

This Month's Working Fire...

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Volume 99-1: January 1999
Approx. Program Length 56:50

FIRELINE

Council Towers Retirement Home Fire St. Louis, MO

Approx. length: 11:53

Presumably started by smoking in bed, a fire at this retirement home forced the evacuation of over 150 residents. While the fire was contained on the 21st floor, the evacuation progressed slowly because of the inherent physical and medical condition of the elderly. A triage was set up in the lobby of the building to avoid falling glass outside which might have resulted from ventilation efforts. While many residents were "protected-in-place" in safe rooms on the upper floors, other residents needed rescuing. During one such rescue, a firefighter was subjected to severe smoke inhalation after running out of air. Amazingly, there were no fatalities or serious injuries among either residents or firefighters during this eight-alarm blaze. For more information, contact Duane Greer, P.I.O., St. Louis Fire Department, 1421 N. Jefferson Ave., St. Louis, MO 63106 or call him at 314-289-1900.

Abcom Wire Company Fire

Approx. length: 10:58

Welders ignited the roof of this large industrial building complex. The smoky fire spread quickly and fast through a cockloft area due to a delayed alarm. An initial interior attack turned fruitless and the strategy went defensive; exposures were protected as responders tried to cut off the fire. There was also a haz-mat spill in the incident with the presence of acid used in the wire fabrication process. Incident Command played a big role in this fire with as multiple alarms were pulled. For more information, contact Battalion Chief Terry L. Dennis, Jacksonville Fire-Rescue Department Academy., 6925 Evergreen Ave., Jacksonville, FL 32208 or call him at 904-645-0124.

HANDS-ON

Water Streams Management Part II

Approx. length: 10:25

This training follows up on Part One conducted last month and uses field training to illustrate proper nozzle and stream use. For more information contact Steve Stokely, Sr., Coordinator, Fire Technology, Lamar University Institute of Technology, 885 E. Lavaca St., Beaumont, TX 77705 or contact him at 409-833-7491.

Fireline Incident Analysis

HANDS-ON (cont.)

Forcible Entry Tips & Techniques Part I

Approx. length: 10:00

In Part One of a multiple-part series, Jacksonville firefighters demonstrate a number of techniques and tips that can be used for forcible entry through dead bolted doors, burglar bars and various metal and plate-glass doors. For more information, contact Captain Rob Sorenson, Jacksonville Fire-Rescue Dept., 6925 Evergreen Ave., Jacksonville, FL 32208 or call him at 904-645-0124.

FIRE MEDICS

Alternative Care Delivery Systems

Approx. length: 8:07

The St. Louis Bureau of EMS, a division of the Fire Department, examined a year's worth of EMS runs and discovered that only on a small percentage of calls was meaningful care administered; in fact, many times calls were from disadvantaged patients looking for transportation somewhere or had needs for services which were out of the purview of the EMS response protocol. In view of this, St. Louis EMS developed a network of social services including the HMO for the state Medicare/Medicaid plan which offer such services. As a result, overall EMS calls have been reduced by 20 percent. This has significant implications for EMS departments who are under budgetary restraints. For more information, contact Kim Wood, P.I.O., St. Louis Fire Department, 1421 N. Jefferson Ave., St. Louis, MO 63106 or call her at 314-289-1900.

EVOLUTIONS 2000

Kramer vs. Kramer: The Great Fire Nozzle Debate

Approx. length: 2:26

Working Fire and Professor/Chief Bill Kramer presents our Continuing Education segment that's worth one credit from the University of Cincinnati. This month, Bill compares and contrasts he uses and effectiveness of different kinds of nozzles and streams. For more information, contact the Open Learning Fire Service Program, College of Applied Science, 2220 Victory Parkway, ML #103, Cincinnati, Ohio 45206 or call 513-556-6583.

This months *Working Fire...*

From the Departments Involved...

DISCUSSION QUESTIONS FOR THIS MONTH'S INCIDENTS

The departments involved in this month's incidents pose some discussion questions that you can use as discussion-starters in your own department's training sessions. Let's kick it around!

Council Towers Retirement Home Fire/St. Louis, MO Chief Neil Svetanics, St. Louis Fire Department, St. Louis, MO

1. Do you preplan retirement and nursing homes? Are you familiar with all exits? How ambulatory are the residents?
2. In the event that residents can't return to their rooms, are residents' medications/prescriptions kept somewhere off-premise? Do you have an arrangement with a nearby pharmacy that will fill these prescriptions in an emergency?
3. Can you muster sufficient EMS transport in the event you must stage an evacuation or have a mass-casualty event?

Adcom Wire Company Fire/Jacksonville, FL Battalion Chief Terry L. Dennis, Jacksonville Fire-Rescue Department, Jacksonville, FL

1. Do you educate industrial company personnel about the importance of reporting a fire immediately rather than trying to fight the fire themselves?
2. Are you and your mutual aid departments practiced in using Incident Command together at a large incident?
3. Do you train your personnel to stay off the radio on the fireground unless what they have to say related to the "big picture" or has major significance for Incident Command?

Enhanced Training

Water Streams, Pt. 2

Objectives

After watching this program the student shall:

1. understand the basic characteristics of nozzles and streams
2. understand the types and uses of nozzles.

Standards and Regulations

This training is consistent with NFPA 1500 and appropriate OSHA regulations.

Training Outline

FIRE STREAMS

A. FIRE STREAM

A stream of water or other water-based extinguishing agent after it leaves the fire hose and nozzle until it reaches the desired point.

B. SOLID STREAM

CHARACTERISTICS

1. Produced from a fixed-orifice, smooth-bore nozzle.
2. A stream that has not lost continuity by breaking into showers of spray.
3. Preferred where a powerful, long-ranging, high-volume stream is desired.

FLOW CAPACITIES

1. Any increase in the area of the discharge orifice or the velocity of the stream of water will result in a corresponding increase in the flow rate.
2. Flow capacity of a nozzle increases by four times when the diameter of the discharge opening is doubled at equal discharge pressure.
3. The nozzle tip size should not be larger than one-half the diameter of the hose.

REACH

1. Reach is the distance a solid fire stream can be effectively projected from a nozzle.
2. Reach can be affected by **gravity** and **friction of the air and wind**.
3. The **greater** the **discharge pressure**, the **greater** the reach of the stream.

Training Outline

4. Given equal discharge pressures, the **reach** of the stream will **increase** as the **size** of the discharge orifice is **increased**.
5. The **maximum horizontal reach** of a stream is achieved when the stream is directed at an **angle of 32 degrees** to the earth's surface.

C. FOG STREAM

CHARACTERISTICS

1. Patterned stream composed of droplets.
2. The difference between a fog stream and a broken stream is that the fog stream has a definite pattern, is generally composed of small droplets, and is usually adjustable.
3. Capable of achieving unlimited range of patterns from straight-stream to wide protective fog.

VELOCITY OF THE STREAM

1. Water for the fire stream is given velocity by the pressure exerted upon the water by the pump.
2. As the pressure in a hoseline increases, so does the velocity of the water.
3. The stream's velocity is retarded by friction with the air as it is pulled downward by the force of gravity.
4. Forward velocity is one factor that governs the reach of a fog stream.

REACH

1. Five factors that affect the reach of a fog stream are **gravity, water velocity fire stream pattern, water droplet friction with the air, and wind**.
2. The fog stream is useful for fighting enclosed fires due to the five negative factors.
3. Unsatisfactory fog discharge patterns are often caused by insufficient nozzle pressures.

D. BROKEN STREAM

CHARACTERISTICS

1. A stream of water that has been separated into coarsely divided drops.
2. Droplets are larger than fog stream droplets.
3. Useful when fighting basement fires through the floor, attic fires through a ceiling, or when fighting fires in partitions.
4. Produced by special-purpose nozzles.
5. Volume of broken streams is comparable to that of a solid stream.

Water Streams, Pt. 2

NOZZLES

A. COMPONENTS OF NOZZLES

NOZZLE CONTROL VALVES

1. Regulates flow of water.
2. Ball Valve: fully closed, partially open, or fully open to control the flow of water.
3. Slide Valve: movable cylinder seats against a shaped cone which increases or decreases the flow with a sliding motion.
4. Rotary Valve: an exterior barrel rotates around an interior barrel to control flow and discharge pattern.

NOZZLE TIPS

1. Solid stream
2. Fog stream
3. Broken stream

PLAYPIPES

1. Used to accelerate the flow of water.
2. Located in front or behind the nozzle control valves.

STREAM STRAIGHTENERS (VANES)

1. Prevents twisting motion in streams
2. Straight, internal blades inserted parallel to the axis of the stream tube.

ACCESSORIES

1. Makes nozzles easier to handle and more versatile.
2. Pistol grips, large double handles, etc.

B. TYPES OF NOZZLES

SOLID STREAM NOZZLES

1. Designed so the shape of water in the nozzle is gradually reduced until it reaches a point a short distance from the outlet.
2. Outlet diameter is equal to one-half the inner-diameter.
3. Purpose of short, cylindrical bore is to round out and give water its shape before discharge.
4. Discharge orifice of nozzle should be no greater than one-half the size of attached hoseline.

Water Streams, Pt. 2

FOG STREAM NOZZLES

1. **Periphery**: deflected streams are produced by deflecting water from the periphery on an inside, circular stem.
2. The **impinging** stream nozzle drives several jets of water together at a set angle to break the water into finely divided particles, usually a wide-angle stream.
3. May be produced by deflection at the **periphery**, or by **impinging** jets of water, or by a combination.
4. Fog patterns are easy to handle because reaction forces of water counterbalance each other (versus a solid or straight pattern).

CONSTANT FLOW NOZZLES

1. Discharges the same volume of water continuously.
2. Designed to flow a specific amount of water at a specific nozzle discharge pressure.
3. Use periphery-deflected streams.
4. Equipped with an adjustable pattern setting.

VARIABLE FLOW NOZZLES

1. Produces different flows depending on stream pattern, water pressure, and the size of the supply line.
2. Three types of variable flow nozzles: rotary control, variable pattern, and automatic nozzles.

HANDLINE NOZZLES

1. Designed to be placed on mobile attack lines that are easily maneuvered by firefighters.
2. May be **solid**, **fog**, or **broken** streams.
3. **Maximum** amount of water flowed is 300 gpm.
4. Most use ball or slide control valves.

MASTER STREAM NOZZLES

1. Master stream refers to any fire stream that is too large to be controlled without mechanical aid.
2. May be **solid**(80 psi) or **fog**(100 psi) streams.
3. Usually flow 300 gpm or greater.
4. Deliver large volumes with greater reach.

Answers to the quiz on page 9:

1. true 2. false 3. true 4. e. 5. c.

Water Streams, Pt. 2

TYPES OF MASTER STREAM NOZZLES

1. Monitors: stream direction and angle can be changed while water is being discharged.
2. Turret Pipes: mounted on fire apparatus deck.
3. Deluge Set: consists of a short length of large diameter hose with large nozzle supported at the discharge end by a tripod.
4. Elevated Master Streams: large-capacity nozzles placed on the end of an elevating device. Examples include pre-piped ladders or hoses with aerial ladders.

C. SPECIAL-PURPOSE NOZZLES

CHIMNEY NOZZLES

1. For chimney flue fires
2. Loosens soot inside of chimney

LOW-VELOCITY NOZZLES

1. Uses an impinging stream and operates at **greater pressure** than other special-purpose nozzles.
2. Develops a "rain" into the heated area.

HIGH-PRESSURE NOZZLES

1. Develops fog streams with a **high-velocity** fine spray.

D. WATER HAMMER

Water moving through a pipe or hose has both weight and velocity. The weight of the water increases as the pipe or hose size increases (because there is more area or volume). If you suddenly stop the water by quickly closing a valve or nozzle, there will be an energy surge transmitted in the opposite direction (often the original pressure) that can damage the pump, appliances, hoses, or the municipal water system.

Water Streams, Pt. 2: Quiz

Date _____
Firefighter (print) _____

Chief/T.O. _____
Education Credits/
Hours/Units _____

Signature _____

Select the best answer:

1. True or False: An impinging stream nozzle drives several jets of water together.
2. True or False: A monitor is a fixed device through which stream and angle can't be changed.
3. True or False: A Cellar Nozzle can be used in an attic.
4. Five factors affect the reach of a fog stream:
 - a. gravity and wind
 - b. water velocity
 - c. fire stream pattern
 - d. water droplet friction with air
 - e. all of the above
5. With Solid Streams:
 - a. A solid stream is produced from a variable-orifice nozzle.
 - b. A decrease in the area of the discharge orifice will increase the flow rate
 - c. The maximum stream reach is achieved at an angle of 32 degrees
 - d. All of the above are true.

(Correct answers can be found at the top of page 8.)

Enhanced Training

Forcible Entry, Pt. 1

Objectives

After watching this program the student shall:

1. become familiar with forcible entry tools
2. learn specific techniques and alternatives for gaining entry

Standards and Regulations

This training is consistent with NFPA 1500 and appropriate OSHA regulations.

Training Outline

A. EVOLUTION #1

Door Entry Using Hydra-Ram

Entry Time: 15 seconds

1. Used for metal or wooden doors opening **inward**
2. Generates 10,000 psi with a four-inch throw and only weights 11lbs.
3. Can damage a wooden door jam.
4. A rubber mallet can be used to drive the lip of the ram into the door jam to get a better bite.
5. Door is then "pumped" open with the ram.

B. EVOLUTION #2

Overhead Door Entry Using a 5-10 Steel Circular Saw

Entry Time: 1 minute

1. Start inverted V cuts as high as you can
2. Be sure and cross the cuts at the apex of the inverted V.
3. Be prepared to cut additional bracing that might be behind the door.

OVERHEAD DOOR



**MAKE INVERTED V
CUTS AS HIGH
AS POSSIBLE**

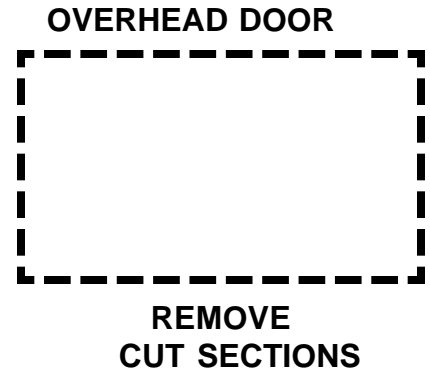
Answers to the quiz on page 9:

1. true 2. false 3. true 4. d. 5. d.

Forcible Entry, Pt. 1

Alternative Methods:

1. Make the inverted V cuts with an air chisel.
2. Locate the lock mechanism, cut an access opening, then reach in and release the lock.
3. Use a hi-lift jack.



C. EVOLUTION #3

Burglar Bar Window Entry with Hi-Lift Jack Entry Time: 1-2 minutes

1. Place jack on window sill.
2. Slide lip of jack under bottom burglar bar frame member.
3. Be prepared to cut additional bracing that might be behind the door.
4. Pump jack until bars pull out of window frame.

D. EVOLUTION #4

Inward-Opening Plate-Glass Door with Burglar Bars on the Inside using an Extrication Chain Entry Time: 1 minute

1. This case poses real problems.
2. Probably the best method is to break the glass, loop an extrication chain around the bars and hook it to an apparatus. Then drag the bars away.
3. This demands preplanning so the maneuver can be accomplished before the hoses are hooked up to the apparatus.
4. This door should be preplanned and noted for future responses to that location.

Forcible Entry, Pt. 1: Quiz

Date _____

Chief/ T.O. _____

Firefighter (print) _____

Education Credits/
Hours/Units _____

Signature _____

Select the best answer:

1. True or False: An air chisel can be used to cut an entry in an overhead door.
2. True or False: An extrication chain is used to strap the Hi-Lift jack to the truck.
3. True or False: A Hydra-Ram would make a wonderful tool for burglars.
4. When it comes to unusual doors:
 - a. know alternative entry methods
 - b. preplan
 - c. be prepared to improvise
 - d. all of the above
5. Which of the following would not be used for forcible entry:
 - a. Hi-Lift jack
 - b. Air chisel
 - c. Hydra- Ram
 - d. Piercing nozzle

(Correct answers can be found at the top of page 11)

Evolutions 2000

University of Cincinnati Continuing Education Program

Comparing Nozzle Characteristics and Uses

If you're enrolled in the **Open Learning Fire Service Program** at the **University of Cincinnati**, here's your opportunity this month to earn one college credit hour for watching *Working Fire*.

VOULUME 99-1

COMPARING NOZZLE CHARACTERISTICS AN USES

Complete written responses to the following three essay questions:

1. List the advantages of a straight-tip or smooth-bore nozzle as compared to a fog or variable nozzle.
2. List the advantages of a fog or variable nozzle as compared to a straight-tip or variable nozzles if you could not have both.
3. Explain why you would equip a fire department with either straight-tip or variable nozzles if you could not have both.

Submit your responses to:

**Mr. Bill Kramer
University of Cincinnati
College of Applied Science
2220 Victory Parkway, ML #103
Cincinnati, OH 45206**

ENROLLMENT INFORMATION:

For more information on enrolling in the Open Learning program to gain college credit, call Working Fire at 800-516-3473 for a brochure or, to register directly, call the University of Cincinnati at 513-556-6583. Associate and bachelors programs are available. Call to have your transcripts evaluated.