www.GotBigWater.com

Deer Creek Fire Protection District
Deer Creek, Illinois

Rural Water Supply Operations Seminar
2-hr Water Supply Drill – August 15, 2010
Summary Report

The Purpose

- The purpose of the seminar and drill was to review the basics of rural water supply operations and to practice water supply operations in a non-hydranted setting.
- The seminar was funded as part of a large, Federal grant that provided rural water supply equipment and training for local FDs.

The Seminar

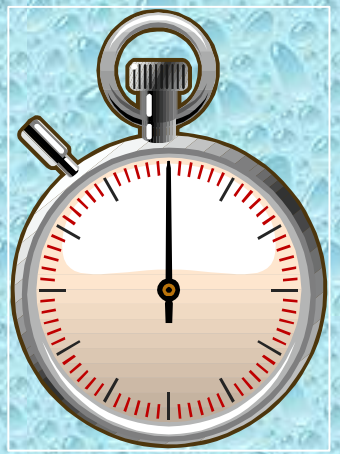
- The seminar started with a 6-hour session to review the basics of rural water supply operations.
- The review session was held at the Goodfield Station of the Eureka-Goodfield Fire Protection District located in Goodfield, Illinois.
- Seminar topics included the history of rural water supply, tanker construction, dump site operations, fill-site operations, tanker shuttle operations, and drafting.
- Seminar participants were from the Deer Creek, Eureka, Goodfield area.

The 2-hour Water Supply Drill

- The tanker shuttle drill was held on August 15, 2010, at Lake Eureka.
- The drill attempted to replicate the 2-hour Water Supply Delivery Test used by ISO in their evaluation of fire department water supply capabilities.
- While everyone in the fire service may not agree on ISO's evaluation of fire department capabilities, the ISO 2-hour test is still a reasonable standard by which fire departments can compare their water supply operations.

The ISO Test

- There are three critical time segments of the ISO 2-hour Water Supply Delivery Test:
  - 0:00 to 5:00 minutes
  - 5:01 to 15:00 minutes
  - 15:01 to 120:00 minutes



ISO Test *0:00 to 5:00 Minutes*

- A drill location is selected and the units due to respond on the first-alarm assignment are dispatched.
- Time starts when the first engine arrives on the scene and comes to a complete stop.
- There is no requirement to flow water during the first 5 minutes, but the crew must be prepared to flow water once the 5-minute mark is reached.

ISO Test *5:01 to 15:00 minutes*

- At the 5-minute mark, a flow of at least 250 gpm must be started - and it must be sustained.
- During the next 10-minutes, crews can work to further develop their water supply and increase their flow, however…
- At the 15-minute mark (5+10), whatever amount of water is flowing at that time must be maintained for the remainder of the 2-hour test.

ISO Test *15:01 to 120:00 minutes*

- Once the 15-minute mark has been reached, the remainder of the 2-hour test is really just about ***sustaining*** the flow.
- The ISO test includes the simulation of automatic mutual aid response and allows additional water supply units to arrive and assist in the delivery process as would happen on a real incident.
- The real advantage of the ISO test is that it gives a fire department the chance to see where improvements can be made in their water supply delivery process.

It is one thing to say that your fire department can deliver 500 gpm for two hours – it is another thing to prove it in a real-life drill scenario!

Water Supply Drill Participants

- *The participants for the drill were from six different fire departments in two counties and the water hauling apparatus was representative of the type of water supply support that would respond to a structure fire in the Deer Creek-Eureka-Goodfield Area.*

Drill Participants

- Deer Creek Engine 1
  - 1,250 gpm pump w/1000 gal tank
- Deer Creek Tanker 1
  - 500 gpm pump, w/3,000 gal tank

Drill Participants

- Eureka-Goodfield Engine 2
  - 1,000 gpm pump w/1,000 gal tank

- Eureka-Goodfield Tender 3
  - 1,000 gpm pump, w/3,000 gal tank

Drill Participants

- Washington Engine 2
  - 1,250 gpm pump w/750 gal tank

- Washington Engine 4
  - 1,250 gpm pump, w/2,500 gal tank

Drill Participants

- Mackinaw Tender 5
  - 800 gpm pump w/3,500 gal tank

- Congerville Tanker/ Pumper 302
  - 750 gpm pump, w/3,500 gal tank

Drill Participants

- Roanoke Tanker 2
  - 2,000 gal tank

- Firovac Vacuum Tanker
  - 500 gpm pump, w/3000 gal tank

Preparation

Units staged at the Goodfield Station where an operational briefing was conducted outlining the objectives for the drill. Safety issues were also reviewed.

The Drill Begins

With everyone ready, the drill started. Deer Creek Engine 1 (left) arrives on the scene and the clock starts. The 4-person crew works to advance a 2-1/2" attack line while also getting ready to set up for dump tank operations. Meanwhile, Eureka-Goodfield Tender 3 arrives with 3,000 gallons of water and a dump tank.

The Drill Begins

At the 3:50-minute mark, the attack line is deployed and the dump tank is down and awaiting water – pretty impressive teamwork for the engine and tender crews.

1st Tank is Down

Having deployed its 3,000-gallon dump tank, Eureka-Goodfield Tender 3 backs into position to dump its water.

Water Flow Starts at 5:00 Minutes

At the 5:00 minute mark, water flow is started from Engine 1 - 250 gpm is flowed using a 2-1/2-inch attack line manned by one fire fighter.

More Water Arrives

Firovac's vacuum tanker arrives next. This tanker was provided by Larry Reber – the owner of Firovac – and it was used throughout the day to demonstrate the advantages of a vacuum tanker.

Dump Site Set-Up

Tender 3 begins dumping its 3,000 gallons of water and Engine 1 will soon transfer over to a drafting operation.

2nd Tank is Set Up

The Firovac tanker blows off its 3,000 gallons of water in short order. By reversing the rig's vacuum pump, the tank is pressurized and water is blown out at over 1,000 gpm through a 6-inch outlet. Plus, the driver never leaves the cab!

2nd Tank is Filled

Mackinaw Tender 5 arrives next and offloads its 3,500-gallons of water through its rear, 12-inch dump.

Dump Site Set-up

Meanwhile, a two-person crew works to set up a portable monitor so that the flow can be pushed to 500 gpm. Two, 2-1/2-inch lines will be stretched to the monitor – while the attack line continues to flow 250 gpm. Washington Engine 4 arrives and dumps its 2,500 gallons of water.

Dump Site Set-Up

At the 11:43-minute mark, with two dump tanks now in operation, more tankers begin to arrive and crews work to build out the dump site.

Flow Move to 500 gpm

At the 15:00 minute mark, the flow is moved to 500 gpm through the portable monitor. A pitot gauge was used to verify the flow on the 1-3/8-inch tip. Once the monitor was put into operation, the 250 gpm attack line was shut down.

A 3rd Tank is Set Up

As more rigs arrive, crews work to set up a third dump tank. Original thoughts were to set the tank up as shown above, but it was moved in order to accommodate more side-dumping tankers.

More Tankers Arrive

Congerville's tanker offloads its water as more tankers continue to arrive to support the operation.

Water Transfer Operations

Jet siphons are used to transfer water to the primary drafting tank. Students often ask about the discharge pressure needed to make a jet siphon work. The answer is simple – pump it until the flow looks like the photo above.

More Tankers Arrive

Deer Creek Tanker 1 is shown here dumping its 3,000 gallons of water at the dump site.

Three Tanks in Operation

Around the 22:00-minute mark, the dump site moves to a 3-tank operation in anticipation of increasing the flow.

Incident Command

Chief Chad Fiers (right) of the Eureka-Goodfield Fire Protection District assumed the command as Chief Andy Knitt (left) worked to support the dump site operation.

A Bit of a Slope

The dump site was set-up on a slight grade which resulted in not all of the water being available in the dump tanks – kind of a “real life” matter.

A Bit of a Slope

The folks are shown above trying to get every last drop of water out of the 2nd tank while waiting for a tanker to arrive. By setting up to run jet siphons out of the lower ends of the tanks, the crew made good use of the water that was left when levels got low.

Water Arrives Just in Time!

At the 26:00-minute mark, and with 500 pm flowing, there were no tankers waiting in line (or even in sight) to dump. It looked like an interruption in flow was about to occur but the vacuum tanker arrived just in time - immediately followed by Tender 3 - and the 500 gpm flow was sustained.

More Water Arrives

Roanoke's Tanker 2 arrived and dumped it 2,000 gallons of water and flow was about to be increased..

Dump Site Operations

Washington Engine 4 makes a return to the dump site and offloads its 2,500 gallons of water.

Fourth Tank Added

A fourth dump tank (1,500 gallons) was added around the 54:00 minute mark and jet siphons were reconfigured to span more than one tank in order to increase the flow into the primary drafting tank.

Flow Moved to 750 gpm

At the 68:00-minute mark, the flow was moved to 750 gpm – however, that had to be reduced back to 500 gpm for a short period of time while the jet siphons were reconfigured.

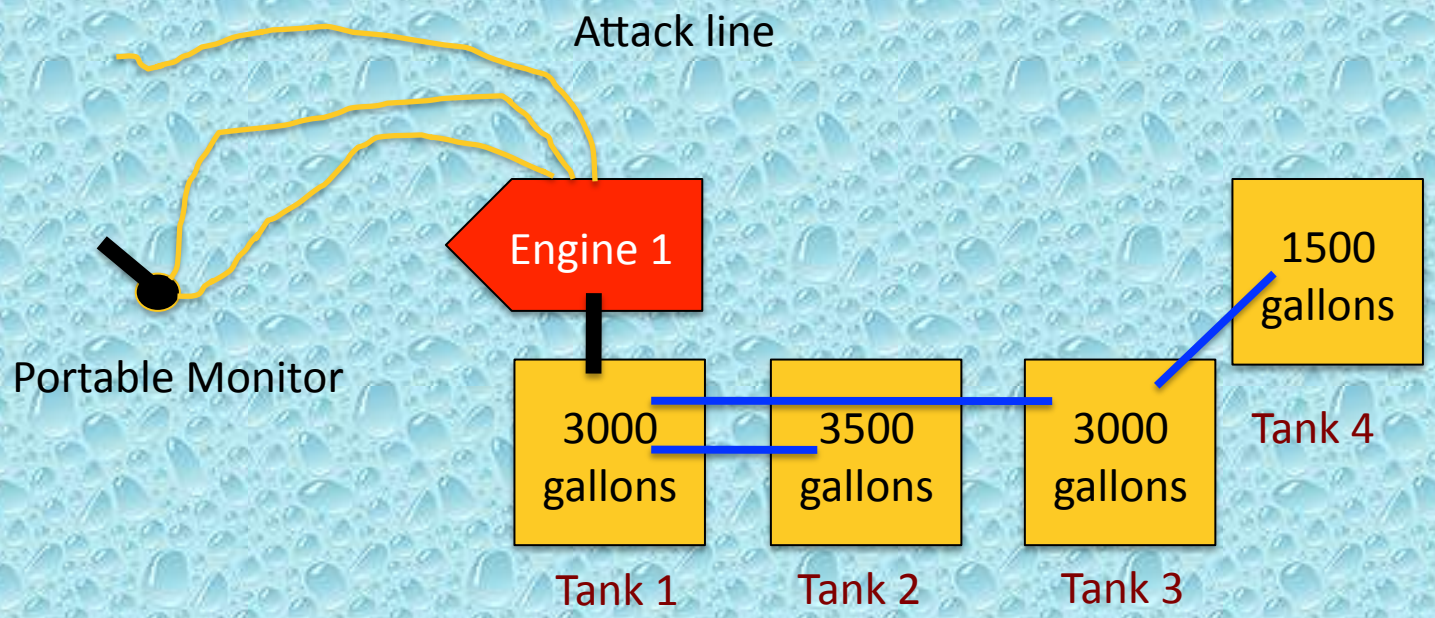
Dump Site Operations

The Firovac vacuum tanker blows off another load of water. The rig hauled six loads of water during the drill which amounted to about 30% of the total water used. The key point is that one man did that by himself!

Dump Tank Set Up

There are a couple advantages to spacing out dump tanks. 1) It provides additional work area around the tank for crews to access equipment; 2) It provides an area of refuge to avoid getting hit by a tanker; 3) It gives more room for two large tankers to dump simultaneously; and 4) It allows for equipment storage – like this detachable chute from one of the shuttle tankers.

Dump Site Layout



Suction Hose

2-1/2” Hose

Jet Siphon

The Fill Sites

- For this drill – two fill sites were used – one at the lower end of Lake Eureka and one at the upper end of Lake Eureka.
- The upper end fill site required the use of a dry hydrant and generated a 5.9-mile roundtrip for tankers hauling water.
- The lower end fill site was situated at a creek and required the use of portable pumps and a pumper. This fill site provided a 2.8-mile roundtrip for the tankers hauling water.

Upper Fill Site

Washington Engine 2 (1,250 gpm) is shown above connecting to a dry hydrant in order to establish a water supply for the first fill site.

Upper Fill Site

While part of the crew works connect to the dry hydrant, other crew members stretch hose lines in order to build fill lines.

Upper Fill Site

The Firovac vacuum tanker did not need a fill site pumper or crew. The beauty of the vacuum tanker is that the driver can fill the rig by himself as long as a reachable water source is available. The vacuum tanker is shown above arriving at the Upper Fill Site with the driver dismounting in order to initiate fill operations.

Upper Fill Site

The first time in at the fill site, the vacuum tanker operator has to set-up his strainer and suction hose, which will be left at the fill site and simply connected to the tanker each time on arrival. The suction hose uses a cam lock type of fitting in order to reduce the amount of time needed to make the connection.

Upper Fill Site

Once the suction hose is connected and the strainer is in the water, the operator engages the vacuum system and water enters the tank at over 1,000 gpm! All without the need for a fill site pumper or crew.

Upper Fill Site

Cam lock style fittings make the suction hose connections easy to manage - both when connecting and disconnecting.

Upper Fill Site

Mackinaw Tender 5 is the second tanker to arrive at the fill site behind Eureka Tender 3.

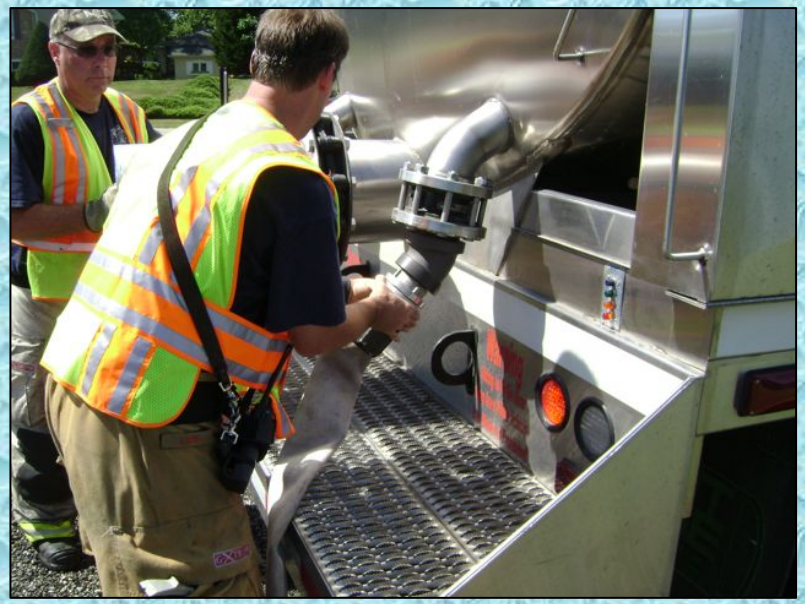
Upper Fill Site

A couple different type of fill lines were used based upon how the tankers filled. In the photos above, a gate valve is used to control flow on the 3-inch fill hose.

Upper Fill Site

Engine 2 is shown in the photos above with a circulation line in operation (deck gun) – this helps to ensure that a prime is maintained.

Upper Fill Site



Mackinaw's tender uses in-line check valves in place of slow-opening ball or butterfly valves on its fill lines. This is another way to reduce the time needed to make and break connections at the fill site.

Upper Fill Site

While this might appear a bit messy – it is very functional because all of the adaptors are ready for use - no digging through a compartment to find the right fitting.

Lower Fill Site

The two portable pumps supply two 5”LDH lines which supply the dump tank.

The second fill site proved to be a bit more of a challenge for crews to set up. Two, 500 gpm portable pumps were used to take water from a creek and supply a 2,100-gallon dump tank. From there, Eureka-Goodfield Engine 2 (1,000 gpm) drafted and filled tankers using 5-inch LDH.

Lower Fill Site

Each of the 500 gpm portable pumps drafted and supplied water through 250-feet of 5-inch LDH into the dump tank.

Lower Fill Site

The two portable pumps did a very nice job of supplying the needed water to the fill site pumper.

Lower Fill Site

Does something not look quite right? With 5-inch hose “new” to some folks at this drill, it was connected to a 5-inch piston intake valve. The problem is that this is a tanker fill site and it should be connected to this engine/tanker’s direct fill line in the rear. Back filling through the pump is way too slow. The connection was corrected after this photo was taken.

A Problem at the Dump Site

At around the 108-minute mark, Deer Creek Engine 1 (above) developed a mechanical problem requiring it to be shut down – thus water flow was stopped.

Switching Pumpers

Hose lines are broken down

Tender 3 is backed into position and hoses are reconnected.

However, quick thinking crews grabbed Eureka-Goodfield's Tender 3 (1,000 gpm) and made a swap with Engine 1.

Switching Pumpers

In just 11 minutes, the rigs were switched out and water was flowing again at 250 gpm. Six minutes after that, the flow was back to 750 gpm. Excellent work by the crews that made this happen. This also shows the importance of having a pump on a tanker – when one can afford it.

The Results

- The drill was stopped after two hours and five minutes.
- Water flow was interrupted twice - once at the 7:10-minute mark when transitioning to drafting operations occurred; and again at the 108:00-minute mark when the mechanical issue arose.
- An estimated 59,625 gallons of water were flowed through the attack engine during the drill producing an average flow rate of 552 gpm.

The Lessons Learned

- There was over 20,000 gallons of “water on wheels” at this drill – so sufficient water was available to sustain the 500 gpm for some time. This shows the importance of “front-loading” assignments so that adequate water is enroute to incident “on the go down.”.
- It is not easy to transition from using one’s booster tank to drafting from a dump tank without interrupting water flow. This was the case at this drill as well. Even though the interruption was only for about 50 seconds – it was still an interruption.

The Lessons Learned

- Regardless of the 50-second interruption, the first-arriving crews at this drill did a fantastic job of having a dump site operation set-up by the the time the engine was running out of water.
- Engine 1 only had a 1,000-gallon booster tank, so once water started flowing at 250 gpm, there was about 4-minutes of flow available. But at this drill, the first dump tank had water in it ready for drafting BEFORE the 4-minute supply was exhausted.

The Lessons Learned

- Portable pumps can be useful for tanker fill operations. At this drill – they were used to create an open relay from which the 1,000 gpm pumper could draft and fill tankers.
- The use of 5-inch LDH with the portable pumps allowed the pumps to maximize their efficiency while still being 250-feet away from the dump tank.

The Lessons Learned

- Having different size and type of direct fill connections can drive a fill site crew crazy. Standardization of tanker fill connections will help reduce fill time by making the connection process simpler.
- The "bundling" of water hauling mutual aid resources has proven successful in many drills – it did at this one as well. The tanker task force concept is an effective process for requesting and using additional rural water supply resources.

The Lessons Learned

- Vacuum tankers are probably one of the most significant innovations in rural water supply operations. One of their key advantages is that a fill site pumper and crew is not needed – the vac tanker can just go fill itself – driver only.
- For departments suffering staffing problems – having a vacuum tanker arrive early in an incident can make a big impact because it can offload and go reload with little need for additional resources.

Summary

- The drill was a success. For the new folks, they got to see how "it is supposed to done."
- For the older, experienced folks, it was a chance to practice their "craft."
- The success of the drill showed the importance of mutual aid response practices and procedures – and the importance of mutual aid interoperability.
- Much thanks to the Deer Creek and Eureka-Goodfield FDs for sponsoring and hosting this seminar.

www.GotBigWater.com

This program was developed by
GBW Associates, LLC

For more information contact us at
thebigcamel@gotbigwater.com