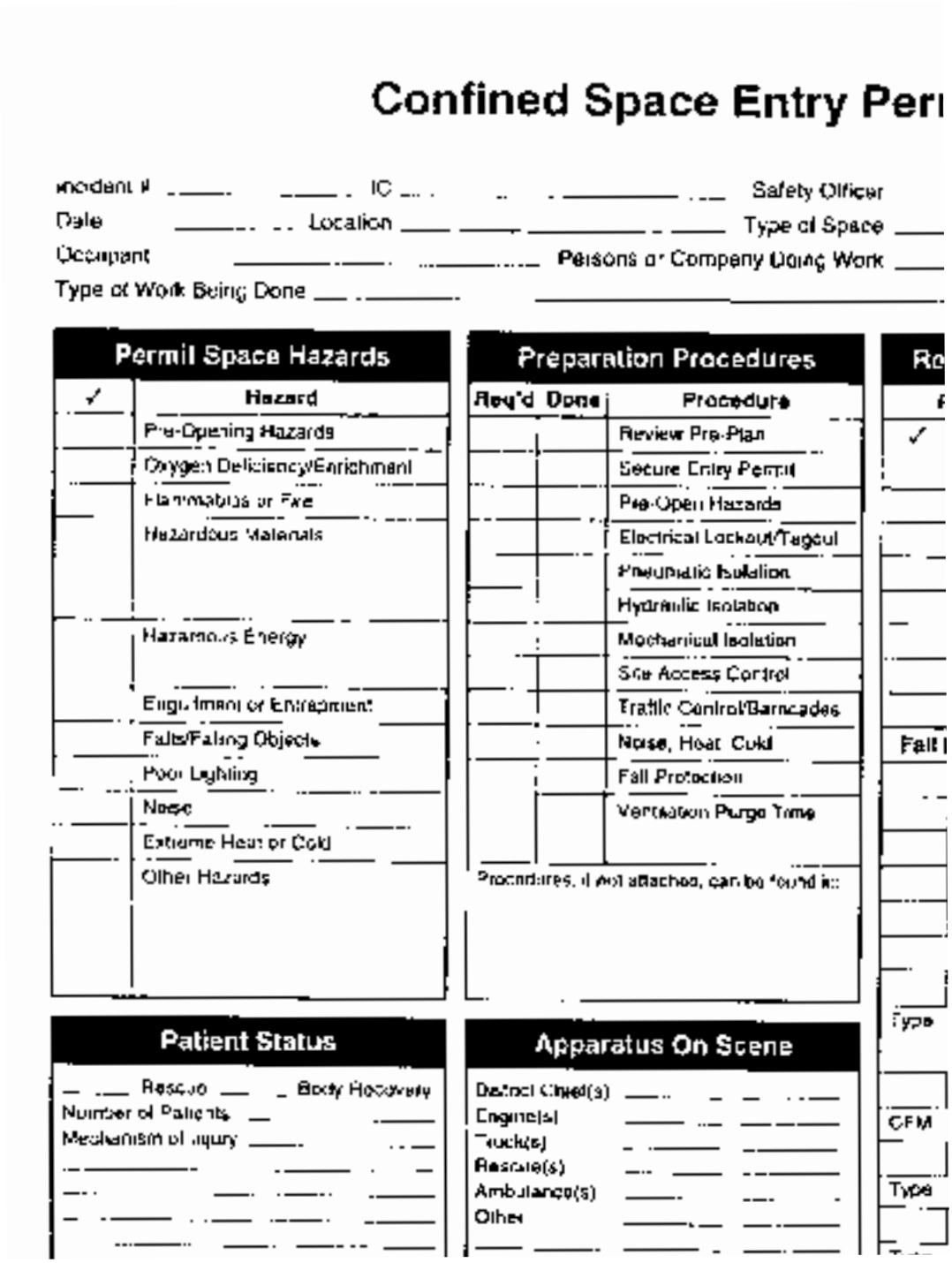
Limits		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Equipment	Tester
23.5% 19.5%	Time							Type	
	Result								
10% LEL	Time							Type	
	Result								
35 PPM	Time							Type	
	Result								
10 PPM	Time							Type	
	Result								
	Time							Type	
	Result								
	Time							Type	
	Result								

Entry Authorization

I certify that all precentry conditions listed on this permit have been met and the space is safe to enter.

Signature Date/Time

Entry Supervisor



Confined Space Entry Per

Incident # _____ _____ IC _____ _____ Safety Officer

Date _____ Location _____ Type of Space _____

Occupant _____ Persons or Company Doing Work _____

Type of Work Being Done _____

Permit Space Hazards

✓	Hazard
	Pre-Opening Hazards
	Oxygen Deficiency/Enrichment
	Flammables or Fire
	Hazardous Materials
	Hazardous Energy
	Engulfment or Entrapment
	Falls/Falling Objects
	Poor Lighting
	Noise
	Extreme Heat or Cold
	Other Hazards

Preparation Procedures

Req'd	Done	Procedure
		Review Pre-Plan
		Secure Entry Permit
		Pre-Open Hazards
		Electrical Lockout/Tagout
		Pneumatic Isolation
		Hydraulic Isolation
		Mechanical Isolation
		Site Access Control
		Traffic Control/Barricades
		Noise, Heat, Cold
		Fall Protection
		Ventilation Purge Time

Procedures, if not attached, can be found in:

Patient Status

_____ Rescue _____ Body Recovery

Number of Patients _____

Mechanism of Injury _____

Apparatus On Scene

District Chief(s) _____

Engine(s) _____

Truck(s) _____

Rescue(s) _____

Ambulance(s) _____

Other _____

IC Checklist for Confined Spac

Pre-Entry Size-Up

- [ ] Secure permits (entry, hot work, etc.)
- [ ] Identify hazards, mechanism of injury (1)
- [ ] Victim identification - Number:_____ Condition:_____
- [ ] Locate job supervisor
- [ ] Identify authorized work
- [ ] Ensure space is structurally safe for entry

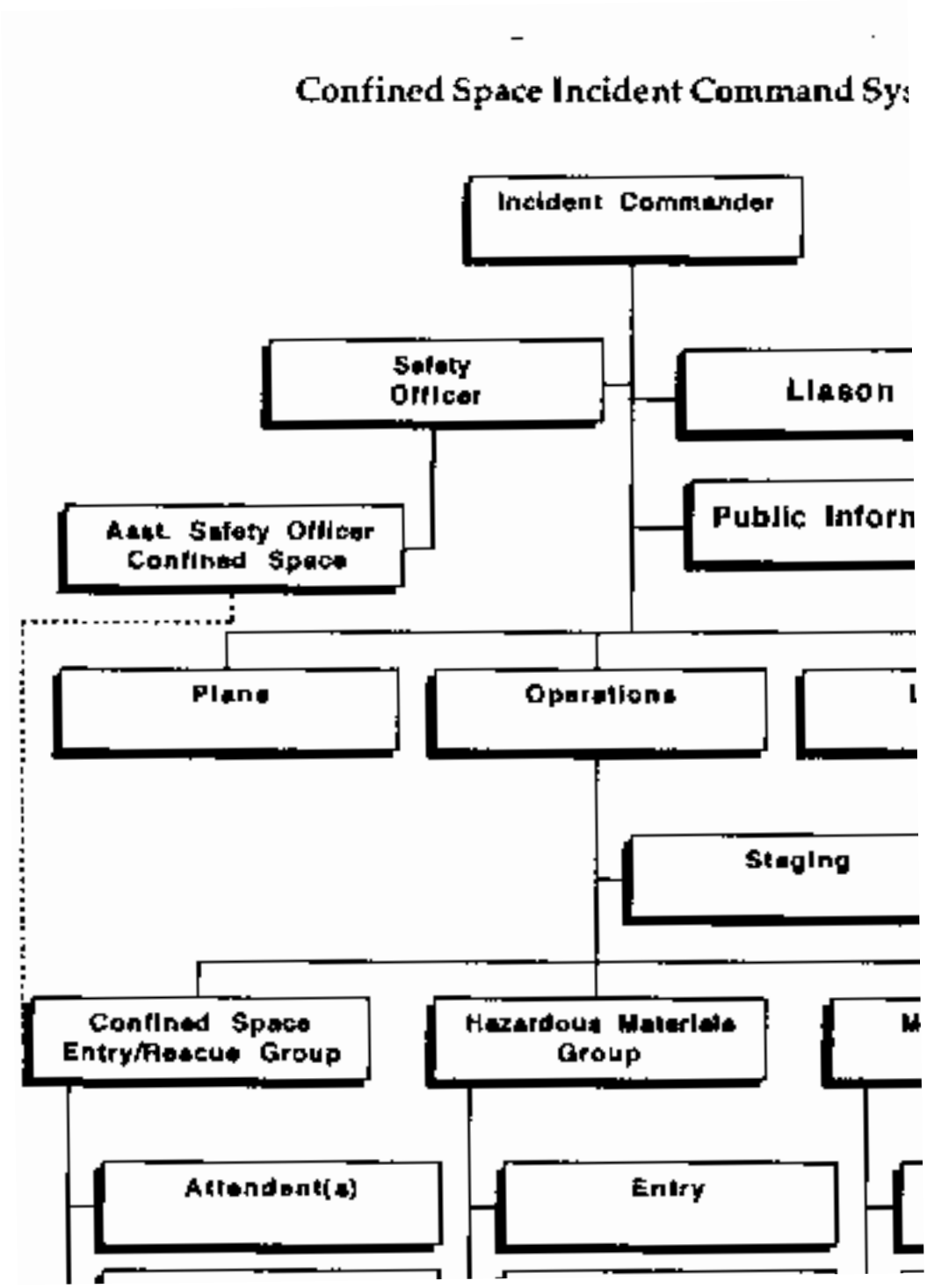
Prior to Entry

- [ ] Establish and control perimeter
- [ ] Assign responsibility for space entrance (Attendant) (2)
- [ ] Medically monitor personnel if appropriate
- [ ] Test atmosphere (Log readings on Confined Space Entry Permit Form)
- [ ] Secure hazards (Lockout/Tagout)
- [ ] Develop Action Plan (ICS 202)

The Rescue

- [ ] Entry group ready, with back-up team
- [ ] Personal protective equipment (3)
- [ ] Intrinsically safe lighting and communications
- [ ] Monitoring (remote and personal)
- [ ] Harnesses (ful. body)
- [ ] Retrieval system with back up system
- [ ] Victim (location, assessment, packaging, extrication)

After the Rescue


Confined Space Incident Command Sys
Incident Commander
Safety Officer
Liason
Asst. Safety Officer Confined Space
Public Inform
Plans
Operations
Staging
Confined Space Entry/Rescue Group
Hazardous Materials Group
Attendant(s)
Entry

Enhanced Training

Confined Space Rescue, Part II: Quiz

Date_____ **Chief/T.O.**_____

Firefighter (print)_____ **Education Credits/ Hours/Units**_____

Signature_____

Select the best answer:

1. True or False — Fire departments responding to a confined space rescue are not required to conduct hands-on training prior to any personnel performing rescue from a permit-required confined space.

2. True or False — Fire departments do not have to follow OSHA's rules for permit-required entry while training in a permit-required confined space.

3. True or False — While monitoring a confined space it is necessary to sample at various locations due to the fact that some gases are lighter or heavier than air.

4. Circle three of the following five which are positive attributes of a hard-line communication system:
   1. Voice-activated hand-free communication
   2. A team can choose a non-intrinsic safe system
   3. Does not potentially restrict a rescuer's movement
   4. Allows direct communication with support and rescue personnel
   5. Is shielded and will not interfere with your monitors

5. List the two main advantages a supplied air system offers a confined space rescue team that a self-contained breathing apparatus does not.

Bibliography

Federal Register, Chapter 29 part 1910, Section 146 of the Code of Federal Regulations (CFR), "Permit-Required Confined Spaces": April 15, 1993.

"Confined Space Awareness," California State Fire Marshall: 1995.

"Rescue Systems I, Fundamentals of Heavy Rescue," California State Fire Marshal: June, 1989.

Enhanced Training

Positive Pressure Ventilation

Objectives

After watching this segment the student should:

1. Understand the differences between positive pressure ventilation and negative pressure ventilation.
2. Describe the techniques for successfully using PPV.

Standards and Regulations

This training is compatible with NFPA 1001, Standard for Firefighter Professional Qualifications (1992 Edition).

Training Outline

Introduction

A standard on nearly every fire scene is the use of forced air ventilation. In many situations it is used in conjunction with offensive fire attack. In others, it is accomplished after the fire is knocked down and crews are tasked with salvage and overhaul.

There are two generally recognized types of forced air ventilation; positive pressure ventilation (PPV) and negative pressure ventilation (NPV).

A. Negative Pressure Ventilation

1. NPV is best characterized by the illustration of the old smoke ejector hanging from the doorway doorjamb, bringing smoke out of the building. A window or door would be opened on the opposite end of the house from the smoke ejector and a simple venturi effect would occur, channeling smoke and fire gases to the outside. This was often done in conjunction with the hydraulic ventilation used by firefighters and their hoses.

2. NPV is less effective when used with vertical ventilation and as mentioned is usually not part of the initial fire attack efforts. Firefighters often have to work in the space to be ventilated exposing them to fire products and many of the fans use electrical power, so electrical cords must be run to operate the unit. If the unit is placed at a

Positive Pressure Ventilation

point of egress, firefighters often have to seek an additional entry and exit point or stoop down low to get under the fan.

B. Positive Pressure Ventilation (PPV)

1. PPV is essentially the opposite of NPV. Instead of pulling smoke and fire gases out of the building, PPV pushes fresh outside air into the structure. Air is introduced at a rate faster than it is discharged, creating the positive pressure inside the structure.

2. PPV is often used during offensive fire attack and is set at the point of entry into the building at the same time that attack hose lines are being advanced and used. Typically, the first attacking crew will set up the PPV blower as part of the task for offensive attack, placing the fan and then continuing inside with hose lines.

C. PPV in Action: The How-To's

1. One of the big advantages of PPV is that the smoke fan or blower is normally gasoline operated and eliminates the need for electrical cords to be strung, saving time.

2. The blower should be placed at the point of entry, and used in the same way as a hose line, blowing from unburned toward the burned portion.

3. If the fire has not vented upon initial deployment of hose lines, then a ventilation opening should be made with which smoke can escape. This exit opening should be made as close to the seat of the fire as possible.

4. The exit opening should be in proportion to the point at which air is being introduced. A general rule of thumb is that the venting exit should be 75% to 150% the size of the entry opening. The more air you introduce with one or more fans, the larger the exit opening should be.

5. The fan produces a cone of air which should completely cover the air entry point. Typically the fan is placed six to eight feet from the entry point and the cone will easily cover that area. Setting up the blower correctly prevents the wasting of PPV air.

6. For larger structures, more than one fan can be set in series to increase air flow.

7. Blowers should be purchased according to the specific needs of the department. Blowers create varying amounts air movement, measured in "CFM," cubic feet per minute. Purchase a blower that will do the job efficiently!

Enhanced Training

Positive Pressure Ventilation: Quiz

Date_____ **Chief/T.O.**_____

Firefighter (print)_____ **Education Credits/ Hours/Units**_____

Signature_____

Select the best answer:

1. True or False PPV is best accomplished during salvage and overhaul operations.

2. True or False NPV is best described as being done with initial fire attack offensive hose lines.

3. True or False The exit opening when using PPV should be at least 150% larger than the entry opening.

4. Identify the step to take before using PPV in offensive fire attack.
   a. Locate entry point for fire attack
   b. Create an exit opening for ventilation if one is not already in place
   c. Open all the windows possible
   d. All of the above

5. Identify five of the positives aspects of PPV.

Bibliography

Fire Service Ventilation; International Fire Service Training Association; Oklahoma State University; Seventh Edition