Rural Innovations

Departments from Iowa, Maine, and Pennsylvania share their innovations

Figure 1. An Elk Horn engine drafts from a suction pipe installed into one of the ten underground water storage tanks they have had installed throughout their service area. Each tank holds between 6,000 and 15,000 gallons and is equipped with a large acess opening and a 6″ suction pipe for pumper drafting and 2-1/2″ suction pipe to allow for portable pump drafting.

The purpose of this column is to share ideas and information with readers so in keeping with the *FireRescue* motto, they can *read it today and use it tomorrow*. While I wish all of these ideas were mine, most have originated in rural departments from throughout North America. In many cases, all I am is a conduit to funnel information on these innovations to *FireRescue* readers.

One of the greatest rewards for me, as the writer, is when a reader takes the time to shoot me an email and photos showing how their department has dealt with a particluar rural firefighting challenge so I can share this information with all of the readers of *FireRescue*. In the last couple of months I have had three departments contact me about solutions they have come up to meet the fire protection needs of their service areas.

This column focuses on the innovations of the Elk Horn (Iowa) VFD, the Mt. Chase VFD of Shin Pond, Maine, and the Hilltown Twp. VFD of Bucks County, Pennsylvania

ELK HORN'S WATER SUPPLY SOLUTION

Chief Mark Paulisen of the Elk Horn VFD, shared the idea his department came up with to meet their rural water supply challenges. Elk Horn is a rural community, located about 70 miles from Des Moines, and with a population of about 650.

Like most rural departments, Elk Horn has to haul its firefighting water to most of the agricultural district it protects. Because of the locations of static water sources, tankers had to travel up to 8 miles to refill. To reduce this travel distance and increase the delivery rates at fires, Elk Horn devised a unique system of underground storage tanks.

A unique feature of the agricultural fields in Elk Horn's area is the installation of underground drainage systems that drain excess water from the fields. Historically, this crystal clear water was simply funneled to area streams.

The department decided to make use of this otherwise wasted water by installing undergound storage tanks into which this water would drain. They then approached area farmers and the Iowa Department of Natural Resources'

Figure 2. Storage tanks are located close to roadways and vary in type — some horizontal and completely buried, and some vertical tanks with their tops exposed. Most of the tanks were acquired for little or no cost to the fire department.

Forestry Division with their idea. Both the farmers and DNR gave their approval for the installation of these tanks. The department even received some federal funding to help with the installation costs.

The overall plan was to install 10 tanks strategically located about 5 miles from town in the outer areas of Elk Horn's district so that a water source was available on average of no more than 3 miles from any point. As of this writing 8 of the 10 tanks have been installed.

Figure 3. The 6″ suction pipes have irrigation pipe connections while the 2-1/2″ suction pipes are equipped with camlock connections to save connection time.

Figure 4. Elk Horn and neighboring department engines carry suction adapters from the irrigation pipe conection to fire department suction thread.

The tank design allows any escess water to overflow back into either the tile drainage line or adjoining streams. Because the water is free of any sediment, there is no problem with debris being drawn into pumps as had happened with dry hydrant installations from streams. Flow from the fields is such that an empty tank can be refilled within 12 to 24 hours.

This program has been so successful that neighboring departments are planning to use this same system.

SHIN POND'S CAFS PUMPER

The apparatus shown in the March rural feature prompted Chief Craig Hill of the Mt. Chase VFD of Shin Pond, Maine, to write me about the pumper his department designed based on their needs.

Chief Hill pointed out that Shin Pond is a town about 100 miles north of Bangor, encompasses an area of 36-square miles, and has a "huge population of 240 people." In addition to protecting Shin Pond, the Mt. Chase VFD also provides first response into four adjoining townships of 36 square miles each — most of which is forest land.

Chief Hill pointed out that he sees more and more rural departments purchasing "mega trucks" that are much too big and impractical for rural areas such as that which the Mt. Chase VFD protects. The pumper the department designed was built by Metalfab (in New Brunswick, Canada) for a cost of $169,000. and funded with a Fire Act grant. It was placed in service on 12/01/05.

Mt. Chase operates with no hydrant system and thus relies on drafting and/or tanker operations for all of its firefighting water supplies. In addition, minimum man-power and ease of accessing equipment were critical factors in the design of this pumper.

Figure 5. Mt. Chase VFD's $169,000 pumper is equipped with a 1000-gpm pump, a 1000-gal tank and an 80cfm compessed air foam system (CAFS).

Figure 6. A narrow pump panel was used to reduce the apparatus length. Two 1-3/4″ crosslay preconnects (1 piped with CAFS) and a pre-piped deck gun are provided. Four SCBA are stored horizontally to save space and the 6 spare SCBA cylinders are located on the driver's side.

Figure 7. A 25-ft section of lightweight 5″ suction is stored so one person can easily remove it and connect it. The hose bed carries 1200 ft of 3″ supply line as well as additional 1-3/4″ and 2-1/2″ preconnects.

Figure 8. A ladder rack was installed in keeping with the concept of making equipment available within the reach of a normal person. Both 5″ pump suction intakes are provided with butterfly valves for drafting operations.

All equipment and hose can easily be reached from the ground or rear step — a fact that helps improve personnel safety. To provide scene lighting and electrical needs, a 4000 watt generator is located ahead of the hose bed and above the pump. A remote start is located at the pump panel

Figure 9. The rear compartment neatly houses portable extinguishers, hand tools, extra hose, a pike pole and the direct tank fill.

The 80-cfm CAFS was selected because of the types of structures the departmenr protects and the types of fires the department experiences. Based on this data, it was decided to pipe CAFS to one of the two crosslay preconnects.

This apparatus shows how a rural department can design a practical yet inexpensive attack apparatus to meet its needs based on a community fire risk assessment.

HILLTOWN'S TANKER

The rural feature, "In the Middle of Nowhere: Rural innovators share their water-transport tips," in the March issue, prompted a response from a member of the Hilltown Township VFD of Bucks County, a suburban/rural county, near Philadelphia, PA, and that has several areas with no hydrant protection.

The email suggested that I do a write-up on Hilltown's Tanker 61 since the department had designed their tanker to maximize its delivery rate. I took him up on his suggestion, and in the process of obtaining photos and a description of the tanker I was contacted by Bob Grunmeier, Hilltown's Fire Chief who is also the Executive Director of State and Local Fire Training with the Bucks County Public Safety Training Center.

During our conversation Chief Grunmeier reminded me of the Rural Water Supply Seminar I had done at the Bucks County facility in the late 1980s, and the fact that he was my assigned logistics coordinator during the seminar. He then pointed out that the information I presented in the seminar palyed a role in the design of Tanker 61.

As in the cases of Elk Horn and Mt. Chase, Hilltown used a needs assessment of their firefighting water supply requirements as the basis for the design of Tanker 61 and the SOPs for its use.

Tanker 61 is a 3000-gal tanker that was built by 4 Guys on a Mack chassis in 1990, and was designed to do one thing — *haul water*. This is why the unit is not equipped with a rated fire pump — so it doesn't get committed to anything other than water supply. It does carry a 350-gpm portable pump for use in cases where it might be needed for special operations.

In designing Tanker 61, the department wanted a tanker that would do two things: 1) supply an attack engine with a delivery rate (250-500 gpm) sufficient for a typical structure fire, and 2) shuttle water at a delivery rate of 1000 gpm or more for those cases when high delivery rates were needed. As a result, Tanker 61 was set up to function in the gravity nurse mode and the dump & run mode. Since dump & run SOPs call for use of the side dumps, the members of Hilltown have coined the term "drive-by dumping." Using side dumps eliminates the need to put the rig in reverse and waste time backing up.

Figure 10. Tanker 61carries a 3000-gal porta-tank, is equipped with a remote-operated over-sized vent (1) and exterior vent and dump vave controls (2) on the driver side as well as in the cab.

The department has done extensive testing to document the performance of Tanker 61 both in the gravity nurse mode and the dump & run mode. When used in a gravity nurse mode, the first 2000 gallons off-load through the 28 feet of 5" suction hose at a rate of 1000 gpm, and the last 1000 gallons off-load at 500 gpm.

A series of 10 dump tests were conducted by the department. The average of the test results was 2650 gpm. The tank is empty in 1 min. 15 sec.

As you can see, a lot of thought and common sense went into the design of this tanker. It's impressive. Couple this with the fact that it was built in 1990 makes it even more impressive.

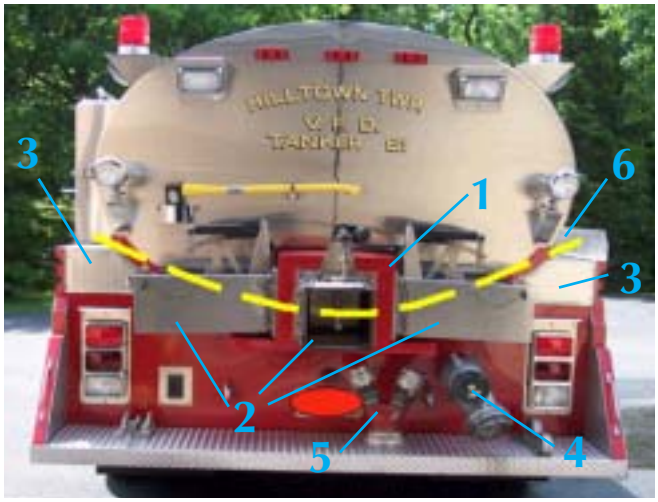

Figure 11. The "working end" of Tanker 61. A lot of attention was paid to the details in designing this tanker. Three electric 10" Newton dumps are connected to a distributor box (1) that sits well below the bottom of the tank (yellow line) and is connected to a 10° sloping trough cut into the length of the bottom of the tank to increase flow. Each dump has a 3-section manual extendable chutes (2). Two 14-ft lengths of 5" suction with Storz couplings are carried — one in each rear compartment (3) — for gravity nurse operations. A 5" pipe (4) serves as both the direct tank fill and as the suction hose connection for gravity nurse operations. A 3" Storz x 5" Storz siamese (5) is also carried. A jet-siphon for porta-tank water transfer is carried connected to a length of hard suction in a trough on the passenger side (6).

Figure 12. A "nose to tail" suction hook-up in which Tanker 61 supplies the quint through a gravity nurse operation with the tanker's 28 ft of suction. In this particular operation, the quint backs into the driveway, to keep from blocking the road. Should a dump & run operation be needed, the suction hose can be disconnected from the tanker, and the porta-tank from Tanker 61 can be dropped in front of the quint so mutual-aid tankers can dump their water into the porta-tank. As additional tankers arrive, additional porta-tanks are set up and jet-siphons used to transfer water to the draft porta-tank.

Figure 13. The in-cab controls for the tank vent and the three dump valves are normally used for dump & run operations.

Figure 14. Dump valve controls are also located at the rear of the driver side (see Figure 10) for operation by the tanker spotter if needed.

Figure 15. The 5″ tank line is equipped with a piston-intake valve (with a 5″ Storz connection). While county SOPs call for filling with a 5″ line, the 3″ x 5″ siamese (shown attached) is carried for use in case dual 3″ lines must be used because a 5″ fill line is not available. Notice that Storz wrenches are carried at the point at which they are likely to be needed — simple things like this can help eliminate chaos.

CONCLUSION

It's always a pleasure to share readers' innovations with others. My experience has been that in most cases the only recognition rural departments get for their ingenuity and innovation is that which they get from seeing their ideas shown in the leading fire service publication.

I want to thank Chiefs Paulisen, Hill, and Grunmeier for the photos and information they provided to make this article possible. I am extremely grateful.

If your department has an innovation or procedure to share, let me or the staff at FireRescue know.

Til next time, stay safe.

For information on obtaining a Powerpoint presentation of this article, contact the arthor at the listed email address.

Photo Credits

Figures 1 - 4 to Elk Horn VFD

Figures 5 - 9 to Mt. Chase VFD

Figures 10 - 15 to Hilltown Twp. VFD