This Month's *Working Fire*...

Volume 99-4: April 1999
Approx. Program Length 60:00

FIRELINE

Warehouse Fire & Elevator Rescue **Approx. length: 9:53**
Portland, OR

Firefighters arrived to find a three-story warehouse fully involved. A fire inspector who turned in the alarm was present to tell responders that there was a worker trapped in a freight elevator. Rescue teams found the elevator stuck at the second-floor level, surrounded by fire. Water streams were fired up the elevator shaft to forestall the fire's advance. With the chance of collapse a real possibility, another team made its way to the basement to cut a hydraulic line, releasing the elevator and saving the victim. For more information, contact Deputy Chief Del Stevens, Portland Fire Bureau, 55 Southwest Ash, Portland, OR 97204 or call him at 503-823-3755.

Industrial Acid Spill **Approx. length: 10:02**
Riverside, CA

A local metal can manufacturer uses hydrofluoric acid in its production process. In the process of off-loading acid from a tanker, a connecting hose came loose in the containment area, spilling about 3,000 gallons. Hydrofluoric acid (NIOSH/RTECS #: MW7875000) is extremely dangerous to anyone coming in contact with it. The company choose to let a private contractor handle the problem who soon handed the job off to the fire department. The Riverside Haz-Mat team decided to pump the acid back on to the tanker and did so safely. Company management was very cooperative throughout the incident; even so, the operation took about 19 hours. EMS was on-scene with an acid antidote should it have been needed. Fortunately, it never was. For more information, contact Fire Captain Larry Katuls, Hazardous Materials Team, Riverside County Fire Department, 1550 East 6th St., Beaumont, CA 92223 or call him at 909-845-0448. .

HANDS-ON

Engine Pump Recertification **Approx. length: 8:19**
Part III

In the conclusion of this three-part series, Trainer Barry Ashman shows you the right way to recertify your pump and offers some great tips on performing the 50% capacity flow test and the relief valve test. See relevant figures and formulas in last month's (Volume 99-3) "Hands-On" Training Materials section which correspond to the pump service tests conducted in this segment. Also see this month's "Hands-On" section for Service Test Results forms that your department can use for pump recertification. For more information, contact Barry Ashman at Ashman Enterprise: 941-772-3129 or 941-336-E-ONE.

This Month's "Working Fire"

HANDS-ON (cont.)

High-Tech Airbags **Approx. length: 12:06**
Part I

In Part One of a two-part series, Res-Q-Tek demonstrates a relatively new kind of high-technology air bag with incredible lift and stability features. This month, we're in the classroom for a presentation of these bags and a comparison of them with conventional low- and high-pressure air bags. Next month we see them used on-scene. For more information, contact Andy Dzuryachko, Res-Q-Tek, 10405-G Bauer Blvd., St. Louis, MO 63132 or call him at 314-692-0065.

FIRE MEDICS

Swimming Pool Safety Program **Approx. length: 9:41**

With swimming pool season just around the corner, firefighters and EMS personnel have to prepare themselves for a new season of swimming pool accidents and medical emergencies, especially at unsupervised pools in your jurisdiction. Here's a segment aimed at the pool manager and maintenance person at unsupervised pools which EMS departments can take into the field and present proactively. For more information, contact Wayne Sanders, EMS Supervisor, West County Fire & Rescue, 123 Henry Avenue, St. Louis, MO 63011 or call him at 314-227-9350.

EVOLUTIONS 2000

Barricade® **Approx. length: 4:33**

Although it's not *Working Fire's* policy to endorse products, this month we present for your consideration a brief demonstration of the first of what will surely be a new generation of fire-retardant products. Barricade® is an amazing product that seems to totally protect the material it's applied to. For more information about Barricade®, contact John Bartlett, Fire Protection, Inc., 18425 S.E. Federal Highway, Tequesta, FL 33469 or call him at 800-201-3927.

Kramer vs. Kramer: **Approx. length: 2:13**
Water vs. Foam/Gel Products

Working Fire and Professor/Chief Bill Kramer presents our Continuing Education segment that's worth one credit from the University of Cincinnati. Following up on our Barricade® segment, this month Bill argues the pros and cons of using water versus foams and other fire retardant products. 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 Month's "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!

Warehouse Fire & Elevator Rescue/Portland, OR
Deputy Chief Del Stevens, Portland Fire Bureau, Portland, OR

1. On a large fire scene, how soon into the incident do you call for extra alarms? Are you prepared to assimilate multiple agencies (police, disaster services) and mutual aid departments into your command management structure? Do you train with these entities?

2. Do you keep in mind the collapse zone of a large building and position apparatus accordingly from the outset, so they don't have to be moved in mid-incident?

3. To what extent are you willing to risk personnel in the act of a rescue which puts them in deep jeopardy? Does your department have an established policy that's followed in such situations?

Industrial Acid Spill/Mira Loma, CA
Fire Captain Larry Katuls, Riverside Fire Department, Riverside, CA

1. Do you brief your haz-mat team completely, explaining the mission and the inherent risks and dangers up front? Do you have all the necessary MSDS available?

2. Do you have favorable relations with all hazardous materials users or producers in your jurisdiction? Do you ever train with them on possible disaster scenarios?

3. Do your personnel understand and follow the basics of haz-mat: always wearing complete protective suits (Level 1 or other), respecting the "hot zone," working in teams, etc.?

Enhanced Training

Engine Pump Recertification, Pt. III

Objectives

After watching this program the student shall:

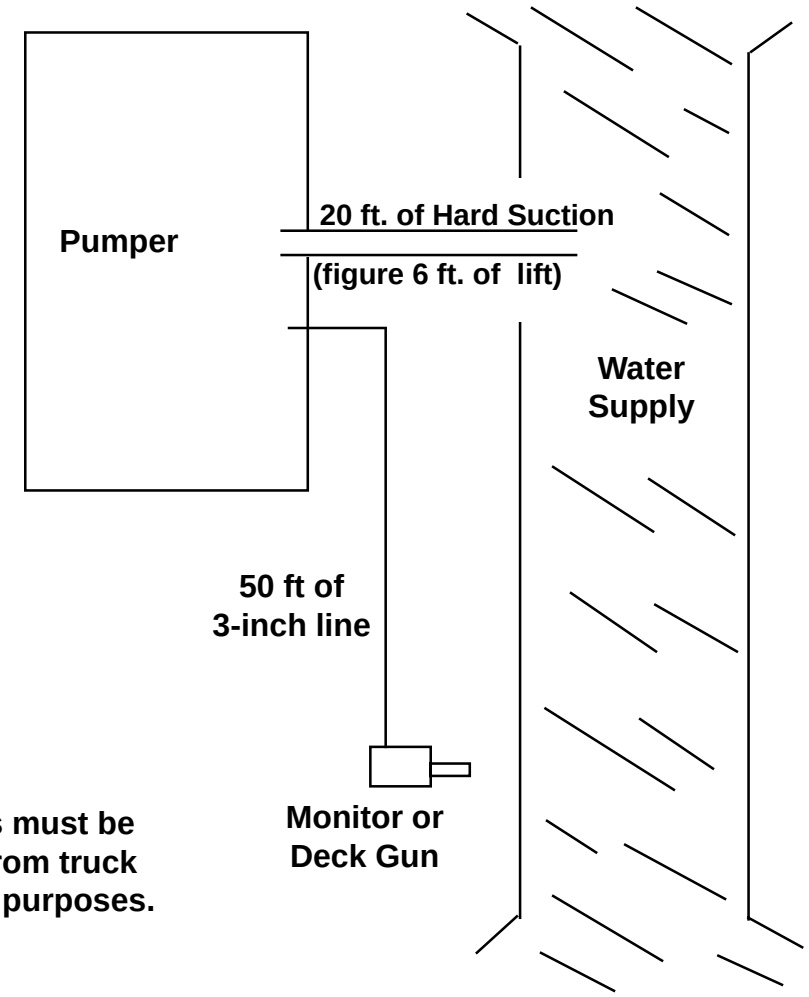
1. understand how to conduct the 50% capacity flow test and the relief valve test
2. acquire instruction on what might fail a pump, what to watch for if pumps aren't performing properly, and the de-rating of pumps.

Standards and Regulations

This training is consistent with NFPA 1911, 7th edition, 1997; IFSTA, "Fire Department Pumping Apparatus," pgs. 217-229; and appropriate OSHA regulations and practices.

Training Outline

A. APPARATUS TEST CONFIGURATION



NOTE: Deck guns must be removed from truck for testing purposes.

Engine Pump Recertification, Pt. III

A. BASIC EQUIPMENT NEEDED

1. Hard suction and strainer
2. Pitot tube
3. Pressure gauge, 0 – 300 psi and 0 – 200 psi
4. One vacuum gauge
5. Solid-stream nozzles
6. Revolution counter

B. PROCEDURAL GUIDELINES

1. Review prior-year test results
2. Locate a static water source with a minimum water depth of 48”
3. Perform test at sea level
4. Select proper nozzle diameters
5. Remove pre-piped monitor or deck guns and place at ground level
6. Hook up all pitot tubes and gauges
7. Place one gate valve or choke down the valve in line for each deck gun
8. Use all safety equipment that is applicable
9. Determine the net pump discharge pressure correction (IFSTA, pg. 221); see the chart which appeared in WF 99-3.

C. 50% CAPACITY FLOW TEST

1. 50% capacity flow test at 250 psi* net pump pressure for 10 minutes.
2. One 1 1/2-inch tip at 88 psi at the tip equals 625 gpm.
3. For this test, nozzle pressure and RPM readings are taken three times: at the beginning and end and once in the middle with all readings being equally spaced.
4. *Actual pump discharge pressure is 246 psi instead of 250 (see below).

*The net pump discharge pressure will always be a little higher when at a draft. The actual pump discharge pressure is the work done by the pump. At a draft, the pump has to work to get the water up the hose and into the pump. Therefore, the height of the lift and the friction loss in the suction hose are lost energy and must be subtracted from the pump discharge pressure. In the first example, the 100% capacity test, the actual discharge pressure is 144 but the pump is doing the work as if it were pumping at 150 psi.

Engine Pump Recertification, Pt. III

D. RELIEF VALVE TEST

1. Set the relief valve at the pump pressure for 50% capacity test.
2. Take a pressure reading and start the test. Crankthe gate valve down and raise pressure. Take three readings during the ten-minute test; one at the beginning, middle and conclusion.
3. Close all discharges slowly at a rate of 3-10 seconds; no quicker than 3 secs. and no slower than 10 secs. as required by NFPA 1911.
3. Watch the pressure gauge; it cannot rise by more than 30 psi. If our pump is pumping at 246 psi, it can't go higher than 276 psi and pass the test.

D. TEST MANDATORIES

1. During all capacity tests, the truck engine and transmission can't overheat.
2. Ambient air temperature must be less than 100 degrees F.
3. If pressure readings vary by more than 5% during the tests, you need to stop and determine what's causing those fluctuations. Possible causes are:
    a. unequal hose lengths
    b. something is clogged; i.e., the strainer or suction screens, impellers, pitot tube, suction hose, or the suction hose inner lining has collapsed
    c. the water is too warm
    d. tidewater is falling or rising
    e. the transmission is in the wrong gear
    f. the clutch is slipping
    g. the engine is overheating
    h. the muffler is clogged
    i. the tachometer is inaccurate
    j. the engine governor is malfunctioning
    k. excessive air leaks at the suction side of pump
    l. the pump is not fully primed
    m. the relief device is malfunctioning
    n. the transfer valve is in the wrong position
    o. inaccurate gauges
    p. the nozzle is too large
    q. the lift is too high
    r. the altitude is too high
    s. the water is aerated
    t. restrictions in the air filter or fuel filter
    u. worn impeller rings.

Answers to the quiz on page 10:

1. false 2. true 3. false 4. true

5. true 6. false 7. false 8. true

Engine Pump Recertification, Pt. III

E. PUMP OPTIONS

Technically, by NFPA 1911, a truck pump must pump 90% of its rated capacity or it fails. So a brand-new 1,000 gpm pump may pump 900 gpm and still pass. Anything lower than 900 gpm and it fails.

If it fails, departments have two options:

1. Repair the pump.
2. De-rate the pump.
   a. If it's rated at 1,000 gpm but only pumps 850 gpm, it would be rated at 750 gpm (the next permissible rating is 250 gpm below the original rating).
   b. Be careful if you de-rate; ISO ratings may require you to maintain certain capacity pumps.

During pump testing, you may notice that it takes slightly more RPMs each year to achieve the same results. This is normal. The wear ring in the impeller gets worn over time and allows increased "slippage" (water gets through the wear ring and goes back to the intake side of the impeller).

F. SERVICE TEST RESULTS FORMS

On the following pages are Service Test Result forms that your department may use to document the recertification of your truck pumps.

SERVICE TEST RESULTS

PUMPER NO._____ YEAR BUILT_____

MANUFACTURER_____ MODEL._____

MANUFACTURE SERIAL NO._____

ENGINE MAKE AND MODEL._____

PUMP MAKE AND MODEL. _____

RATED CAPACITY._____ GPM AT_____PSI

GEAR RATIO. ENGINE TO PUMP CAPACITY_____200 PSI_____

250 PSI_____. TRANSMISSION GEAR USED CAPACITY_____

200 PSI_____. 250 PSI_____. SUCTION SIZE_____

LENGTH_____. LIFT_____

HAND COUNTER SPEED CHECK READINGS TAKEN FROM_____

RATIO TO ENGINE. 1 TO _____

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CAPACITY TEST NOZZLE SIZE_____

LAYOUT_____

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TIME	COUNTER	RPM	TACH	APP =GA	TEST =GA	PITOT //////
____	_____	____	_____	_____	_____	_____
____	_____	____	_____	_____	_____	_____
____	_____	____	_____	_____	_____	_____
____	_____	____	_____	_____	_____	_____
____	_____	____	_____	_____	_____	_____
____	_____	____	_____	_____	_____	_____

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200 PSI TEST NOZZLE SIZE_____

LAYOUT_____

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TIME	COUNTER	RPM	TACH	APP =GA	TEST =GA	PITOT /////
____	_____	____	_____	_____	_____	_____
____	_____	____	_____	_____	_____	_____
____	_____	____	_____	_____	_____	_____
____	_____	____	_____	_____	_____	_____

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250 PSI TEST NOZZLE SIZE_____

LAYOUT_____

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TIME=COUNTER=RPM = TACH=APP =TEST =PITOT
////=/////////=////=/////=GA///=/GA//=/////
_____=_____=_____=_____=_____=_____=_____
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==========

COMMENTS*_____
_____
_____
_____
_____
_____
_____
_____

TEST GIVEN BY,_____

DATE OF TEST,_____

AMBIENT AIR TEMPERATURE AT TEST TIME,_____

ESTIMATED WATER TEMP AT TEST SITE,_____F____

FINAL RESULTS GPM RPM PSI

100%_____

70%_____

50%_____

TESTED AT_____

WITNESSED BY_____

Engine Pump Recertification, Pt. III: Quiz

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

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

Signature_____

Select the best answer:

1. True or False A 50% capacity test may be run for five minutes.
2. True or False Lift affecting discharge pump pressure should always be taken into account.
3. True or False One 1 1/2-inch tip at 88 psi at the tip equals 925 gpm.
4. True or False "Slippage" is to be expected.
5. True or False Being aware of tidewater movement is important.
6. True or False Pressure readings during tests may vary by 10 percent.
7. True or False A clogged strainer or suction hose is nothing to worry about.
8. True or False A 1500 gpm-rated pump could be de-rated to 1250 gpm.

(Correct answers can be found at the top of page 7.)

Enhanced Training

High-Tech Air Bags, Pt. I

Objectives

After watching this program the student shall:

1. become familiar with how high-tech air bags work
2. understand their features and advantages over conventional air bags.

Standards and Regulations

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

Training Outline

A. COMPARISON BETWEEN CONVENTIONAL AND HIGH TECH BAGS: <u>WORKING PRESSURE</u>

1. Conventional Flat Bag
   a. Uses a working pressure of 118 psi.

2. High-Tech Air Bag
   a. High-Tech bags use a working pressure of 147 psi.

   Both have about the same size and thickness when deflated.

B. COMPARISON BETWEEN CONVENTIONAL AND HIGH TECH BAGS: <u>LIFT CAPACITY (Surface Area X PSI)</u>

1. Conventional Flat Bag
   a. Full lift capacity is rated at one inch.
   b. Surface area and capacity decreases as the bag inflates.
   c. Full height gives 4 square-inches of contact and a lift of 500 pounds.

2. High-Tech Air Bag
   a. Full lift capacity is rated at four inches.
   b. Surface area and capacity decrease little as the bag inflates.
   c. Full height gives 50 square-inches of contact and a lift of 7,500 pounds.

Answers to the quiz on page 13:

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

High-Tech Air Bags, Pt. I

C. COMPARISON BETWEEN CONVENTIONAL AND HIGH TECH BAGS: STABILITY AND STACKABILITY

1. Conventional Flat Bag
   a. Single bag is stable.
   b. Stacked bags are very unstable and is not a good practice.

2. High-Tech Air Bag
   a. Single bag is very stable because of integrated hard points.
   b. Stacked bags are very stable because they are locked together with threaded adapters.

D. COMPARISON BETWEEN CONVENTIONAL AND HIGH TECH BAGS: SAFETY

1. Conventional Flat Bag
   a. 2:1 safety ratio.

2. High-Tech Air Bag
   a. 4:1 safety ratio.

E. COMPARISON BETWEEN CONVENTIONAL AND HIGH TECH BAGS: MAINTENANCE

1. Conventional Flat Bag
   a. No access to the inside of the bag.

2. High-Tech Air Bag
   a. Removal of the cap plug allows access to the inside of the bag.
   b. Wash the inside of the bag with soap and water to avoid contamination. Remove the plug and allow to dry.
   c. Bags can be retested (hydro-tested in a tank) like an air bottle.
   d. In most cases, punctures can be repaired.

F. TYPES OF HIGH TECH BAGS:

1. Bags come in:
   a. 25-ton lift capacity
   b. 64-ton lift capacity
   c. 145-ton lift capacity.

High-Tech Air Bags, Pt. I: Quiz

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

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

Signature_____

Select the best answer:

1. True or False Low-pressure air bags can be stacked on top of each other.

2. True or False High-pressure air bags can be locked together.

3. True or False A high-tech air bag can be cleaned inside.

4. High-tech air bags will produce:
   a. lift capacity rated at one inch
   b. a 2:1 safety ratio
   c. 50 square inches of contact
   d. all of the above.

5. High-tech air bags come in:
   a. a 25-gallon capacity
   b. a 64-ton lift capacity
   c. a 145-pound lift capacity
   d. all of the above.

(Correct answers can be found at the top of page 12)