Rural Fire Command

by

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The Mother of Invention

Rural fire departments meet challenges with innovations

RFI
RURAL FIREFIGHTING INSTITUTE

Training America's Rural Fire & Emergency Responders

A Message the Author, Larry Davis

In October 2002, I started writing the monthly "Rural Fire Command" column for *FireRescue Magazine*. Since that time, the RFC column has been carried in just about every subsequent issue of the magazine.

As time has passed, several readers have contacted me about obtaining back issues of the column. Some expressed an interest in acquiring the articles in Powerpoint format for use in training programs.

This led to, my adaptation of the RFC columns to the PowerPoint format. These PowerPoint programs are being made available through the combined efforts of *FireRescue Magazine* and the Rural Firefighting Institute.

The Mother of Invention

Rural fire departments meet challenges with innovations

What's the biggest difference between rural and urban firefighting? It boils down to how they have to deal with what I call the Big 5 of Fire Control: 1) Time; 2) Agent; 3) Hardware (apparatus and equipment); 4) People; and 5) Standard Operating Procedures (SOPs).

For more information on the Big 5, see *Rural Fire Command*, "No Time to Burn," December 2002.

Although urban firefighters must deal with these same 5 elements to control and suppress fire, rural firefighters generally don't have the necessary resources as readily available as their urban brothers and sisters do.

The Mother of Invention

As I've talked with rural fire chiefs and asked them what their departments' most pressing issues were, they've answered:

- We need to maximize the output of the few people we have initially on scene;
- We need to save as much time as possible when setting up for water transport and fire attack;
- We need to make things as simple as possible to improve efficiency and reduce the need for unnecessary training so we can spend that time on other, more important topics; and
- We need to maximize the capability of our apparatus and equipment without spending a fortune.

The Mother of Invention

Rural firefighters are *the* fire service innovators when it comes to dreaming up and accepting new concepts. To maximize rural firefighting operations, we must address two specific systems:

- The Water Transport System, and
- The Fire Attack System.

The Water Transport System involves all of the tasks associated with getting water from a source (generally a static source that requires drafting operations) to the intake of the attack vehicle at the fire. The Fire Attack System involves everything from the apparatus discharge to the point at which the water leaves the nozzle.

As they say, a photo is worth 1,000 words. The following images offer 12,000 words worth of concepts and innovations that rural departments have developed or adopted. These ideas have made their jobs easier, require less time, require fewer people, and improve fire-killing power.

1. The Water Transport System

When it somes to transporting water to the fire attack apparatus intake, our options are limted to:

- Pumps—apparatus pumps and portable pumps;
- Conduit—hose and pipe; and
- Tanks—generally on wheels in the form of tankers or pumper/tankers

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1.1 — Pumps

Some basic considerations regarding fire apparatus pumps:

- Get the largest-capacity pump the engine can drive. When we buy a pump, we pay for water horsepower—the ability of a pump to do work. In too many cases, pumpers have engines capable of driving 2000-gpm pumps, yet the department buys a 1000- or 1250-gpm pump. Although you may not need a 2000-gpm pump to deliver 2000 gpm at 150 psi, you may need it to deliver 1000 gpm at 250 psi to a farther distance than the 1000-gpm pump can.

- *Remember:* Pump location is critical to efficiency. Consider putting the pump at the rear to improve tank-to-pump flow rates, operator safety and convenience, and to maximize drafting operations.

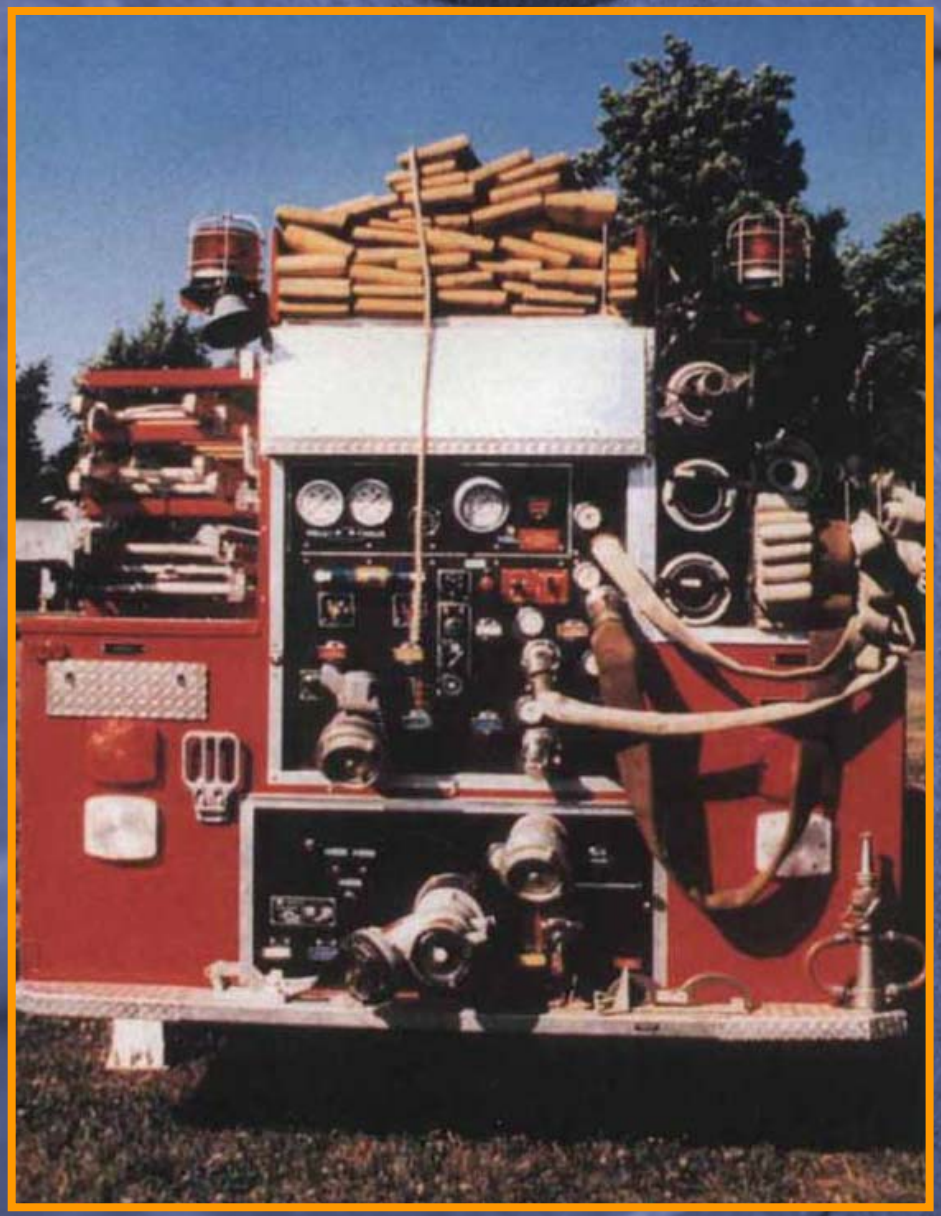

Figure 1. This large capacity,1250-gpm, rear-mount pump exemplifies rural innovation. A rear-mounted pump simplifies drafting operations, shortens the tank-to-pump line from its 1000-gal tank, puts the operator in a safe position without adding to the overall apparatus required for a top-mount operator's panel.

1.2 — Drafting Operations

In drafting operations,pumps expend energy on the suction side of the pump by lifting water against friction loss and elevation loss, and on the discharge side by pushing water through pipes, hose, and appliances. The more energy the pump expends on the suction side, the less remains available on the discharge side. If we can reduce the energy expended for lifting water, we'll have the capability to move more water to the fire.

Some basic rules:

- Use the biggest, shortest suction hose possible
- Use preconnected suction lines; and
- Carry lots of suction hose to use multiple suctions.

Figure 2. The Mort Lake Fire Co., Brooklyn (CT), resurrected an idea that was prevalent in the days of horse-drawn steamers—a preconnected suction line known as a “squirrel-tail” suction. Mort Lake’s 1500-gpm water-supply pumper carries a 28-ft x 6” squirrel tail preconnected to a 6” front suction. It has an additional 28-ft x 6” suction in a coil just ahead of the of the hose reel. The reel carries 5000 ft of 5” hose. A 15-hp vacuum pump, instead of a typical primer, allows the unit to prime from a 10-ft lift in 4 seconds. Dual suctions provide more than 2000 gpm. With this unit, 1 person can move more than 1000 gpm almost 1 mile.

Figure 3. Rural firefighters needed to move more water while using existing apparatus. Because midship pumps have large suction connections on each side, they figured, “Why not put suctions on both sides?” *The result:* a significantly greater flow (e.g., 1800 gpm from a 1250-gpm pump). The Amenia (MY) Fire Department set up a pumper to fill tankers using dual 5” suction lines. Even though the suction lines are 30 ft long, using two maximizes flow to pump with minimum energy loss and maximum output to fill tankers at a faster rate than a single suction. Caution: Although it might appear more advantageous to use a front suction, such is not the case. The typical front suction has an equivalent of 100 ft of pipe from the front suction to the pump.

1.3 — Large Diameter Hose

In general, rural departments must transport their water supplies longer distances than in urban settings. Today 5” hose has become as commonplace as 2-1/2” was 30 years ago. Although you may not need it for the average house fire, you might want to consider the 8” hose shown in the following photos as part of a county or regional taskforce.

The hose can easily flow 3000 gpm more than 3000 feet to supply four portable monitors at 100 psi nozzle pressure.

With all of the federal money being thrown at weapons of mass destruction, a department that thinks “outside-of-the-box” could probably justify some of this hose for an “emergency public water-supply system.”

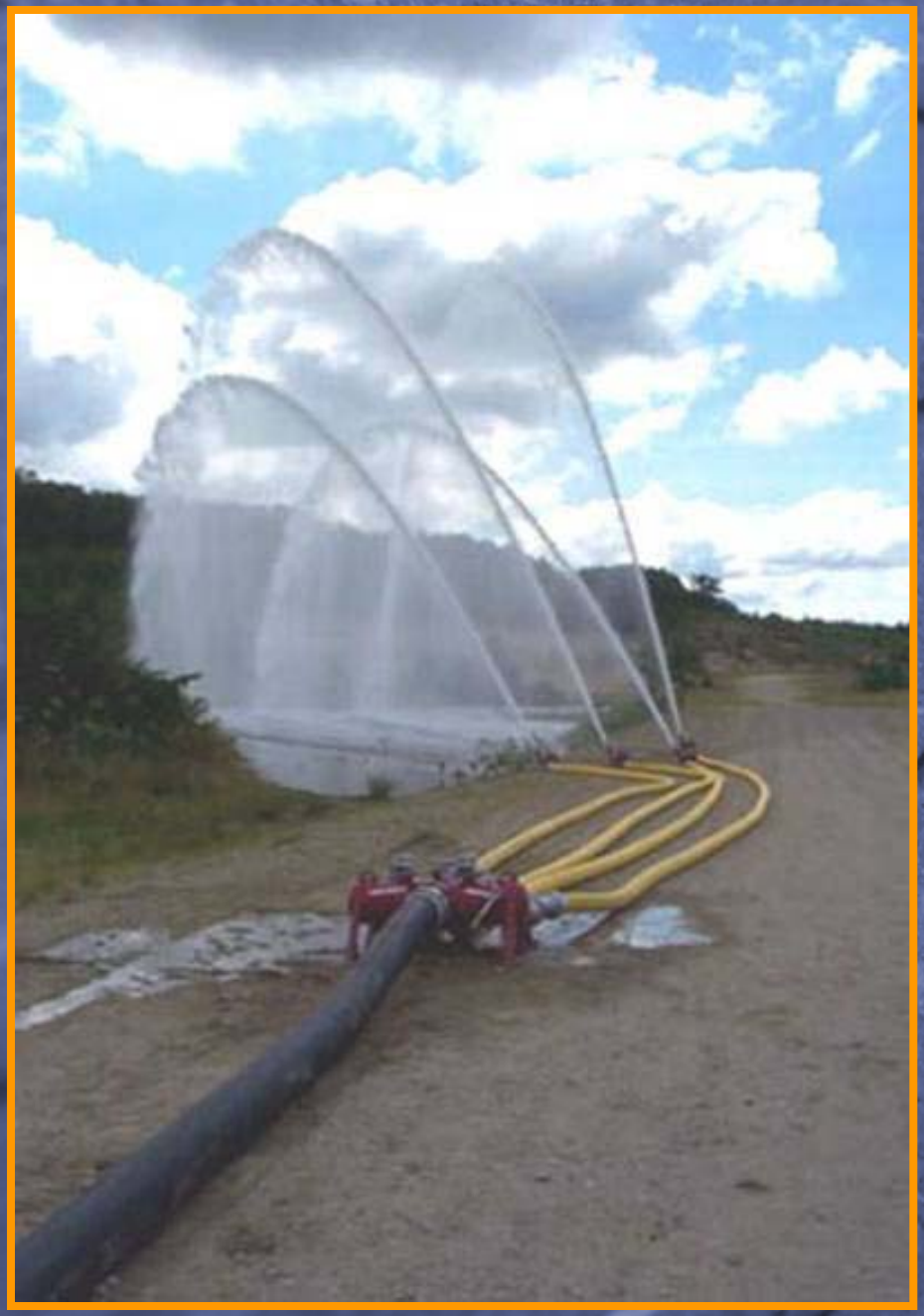

Figure 4. Pushing the envelope, this 8” hose, manufactured by Jaffrey and Oroflex for a petrochemical plant’s fire department, delivers 3000 gpm to 4 portable monitors.

Figure 5. In drafting operations, pumps expend energy on the suction side by lifting water against friction loss and elevation loss, and on the discharge side by pushing water through pipes, hose, and appliances. Here four 5” lines (each supplied by a 1250-gpm pumper at draft are supply the 8” hose.

1.4 — Tanks & Tanker Design

Another key element in water transport is tankers. Tankers come in about every configuration imaginable. What makes taker shuttles effective is how fast they can load and off-load. Contrary to the beliefs of some, tankers don't have to be new. In fact, some of the best tankers I've seen were homemade. The key in tanker design is to ensure the chassis, engine, and brakes can handle the load—and that we don't allow a loose nut behind the wheel.

Figure 6. Both efficient and inexpensive, this 1220-gal tanker from Red Rock VFD (NY) has a 12” dump valve that can off-load 70% of its water in the first 30 seconds. This used oil truck was modified to safely carry water. The unique porta-tank rack allows the tank to slide off, minimizing the time and personnel required to set it up.

The key in tanker design is to ensure the chassis, engine and brakes can handle the load — and that we don't allow a lose nut behind the wheel!

1.5 — Tanker Fill Operations

To perform a productive, high-volume tanker shuttle operation requires tankers be filled at high flow rates (1000 - 1500 gpm). The fill site show in the following photo demonstrates how to fill tankers from a hydrant at a higher rate than the hydrant can flow.

Figure 7. This is one of three fill sites used in a tanker shuttle drill in Oswego County (NY). Originally, the pumper was connected to the hydrant with a short length of 4” hose. *The problem:* The hydrant could only flow about 600 gpm, so the tanker’s fill rate was 600 gpm as well. To maximize tanker filling, we set up a porta-tank, connected 6” hard suction from the hydrant into the porta-tank and set up the pumper to draft through its rear 6” suction.

Figure 7 (cont'd). The hydrant was opened and water flowed into the porta-tank, which acted as a reservoir, allowing the pumper to draft more than 1000 gpm and increasing the tanker's fill rate by 400 gpm.

How? Let's say the porta-tank holds 2000 gal. At 600 gpm, the porta-tank will fill in 3.5 min. Once full, the pumper can then draft at 1000 gpm. At the end of 1 minute, the pumper has removed 1000 gal of water. However, in that same time, the hydrant has flowed 600 gal into the tank. The result: At the end of 1 min, the porta-tank has 1600 gal left in it—a net loss of 400 gal. Based on these numbers, the pumper could fill two 2000-gal tankers before the porta-tank emties completely.

1.6 — Efficient Dump Sites

When sustained attack operations require tanker shuttles, set up dumpsites to maximize fieground water storage and discharge capabilities. Multiple porta-tanks arranged for the convenience of tanker drivers and pump operators are a must.

Figure 8. In a 1000-gpm tanker shuttle drill, the Nikiski (Alaska) Fire Department perfects its high-flow tanker-shuttle techniques. The drill utilizes multiple porta-tanks, 2000-gpm pumpers, and 4000-gal tankers with simple, rear-dump arrangements that allow off-loading from either side or the rear using only 1 valve

2. The Fire Attack System

Think big and hit it hard! Delivering flows in excess of 1000 gpm to the attack apparatus isn't valuable unless you have set up your fire attack system to deliver it to the fire.

Figure 9. Rural departments often have to deal with long, narrow driveways. This Woodlawn (MD) attack rig, which has no pump or water tank, lays a 4” supply line from the main road up the driveway and into the truck’s manifold. Responding engines or tankers then supply water to the attack unit. The unit carries 1-3/4” and 2-1/2” preconnects and a prepiped deck gun.

Figure 9. This Colchester (CT) attack pumper carries a preconnected master stream where it needs to be—on the tailboard. Supplied by 5” hose, this portable monitor can easily flow in excess of 1000 gpm. Two people can have it in operation in less than 1 minute.

Figure 10. Want to maximize your fire attack capability? Use a compressed-air foam system (CAFS). One firefighter using a 1-1/2”, 40-gpm/40-cfm handline takes on and extinguishes a well-involved structure. CAFS makes water about 5 times more effective—a Godsend for those who have to haul their water with them.

Figure 11. The mother of all fire assault apparatus. Chief Chris Hecht and the Sister Bat (WI) FD exhibit the “think biug, hit it hard” concept of rural firefighting. This pumper is equipped with a 2500-gpm, rear-mounted pump; a 200-cfm CAFS, a 2250-gal water tank, a 100-gal Class A foam tank; and 1500 ft of 5” hose.

Figure 11 (cont'd). The pumper also carries two 2-1/2" CAFS discharges in the front bumper, reduced to 1-1/2" with 200 ft of 1-3/4" preconnects; six 2-1/2" rear preconnects (4 CAFS, 2 water only); a prepiped 2000-gpm monitor at the rear; three 6" suctions at the rear; 1 suction at the front for porta-tank operations; and side dump valves to allow for water shuttle operations.

Figure 12. Don’t have a Class A foam-equipped pumper? Want to double your water’s effectiveness? Then batch mix Class A foam into your porta-tank at the rate of 1 gal of foam concentrate per 1000 gal of water (0.1%). The draft pumper can then supply Class A foam through all of its discharges with no need for foam proportioners or eductors.

For Questions or comments on this or any of the Rural Fire Command articles, contact the author at ldavis@RFI411.org

About the Author

Larry Davis is a full member of the Society of Fire Protection Engineers, a Certified Fire Protection Specialist, and a Certified Fire Service Instructor II with more than 30 years experience as a fire service instructor. He is Vice President of GBW Associates, and Chairman of the Rural Firefighting Institute.

Davis has conducted more than 400 Rural Firefighting Tactics and Rural Water Supply Operations seminars throughout the United States and Canada. In addition, he has written numerous fire service texts, including *Rural Firefighting Operations*, books I, II, and III. Most recently, Davis co-wrote the *Rural Firefighting Handbook* and *Foam Firefighting Operations*, book I with Dominic Colletti.

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