TOPIC: Basic Types of Pumping Operations

TIME FRAME: 1 Hour

LEVEL OF INSTRUCTION:

BEHAVIORAL OBJECTIVE:

Condition: A written quiz

Behavior: The student will list and describe the three basic pumping operations performed by firefighting personnel; pumping from tank, pumping from hydrant and pumping from draft.

Standard: With a minimum of 70% accuracy

MATERIALS NEEDED:

- Appropriate visual aids
- Audio visual equipment

REFERENCES:

- CDF, Vehicle Operation and Maintenance Guide Handbook, (6804)
- IFSTA, Fire Department Pumping Apparatus, 7th Edition, Chapter 6

PREPARATION: All firefighters should understand the basic principles involved in pumping from the booster tank, pumping from hydrant and pumping from draft. Though the principles are relatively simple the mechanics of performing these operations are varied and may be complex.

PRESENTATION	APPLICATION

I. PUMPING FROM TANK

A. Principles

1. One of the easiest pumping operations
2. Pumping operation most frequently performed
3. Water carried in engine booster tank is routed to the pump, pressurized in the pump and discharged under pressure
   a. Booster tank must have water
   b. Tank suction (tank to pump)
   c. System must be primed

B. Limited Water Availability

1. Pumping operation is limited to the amount of water in the booster tank
2. Additional water sources must be considered quickly
   a. Switch over to hydrant
   b. Establish drafting operation
   c. Begin water shuttle with other apparatus
   d. Begin relay pumping operation
   e. Begin ejector operation
   f. Begin portable pump operation

II. PUMPING FROM HYDRANT

A. Principle

1. Hook into a pressurized water system

PRESENTATION	APPLICATION

2. Switch over from booster tank to hydrant as a water source

    a. May involve other apparatus establishing the water supply operation for you

    b. Can be time consuming depending on:

        (1) Hydrant proximity

        (2) Water system

        (3) Personnel available

B. Spotting Apparatus

1. If decision is made to spot apparatus at scene

    a. Initial attack engine may be required to make forward lay

        (1) From hydrant to fire

    b. Initial attack engine may be able to hook into hydrant at scene

2. If decision is made to spot apparatus at hydrant

    a. Initial attack engine may be required to make a reverse lay

        (1) From fire to hydrant

        (2) Imperative that all firefighting equipment be staged at fire scene prior to moving apparatus to hydrant.

    b. Initial attack engine may be able to hook into hydrant at scene

PRESENTATION	APPLICATION

III. PUMPING FROM DRAFT

A. Principle

1. Drafting is an operation involving the removal of air from the pump and suction hose, whereby a partial vacuum is created

2. This allows the pressure exerted by the outside atmosphere to force the water up a suction hose into the pump

B. Terminology

1. Atmospheric pressure

a. Air pressure at a given elevation

b. 14.7 PSI at sea level

2. Lift

a. Distance in feet of elevation between the surface of a static water source and the center of the pump

3. Pump efficiency

a. The ability of a pump to supply an adequate fire stream. As RPM's increase there is a corresponding increase in pressure

b. The following factors will affect pump efficiency

(1) Atmospheric pressure exists because air has weight like all other forms of matter. Its weight by volume will vary proportionately to its density

PRESENTATION	APPLICATION

(a) As elevation is increased, the air density and pressure will decrease

(b) Approximately 1/2 lb. of air pressure is lost for each 1,000 foot rise in elevation

  (i) At an elevation of 5,000 feet, the air pressure is approximately 12 PSI

  (ii) At an elevation of 10,000 feet, the air pressure is approximately 9 PSI

(c) 1,000 foot rise in elevation will reduce the pump's ability to lift water by approximately one foot

(d) The maximum water lift for a CDF pump is approximately 15 feet

SUMMARY:

An initial attack incident commander must be able to quickly size up a fire, develop a strategy for dealing with that incident and determine the type of pumping operation to pursue. Absent a policy or standard operating procedure to the contrary any of the three basic pumping operations may be chosen. Failure to select the correct method can have embarrassing consequences.

EVALUATION:

A written quiz.

ASSIGNMENT:

To be determined by the instructor(s).