

DRAFTING DRILL

Lowell Fire Department

Introduction

The information contained within this drill packet has been put together to be used as a tool, to guide you through a drafting drill. Reference sources used include:

- **ifsta Fire Stream Practices , Seventh Edition**

Whereas the City of Lowell has an extensive water distribution system. The need to draft water happens only on rare occasions, such as large mill fires or possibly drafting from a portable tank set up by a mutual aid company at a forest fire. It is because we don't often draft, it is important that we drill not only so we are adept at drafting but to make certain that the pump is capable of drafting.

Any feedback I receive on how to improve this drill packet will be greatly appreciated. I would like to acknowledge and thank Debbie Howard and Steve Ouellette for their invaluable assistance in creating this drill packet.

Captain Dana R. Price

IMPORTANT

Priming pumps should be operated on a weekly basis to make certain they are in operable condition.

DRAFTING OPERATIONS

OBJECTIVE:

The objective of this session is to review the pump operator's ability to operate the pumper at draft from a static water supply source.

PREPARATION:

The following actions must be taken to ensure that you are ready to proceed with this session.

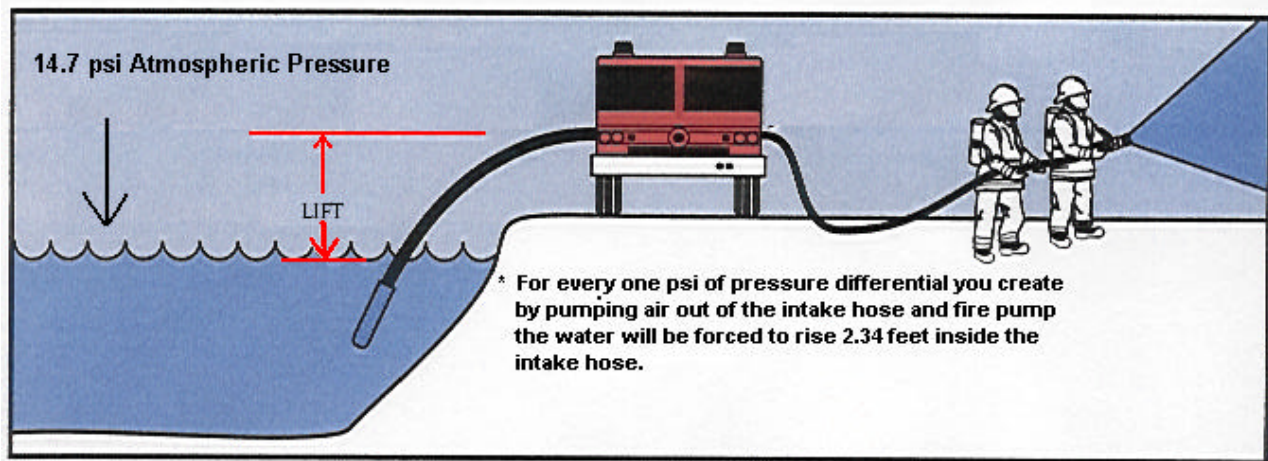
- Review the reference material and procedures to ensure that you are familiar with the session content.
- Perform a pre-trip inspection on the vehicle to be used in the practical evolution. Make sure all the equipment is on the truck and that you have plenty of priming oil in the reservoir.
- Locate a suitable site for drafting operations, if this site is on private property obtain permission from the property owner.

PUMPING FROM DRAFT:

The process of raising water from a static source to supply a pumper is known as drafting. This type of operation may occur from any type of static water source including lakes, ponds, portable tanks, and water-carrying vehicles without pumps. In order to operate from water sources other than a water distribution system, it is important that the pump operator be familiar with the principles involved in drafting.

PRINCIPLES OF LIFT:

During drafting operations, there is generally an elevation difference between the static water source and the center of the pump. This elevation difference is known as **lift**. During the process of drafting, air is pumped out of the intake hose and the fire pump, creating a pressure differential between the inside of the pump and intake hose and the atmosphere. This pressure differential creates a condition of negative pressure (less than atmospheric), also known as a vacuum. Because pressure is greater outside the intake hose, water is forced to rise inside the intake hose. This rise will continue until either the pump is full of water or the head within the intake hose matches the negative pressure. The height of possible lift is not affected by the angle of the intake hose, but it is affected by the vacuum that the pump can produce and by the atmospheric pressure.



THEORETICAL LIFT:

A true vacuum will allow water to be raised by atmospheric pressure to a height in accordance with this pressure. Theoretically, at sea level a pump can lift water 33.8 feet (14.7 psi times 2.3 ft/psi). This theoretical lift will decrease as the altitude of drafting operations increases. For every 1,000 feet of altitude, atmospheric pressure decreases by about 0.5 psi.

MAXIMUM LIFT:

For a variety of reasons, a perfect vacuum is impossible to obtain with a fire pump. The maximum height to which water can be drafted is nearer 20 to 25 feet, as opposed to the theoretical lift of 33.8 feet.

DEPENDABLE LIFT:

Taking into consideration the surrounding atmospheric pressure and friction loss in the intake hose, every fire pump in good repair should be able to lift water at least 15 feet.

CHOOSING THE DRAFTING SITE:

- Good drafting sites in the response district should be identified during pre-incident planning activities.
- The body of water should be large enough to supply the pumper at its rated capacity.
- A site should be chosen which allows 24 inches of water completely around the strainer.
- The pumper must be parked on stable ground.

PREPARING FOR DRAFTING OPERATIONS:

- Park the apparatus at the drafting site if you can make hose connections from the final pumping position. Set the parking brake, and chock the wheels. Otherwise, stop short of the final pumping position to allow hose connections to be made.
- Check hard-suction hose gaskets to make sure that they are in good condition and free of debris.
- Connect strainer to the end of the hard-suction hose. If using barrel-type strainer, attach a rope to the end of the strainer to aid in positioning the strainer in the water.
- Connect enough section of hose together to reach the water source. Use rubber mallet to make sure that connections are airtight.
- Move the apparatus into position, if the apparatus was not parked in final position, while firefighters guide the hard suction hose into the water.
- Tie off the rope connected to the barrel strainer so that the strainer is in the proper position.
- Reenter the cab of the apparatus, and switch the engine power from the road drive to the pump-drive position. Make sure that the indicator light on the dash shows the truck is in pump gear.

- Place two-stage pumps in the parallel (volume) position.
- Make sure that all valves and drains are closed tightly and all unused openings are capped tightly.

PRIMING THE PUMP AND BEGINNING OPERATION:

Review the following procedures for priming the pump and beginning the operation:

- Set the apparatus rpm to the level recommended by the manufacturer. (Approximately 1000 rpm / fast idle)
- Activate the primer control. As water begins to enter the pump, it will be discharged beneath the truck. Do not shut off the primer until a steady stream of water that is void of air flows beneath the truck. Watch your intake and pressure gauges, the intake gauge should start dropping into vacuum and your pressure gauge reading should increase. Also you may notice a difference in the sound of the pump once you have draft. This process should only take about 30 seconds. If the pump has not been primed in this amount of time, stop the operation and check for problems or air leaks.
- When the pump is primed, increase the throttle setting before opening discharges. Pressure should be between 50 and 100 psi. Slowly open discharges and build the discharge pressure to the appropriate level.
- Set pressure-relief valve or governor once the desired pressure has been achieved.

CONTINUING OPERATIONS:

- It is important to monitor operations closely at all times.
- Problems that develop are usually a result of air leaks or air admission to the pump. These problems may be caused by an air leak on pump intake, whirlpool above strainer, or defective pump packing.

- Be aware that when you are drafting it is possible to draw water from your tank if your tank to the pump valve does not work properly or it isn't closed completely. When drafting the driver should check the water tank to make sure the water level isn't going down because if the tank goes empty you will lose draft. If the water level is going down all you need to do is open your tank fill valve to keep your tank full.
- If a vacuum reading increases when flow is not increased, it may be a sign of blockage developing in the strainer. Manually clean debris away from strainer, or direct stream from a booster hose at strainer.
- A booster hose can be tied, with the nozzle open, to a solid object and the water directed back into the source. This will ensure that vacuum is not lost if the main hoselines being supplied are shut down.
- The pump capacity should not be exceeded. This may lead to cavitation.

SHUTTING DOWN:

Review the following procedures for shutting down:

- Decrease engine speed to idle.
- Take pump out of gear.
- Drain pump.
- Disassemble hose and equipment.
- Back flush the pump if necessary.

PRACTICAL EVOLUTION:

Each driver/operator should be expected to put the apparatus through the complete drafting evolution at least one time. A 2-1/2 inch hoseline run to a portable master stream device can be the line to be supplied. If a master stream device is not available, a handline nozzle may be used.

Each driver/operator should be required to approach the drafting site, assemble the hard suction hose and strainer assembly, position the apparatus, prime the pump, and commence drafting operations.

Each evolution should be evaluated by the Office in Charge. The following criteria should be met for each evolution.

- The truck is properly positioned.
- The strainer is properly positioned.
- The hard-suction hose and strainer are properly assembled.
- All drains and valves are closed, and all unused openings are capped tightly.
- The pump is primed in less than 30 seconds.
- The 2-1/2 inch hoseline is flowed for 5 minutes.
- The pumping operation is shut down safely.
- The truck is placed back in service.
- Remember to refill the priming oil reservoir.