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DeKalb County Association of FDs DeKalb County, Alabama

Rural Water Supply Operations Seminar
2-hr Water Supply Drill – September 19, 2010
Summary Report

The Purpose

- The purpose of the 3rd annual seminar and drill was to continue to practice rural water supply operations on a county-wide basis by involving mutual aid companies in a real-life practical scenario.
- The 2-day seminar was well attended once again with over 60 participants both days..



The Seminar



- The 2-day seminar started on Saturday with two, ½-day workshops: one on drafting and one on pump design/operation.
- The drafting workshop was conducted at the DeKalb County Public Lake in Sylvania where crews practiced various aspects of operating a pumper from draft.
- The pump design/operations workshop was held at the Trinity United Methodist Church also located in Sylvania. The work shop reviewed basic pump design and operation.

The 2-hour Water Supply Drill

- The tanker shuttle drill was held on September 19, 2010, at a chicken farm located a few miles outside of Sylvania. Unlike previous year's drills, this location provided a real world challenge of dealing with narrow roads and long travel distances to water supply sites.
- The drill attempted to replicate the 2-hour Water Supply Delivery Test used by ISO in their evaluation of fire department water supply capabilities.



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 sixteen different fire departments and the water hauling apparatus was representative of the type of water supply support that would respond to a structure fire in DeKalb County.*

Drill Participants

- Sylvania Engine 2
 - 1,500 gpm pump
w/1000 gal tank
- Sylvania Tanker 1
 - 500 gpm pump,
w/3,000 gal tank



Drill Participants

- Sylvania Tanker 2
 - 50 gpm pump
w/3,750 gal tank
- Hammondville Tanker 1
 - 750 gpm pump,
w/1,500 gal tank



Drill Participants

- Powell Engine 1
 - 1,250 gpm pump
w/1,000 gal tank
- Fyffe Engine 4
 - 1,250 gpm pump,
w/1,800 gal tank



Drill Participants

- Aroney Engine 3
 - 1,250 gpm pump
w/3,000 gal tank

- Ellisville Tanker 39
 - 500 gpm pump,
w/3,000 gal tank



Drill Participants

- Henagar Tanker 2
 - 500 gpm pump
w/2,000 gal tank



- Cartersville Tanker 1
 - 2,500 gal tank



Drill Participants

- Adamsburg Tanker 1
 - 1,250 gpm pump
w/2,500 gal tank
- Dogtown Tanker 1
 - 500 gpm pump,
w/2,000 gal tank



Drill Participants

- Dogtown Engine 1
 - 1,250 gpm pump
w/1,000 gal tank
- Cartersville Pumper 1
 - 1,250 gpm,
w/1,000 gal tank



Drill Participants

- Henagar Engine 4
 - 1,500 gpm
 - w/1,000 gal tank
- Crossville Engine 6
 - 1,250 gpm pump,
 - w/3000 gal tank



Preparation



Units staged at Sylvania Station 2 where an operational briefing was conducted outlining the objectives for the drill. Safety issues were also reviewed.

The Drill Begins



The drill began with first alarm units being alerted for a reported chicken house of fire on Buttram Road NW. Sylvania Engine 2 was first to arrive and is shown above getting ready to lay out a supply line.

The Drill Begins



Adamsburg's tanker arrives right behind Engine 2 and the plan is to operate as a nurse tanker until dump site operations can be established.

The Drill Begins



Engine 2's crew is shown above dropping off some equipment for the dump site and laying out a 5-inch supply line.

The Drill Begins



500-feet of 5-inch is laid out simulating the attack engine positioning up a farm lane or similar type of road.

Attack Engine Operations



With the timer now running, crews work quickly to get a hose line in place to support a 250 gpm flow at the 5-minute mark. Meanwhile, Adamsburg's tanker gets into position to begin nurse tanker operations.

Water Flow Begins



At the 5:00 minute mark, flow was started at 250 gpm. In order to accurately monitor the flow, a diffuser equipped with a fixed pitot was supplied by Engine 2 via 100-feet of 3-inch hose.

Nurse Tanker Operations



At 6:39 minutes, nurse tanker operations were underway and the 5-inch supply line was charged.

Oops!



A tanker arrives from the opposite direction – pretty much a real life scenario. Crews quickly corrected the problem and got all tankers travelling the same direction on the narrow roadway.

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Nurse Tanker Operations



Adamsburg Tanker 1 supplies the 5-inch line using its LDH discharge – which is a good example of why a tanker equipped with a full-size pump and an LDH discharge is a valuable asset in rural water supply operations.

Dump Site Set-Up



Henagar Engine 4 arrives and begins to set-up the dump site using Engine 2's 3,000-gallon dump tank.

Dump Site Set Up



Because of the narrow road, the Henagar engine sets up to draft using 20-ft of suction hose connected to its driver side suction inlet. This frees up road space and still allows maximum intake capability.

Dump Site Set Up



The crew works to connect a low level strainer to the suction hose so that maximum water can be reached while drafting.

Dump Site Set Up



With the first tank in place, Sylvania's tanker offloads its water so that Henagar's engine can begin drafting operations. Meanwhile, nurse tanker operations continue.

2nd Dump Tank



A second, 3,000-gallon tank from Crossville Engine 6 is shown being set-up above as the crews work to build out a dump site capable of handling 500 gpm at the 15-minute mark.

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Dump Site Operations



At the 25:34 minute mark, two dump tanks are operating and more are being set-up in anticipation of increasing the flow.

Dump Site Operations



More tankers arrive as additional units are dispatched to assist on the call. Fyffe Engine 4 is shown above off-loading its water as flow is now at 500 gpm.

Flow Moved to 500 gpm



This year's scenario was not as "user friendly" as last year's drill which had the dump site in the firehouse parking lot. The narrow and sloped road provided a number of challenges – all which were overcome by the crews.

Dump Site Operations



The 500 gpm flow proved to be a challenge for the two-tank operation, especially given the slope of the road.

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Solving a Problem



Engine 4 ran into a problem with one of its suction hoses and had to change out a 10-ft section while still supporting the attack pumper. The driver/operators and support crews did a nice job of coordinating the change out so that water flow was never interrupted at the flow diffuser.

Three Dump Tanks



Around the 39:00 minute mark, three dump tanks were operational and rear off-loading tankers were directed to offload into the last tank thus keeping the roadway clear.

More Water Arrives



Additional tankers continue to arrive and dump site crews continue to “build out” the dump site.

Four Tank Operation



Near the 60-minute mark, four tanks are operating and the flow is pushed to 630 gpm. The challenge at the dump site became the ability to transfer water fast enough to accommodate the flow demand.

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Adapting



Rear off-loading tanks can prove troublesome sometimes when dealing with a multiple-dump tank arrangement on a limited space road. However, at this drill, a couple of quick-thinking dump site crew members improvised operations by using a dump chute from another tanker to convert the dump chute of a rear off-loading tanker – and it worked out just great.

Being Prepared



One thing learned from previous drills was the need for standardized adaptors at tanker fill sites. The photo above shows pre-rigged fill lines on Sylvania Tanker 2 that are set-up to quickly connect to the direct fills – the blue 4-inch Storz fitting is the agreed upon fitting for DeKalb County tanker fill operations.

Dump Site Operations



With five dump tanks now in operation, multiple tankers can dump at once. Around the 75-minute mark, the flow was moved to 745 gpm where it was sustained for about 15-minutes before being reduced back to 690 gpm.

Dump Site Operations



The dump site became a busy place with everyone hustling to improve the operation and the flow. Many kudos to those who worked their butts off to keep the water flowing.

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Water Transfer Operations



As the dump site grew, it became more difficult for the supply engine to support the attack engine AND run the four jet siphons. So the decision was made to use Fyffe Engine 4 to run jet siphons. The problem was getting water supply to the Fyffe engine – a separate dump tank could have been used but there was really nowhere to locate it. Thus – this option didn't work out so well.

Five Dump Tanks



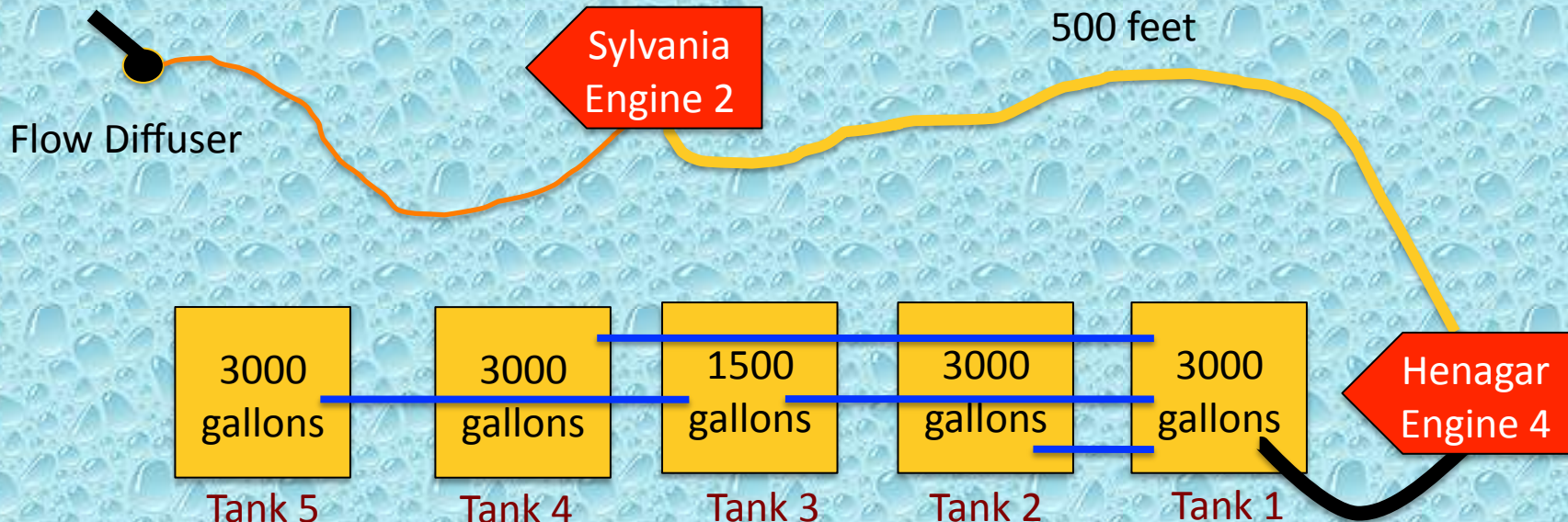
In the end, five dump tanks were used to support the operation and the operation topped out at 745 gpm for about 15 minutes. However, 690 gpm appears to be the flow sustainable by this operation.

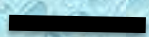
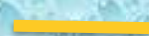
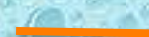

Maximizing Flow



One issue not identified until late into the operation was the lack of a high-flow discharge on the supply engine. Just because a 5-inch hose line can be connected to a 2-1/2-inch discharge does NOT mean that 5-inch flows can be expected. In this drill, the 745 gpm flow was maximizing the single discharge. A better solution would have been to pump two, 3" lines into a 5" LDH manifold.

Dump Site Layout



-  Suction Hose
-  5" Hose
-  3" Hose
-  Jet Siphon

The Fill Sites

- For this drill – two fill sites were used – one at the DeKalb County Lake and one at a fire hydrant on Buttrams Crossing Road.
- The hydrant fill site required a pumper to use a traditional fire hydrant for water supply and provided a 4.9-mile roundtrip for tankers hauling water.
- The lake fill site was located at a boat ramp and required a pumper to draft from the lake. This fill site provided a 9.7-mile roundtrip for the tankers hauling water.

Buttram's Fill Site



This hydrant on Buttrams Crossing Road had been used in previous year's drills. However, the flow rate had been below 1,000 gpm both times – more like in the 600 to 750 gpm rate. The problem posed for the 2010 drill was the ability to fill tankers using this hydrant at a rate high enough to support the fire attack operation. And...this hydrant presented the shortest water hauling distance for the 2010 drill, so it was an attractive site.

Buttram's Fill Site



Cartersville Pumper 1 arrived at the hydrant and crews had to work quickly to get a tanker fill station up and running before the first empty tanker arrived.

Buttram's Fill Site



Since hooking the pumper up directly to the hydrant would have produced a less than desirable fill rate, the decision was made to fill a dump tank using the hydrant - and then draft from the dump tank and fill tankers at a higher flow rate.

Buttram's Fill Site



A 3,000 gallon dump tank was used and positioned near the hydrant. A hose line was stretched from the hydrant to the dump tank and outfitted with a 2-1/2-inch nozzle.

Buttram's Fill Site



The theory behind this operation is that the dump tank gets filled using a control valve to control overflow and the pumper drafts from the tank. Some folks call this an “open” relay. The 1,250 gpm pumper can fill tankers at a rate much higher than what the hydrant could supply in a direct connection arrangement.

Buttram's Fill Site



Pumper 1's crew did a great job of getting set up in time to support tanker fill operations.

Buttram's Fill Site



While the 3-inch hose with 2-1/2-inch nozzle worked, it could have been improved by using a larger hose line or better control valve. However, the concept implemented was okay.

Buttram's Fill Site



Pumper 1 used a low level strainer to ensure that as much water in the tank that could be reached was reached.

Buttram's Fill Site



One problem that arose during the operation was that no control valve was placed on the hydrant. The hydrant had to be opened and closed as needed to fill the tank - which caused the hydrant drains to discharge water thus causing water to bubble up through the ground. An external valve should have been used on the hydrant - it would also have made for less work when opening up to fill the dump tank.

Buttram's Fill Site



After a little while, the nozzle was changed out for a piece of suction hose equipped with an adaptor. This arrangement allowed for less restriction and better flow.

Buttram's Fill Site



Pumper 1 then supplied a length of 5-inch hose which was wye'd into two, 4-inch fill lines.

Buttram's Fill Site



One person served as the “loader” and controlled the water flow into the tankers. Other crew members made and broke connections as needed. With almost all of the tankers arriving with a 4” Storz fill fitting, there was little need for adaptors - a grand improvement over the first year!

Buttram's Fill Site



One problem that occurred was that the suction hose from the hydrant feed kept trying to float to the surface and spray water into the other suction hose's strainer area thus causing the possibility of cavitation.

Buttram's Fill Site



To remedy the floating problem, an "Alabama boat anchor" was used to help secure the suction hose to the bottom of the dump tank. Once in place, the concrete block did its job and floatation was never an issue again during the drill.

Buttram's Fill Site



4-inch hose was used as the fill line. Here, the loader is shown manning the control valve while the other crew member manages making and breaking the connection to the tanker.

County Lake Fill Site



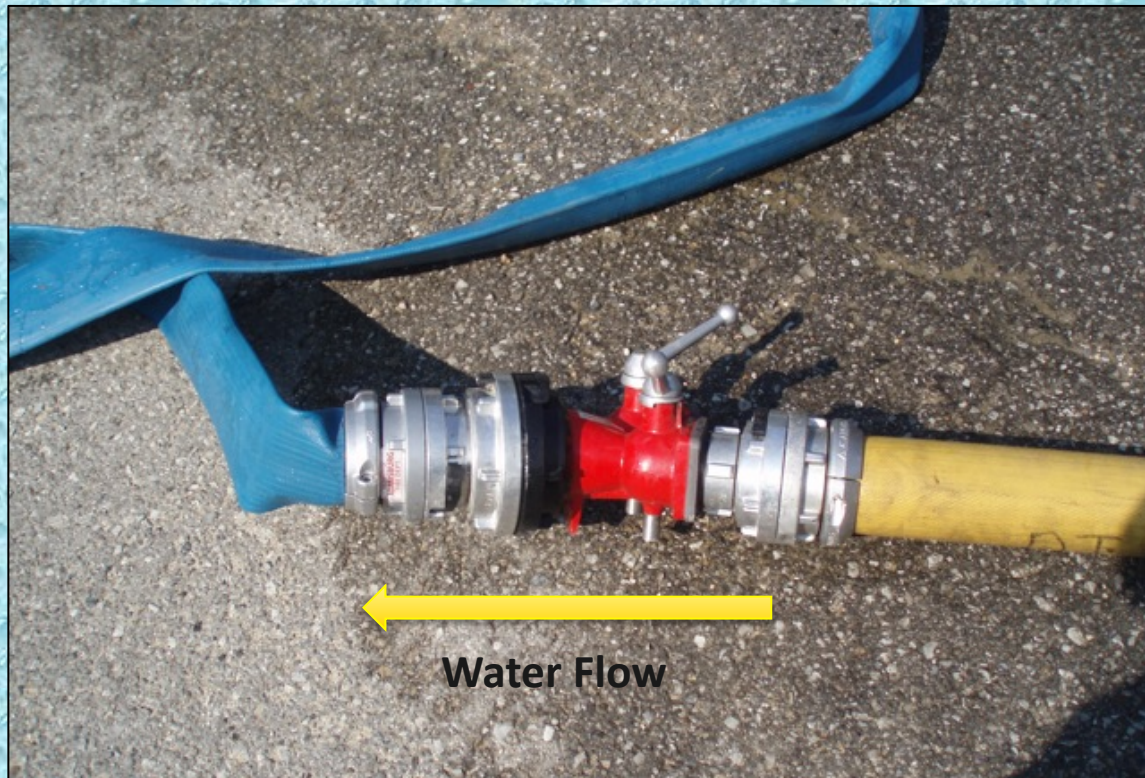
In order to maximize pump ability at the lake fill site, Dogtown's Engine 1 (1,250 gpm) was positioned on the boat ramp. Dual, 4-inch hoses lines were stretched back up the ramp to the parking lot where a tanker fill station was constructed.

County Lake Fill Site



Fortunately, the drill didn't interrupt a Dixie weekend tradition!

County Lake Fill Site



A 5"x 2-1/2"x2-1/2" wye was used as the in-line control valve for loading tankers. The valve was reversed so that one of the 2-1/2" outlets could function as a drain which made breaking the tanker connection much easier.

County Lake Fill Site



4-inch hose was used to fill each tanker that arrived at the lake fill site – this made a significant impact on reducing fill times.

The Results

- The drill was stopped after two hours and twenty-five minutes.
- Water flow was never interrupted – although it was close a few times early in the drill.
- A total of 84,075 gallons of water were flowed through the attack engine during the drill producing an average flow rate of 601 gpm.

The Lessons Learned

- There was over 30,000 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.”.
- A nurse tanker operation was utilized at this drill and it proved successful. Having a large tanker “chase” a pumper allows time for a dump site operation to be set-up while the the fire attack is supported.

The Lessons Learned

- The one lane road where dump site operations were set up was sloped which caused a situation that limited the amount of water available in each dump tank. This was a “real life” situation that was fixed by using an additional dump tank.

The Lessons Learned

- Water transfer operations also can become an issue once operations move beyond a three tank configuration. At this drill, the ability to support jet siphons became a limiting factor and space did not allow for an easy solution.
- Plan ahead for jet siphon use; consider where the jet siphons will come from and how they will be powered.

The Lessons Learned

- Having different sizes and types 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.
- It was clear at this year's drill that standardization has improved the water supply operations in DeKalb County. There were few adaptor issues at tanker fill stations.

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 vacuum 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 3rd Annual DeKalb County Rural Water Supply Operations Seminar was a grand success. Folks enjoyed the extra work shops and it was clear that improvement was made in water hauling operations.
- The success of the drill showed the importance of mutual aid response practices and procedures – and the importance of mutual aid interoperability.
- Once again, many thanks to the DeKalb County Association of Fire Departments for sponsoring and hosting this seminar and to the membership of the Trinity United Methodist Church for providing classroom space and dining facilities.



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