DeKalb County Association of Fire Departments
DeKalb County, Alabama

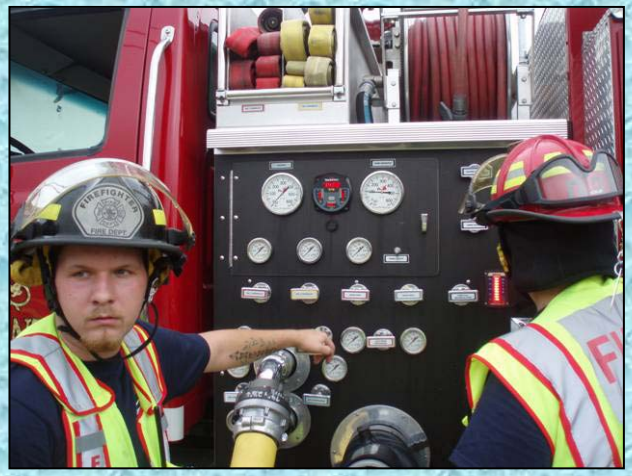
Rural Water Supply Operations Seminar & Drill

Tanker Shuttle Drill
September 20, 2009
Summary Report

Overview

- In September 2009, the DeKalb County, Alabama Association of Fire Departments sponsored its 2nd annual rural water supply operations seminar.
- The seminar, which was delivered by GBW Associates, LLC of Westminster, MD was a joint effort between numerous fire departments in DeKalb County to practice and improve water supply operations.
- This presentation is a summary of the tanker shuttle drill which was part of the seminar.

The Purpose



- The purpose of the seminar and drill was to build upon the information and skills learned and practiced during the 2008 program.

The Seminar

- As in 2008, the 2009 seminar started with a 6-hour refresher session to review the basics of rural water supply operations.
- The refresher session was conducted at the Trinity United Methodist Church located in Sylvania, Alabama.
- Seminar topics included the history of rural water supply, tanker construction, dump site operations, fill-site operations, tanker shuttle operations, and drafting.
- Also, a local E-One apparatus representative provided a demonstration of one of their Water Master vacuum tankers.

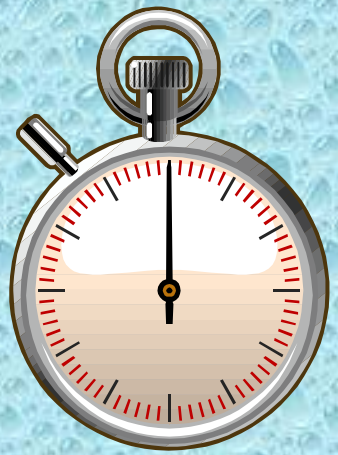
Rural Water Supply Operations Seminar
DeKalb County, Alabama September 2009

The Drill

- The tanker shuttle drill was held on September 20, 2009, in Sylvania FD's first-due area.
- 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 in recent times, ISO has come under some scrutiny for its rating schedule, 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 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!

DeKalb County Drill Participants

The participants for the drill were from 14 different fire departments and the apparatus was representative of the type of water supply support that would respond to a fire in DeKalb County.

Drill Participants

- Powell Engine1
  - 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
  - 3,000 gal tank w/350 gpm pump

Drill Participants

- Henagar Tanker 2
  - 2,000 gal tank w/400 gpm PTO pump

- Cartersville Tanker 1
  - 2,500 gal tank

Drill Participants

- Dogtown Tanker 1
  - 1,400 gal tank

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

Drill Participants

- Sylvania Engine 2
  - 1,250 gpm pump w/1000 gal tank

- Sylvania Tanker 1
  - 3,000 gal tank w/500 gpm PTO pump

Drill Participants

- Sylvania Tanker 2
  - 3,750 gal tank w/50 gpm PTO pump

- Hammondville Truck 1
  - 1,500 gal tank w/250 gpm pump

Drill Participants

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

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

Preparation

Units staged at the Sylvania Fire Department where crews were assigned and an operational briefing was conducted.

Operational Briefing

Participants received a briefing on the specifics of the drill which included the goals and objectives and a reminder about safety.

The Drill Begins

With everything set, the drill begins. The stopwatch was started when Cartersville Engine 1 came to a stop and the driver engaged the parking brake. The engine laid dual, 2-1/2-inch supply lines about 300-ft in length.

Attack Line Deployment

Cartersville crews worked to stretch a 2-1/2-inch attack line in order to establish an initial fire flow of 250 gpm. Crews also set-up a portable monitor fed by dual, 2-1/2-inch lines in preparation for increasing the flow at the 15-minute mark.

1st Tanker Arrives

Adamsburg's Tanker 1 (2,500 gallons) arrives on the scene and prepares to go to work as a nurse tanker.

Attack Engine Operations

With 250 gpm now flowing, the attack engine prepares to receive water from the Adamsburg tanker.

Flow is Interrupted but Restored

At 6:30 minutes, the water flow is interrupted but is restored 15 seconds later when Adamsburg Tanker 1 begins supplying the attack engine.

Attack Engine Operations

Engine 1 is now being supplied through two, 2-1/2-inch supply lines.

1st Dump Tank is Set Up

While the Adamsburg tanker is pumping its water to the attack engine, crews set up the tanker's 3,000-gallon dump tank.

2nd Tanker Arrives

While the Adamsburg tanker continues to pump off to the attack engine, Sylvania Tanker 1 starts dumping its 3,500 gallons into the dump tank.

5-inch Supply Hose is Laid

With a nurse tanker operation still in effect, a 5-inch supply line is laid from Sylvania Engine 2 (dump site engine) to Cartersville Engine 1.

Dump Site Engine

Sylvania Engine 2 (1,250 gpm) goes to work as the draft engine at the dump site.

Auxiliary Intake

Because the 5-inch line is connected to a single, 2-1/2-inch discharge on the Sylvania engine, a 2-1/2-inch supply line is added in anticipation of higher flow needs.

Flow Increased to 500 gpm

At the 15:00 minute mark the flow is increased to 500 gpm using the portable monitor. Flow was measured by a handheld pitot gauge. The photo here shows both lines in operation – it was taken during the transition to the portable monitor (the stream on the left.)

Command is Established

LT Lee Lumpkin of the Dogtown VFD arrived on scene and assumed the command.

2nd Dump Tank is Set Up

With more tankers arriving, another dump tank is set-up. Sylvania Engine 2's 3,000-gallon dump tank is shown above being set up.

2nd Dump Tank in Operation

Additional units from the 1st Alarm begin to arrive and crews work to build out the dump site. The second dump tank was put into operation at the 16:00 minute mark.

1st Tanker Task Force

Sylvania Tanker 2 off-loads its 3,750 gallons of water. This tanker was the first of three on a Tanker Task Force that was dispatched to assist.

Fyffe Engine 4 Dumps

Fyffe Engine 4 is shown dumping its 1,800 gallons of water into the primary drafting tank.

Henagar Tanker 2

Henagar Tanker 2 offloads its 2,000 gallons of water.

2nd Tanker Task Force

Three tankers from the 2nd Tanker Task Force are shown arriving as dump site crews await the added resources.

Hammondville Tanker 1

Hammondville Tanker 1 backs into position to dump its 1,500 gallons.

Ellisville Tanker 39

Ellisville Tanker 39 arrives and awaits its turn to dump its 3,000 gallons.

3rd Dump Tank in Operation

At the 29:00 minute mark, a third dump tank (3,000-gallon from Sylvania Tanker 1) is placed into operation.

Water Transfer Operations

Two jet siphons are used to transfer water to the primary dump tank. Note the use of a ground ladder to span the gap so that water only has to be moved once from the farthest tank.

Jet Siphon Use

When pumping jet siphons, the goal is to have the water output look like the photo on the left. The photo on the right shows a jet siphon that needs more pressure. There should be a solid stream of water being discharged from the suction hose.

New Drain Design

This dump tank manufacturer uses a snap hook to keep the tank drain held up high - thus eliminating the need to tie it up. Good idea and it seemed to work well!

Ellisville Tanker 39 Dumps

Ellisville Tanker 39 dumps it water and supports the 500 gpm flow.

Pumping the 5-inch Line

Sylvania Engine 2 supplies the 5-inch line feeding the attack engine. Note that the pumper does not have a high-flow discharge so the 5-inch is connected to a 2-1/2-inch discharge which limited its flow to about 1,000 gpm on this pumper.

Tankers Return to Dump

Cartersville Tanker 1 arrives with its second load of water.

Flow Increased to 750 gpm

At the 40:00 minute mark, the flow was increased to 750 gpm by placing the 2-1/2-inch attack line back into service. Meanwhile, a second portable monitor is being set up on the right in anticipation of moving to a 1,000 gpm flow.

4th Dump Placed in Operation

At the 55:00 minute mark, a 4th dump tank (2,500-gallon from Henagar Tanker 2) is placed into operation.

Plenty of Storage

With four, large dump tanks now in operation, there is ample space for water storage thus allowing a larger fire flow. When full, this site can hold 11,500-gallons of water.

More Tankers Arrive

With the flow now at 750 gpm, more tankers are needed to support the operation.

Attack Engine

The attack engine works effortlessly to supply the 750 gpm flow - all because of the 5-inch supply line.

2nd Supply Line

In order to increase flow, a 2-1/2-inch line was added into the supply – not ideal, but it added about 300 more gpm capability.

Flow Increased to 1,000 gpm

At the 60-minute mark, Engine 1 pumps the 5-inch line shown above which feeds a portable monitor. The supply to the other portable monitor and hand line is shutdown.

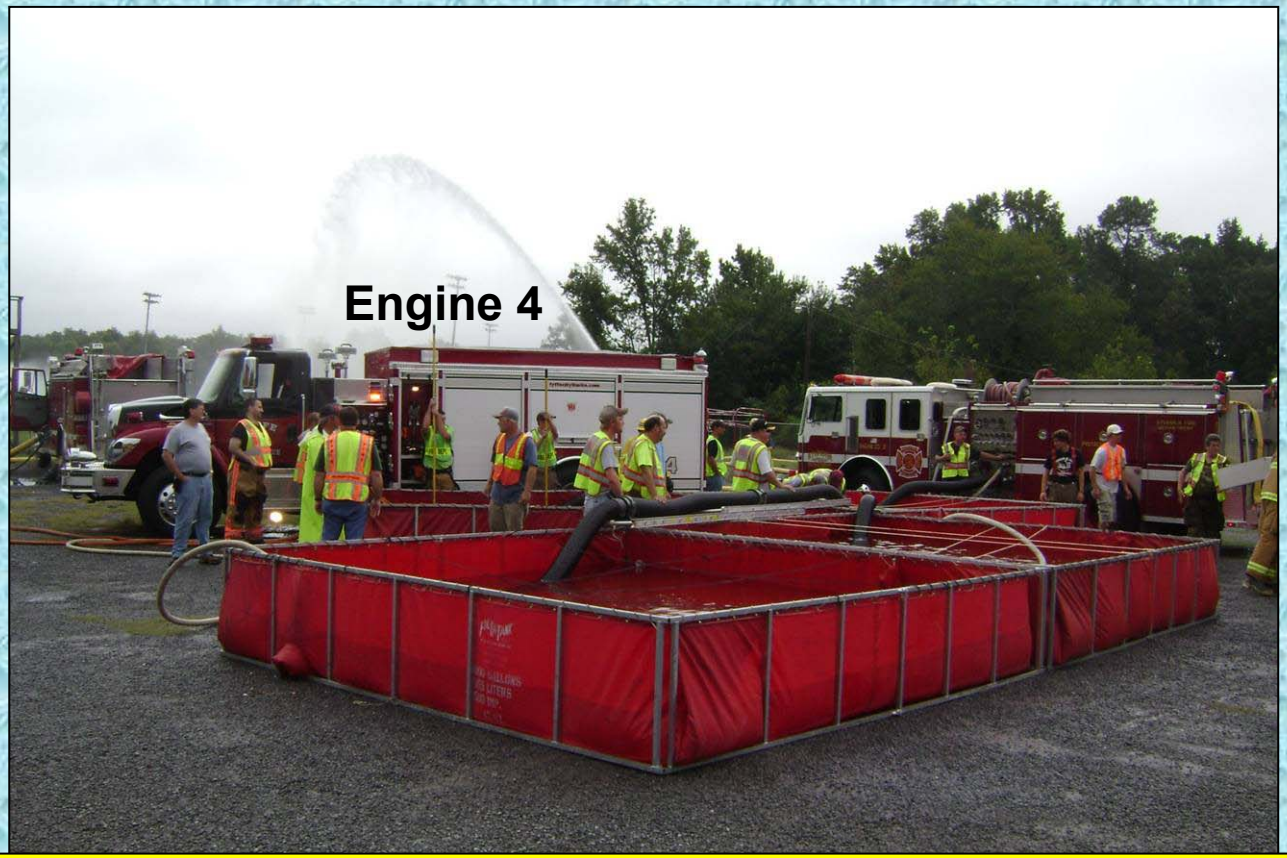
1,000 gpm

A portable monitor from a Fyffe engine is used to flow the 1,000 gpm. Note the 5-inch inlet on the device.

Crews Kept Busy

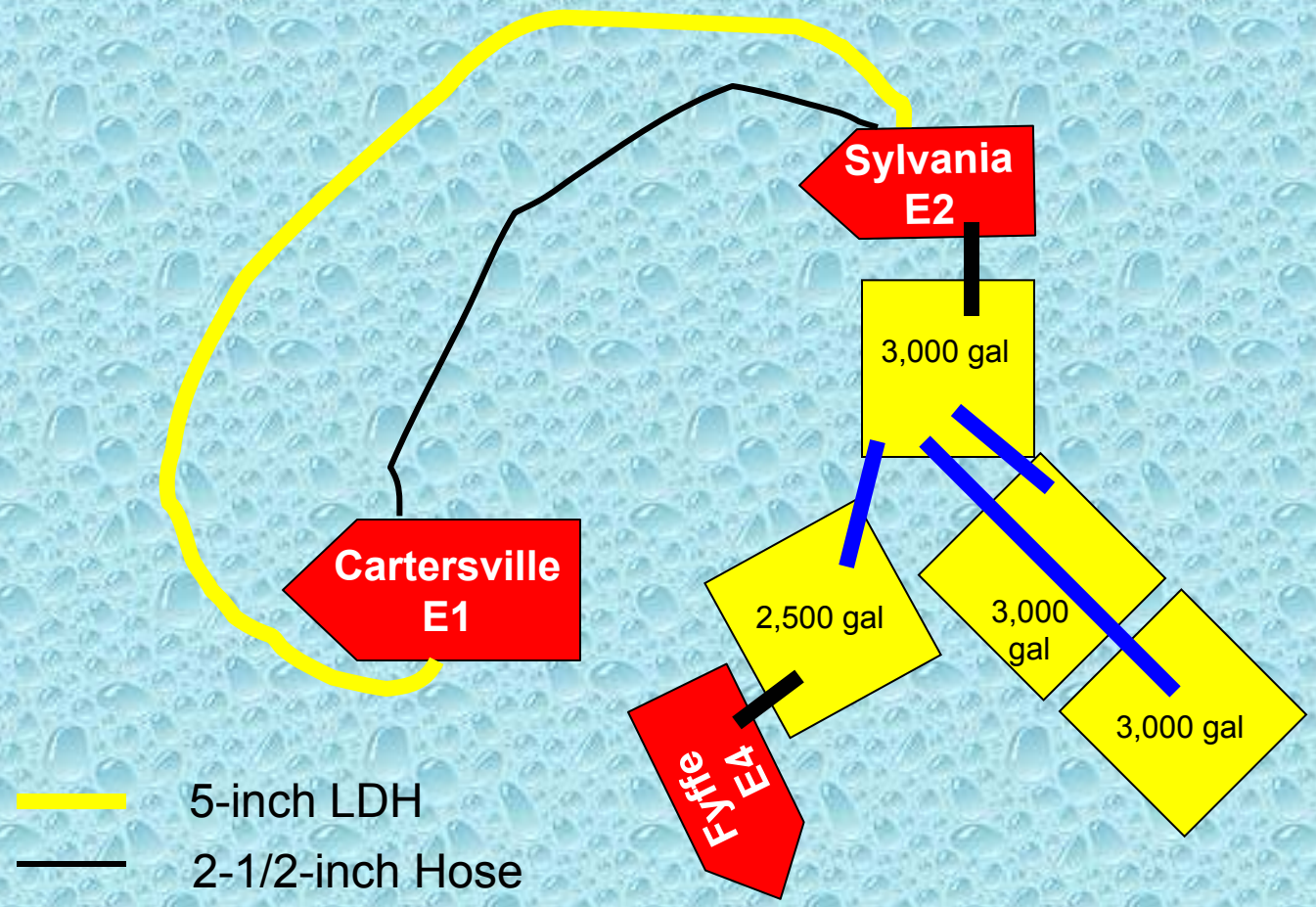
With the flow now at 1,000 gpm, crews were kept busy running a 4-dump tank operation.

Engine 4 Runs Jet Siphons



With the flow increased, Fyffe Engine 4 is taken out of the shuttle to run the jet siphons thus allowing the draft engine to commit its pumping capacity to supplying the attack engine.

Final Dump Tank Layout



Flow Moved to 1,250 gpm

At the 1-hr, 45-minute mark, the flow is moved to 1,250 gpm using the portable monitor on the right and the 2-1/2-inch hand line on the left. The flow is sustained for the remaining 15-minutes of the drill.

The Fill Sites

- Two fill sites were used for the drill; a lake and a traditional fire hydrant (they were the same two used in the 2008 drill).
- The lake was the closest fill site and was supported by Hammondville Engine 1, a 1,250 gpm pumper. This fill site provided a 3.0-mile round trip for rigs hauling water.
- The traditional fire hydrant was supported by a Powell Engine 1, also a 1,250 gpm pumper. This fill site provided a 5.0-mile round trip.

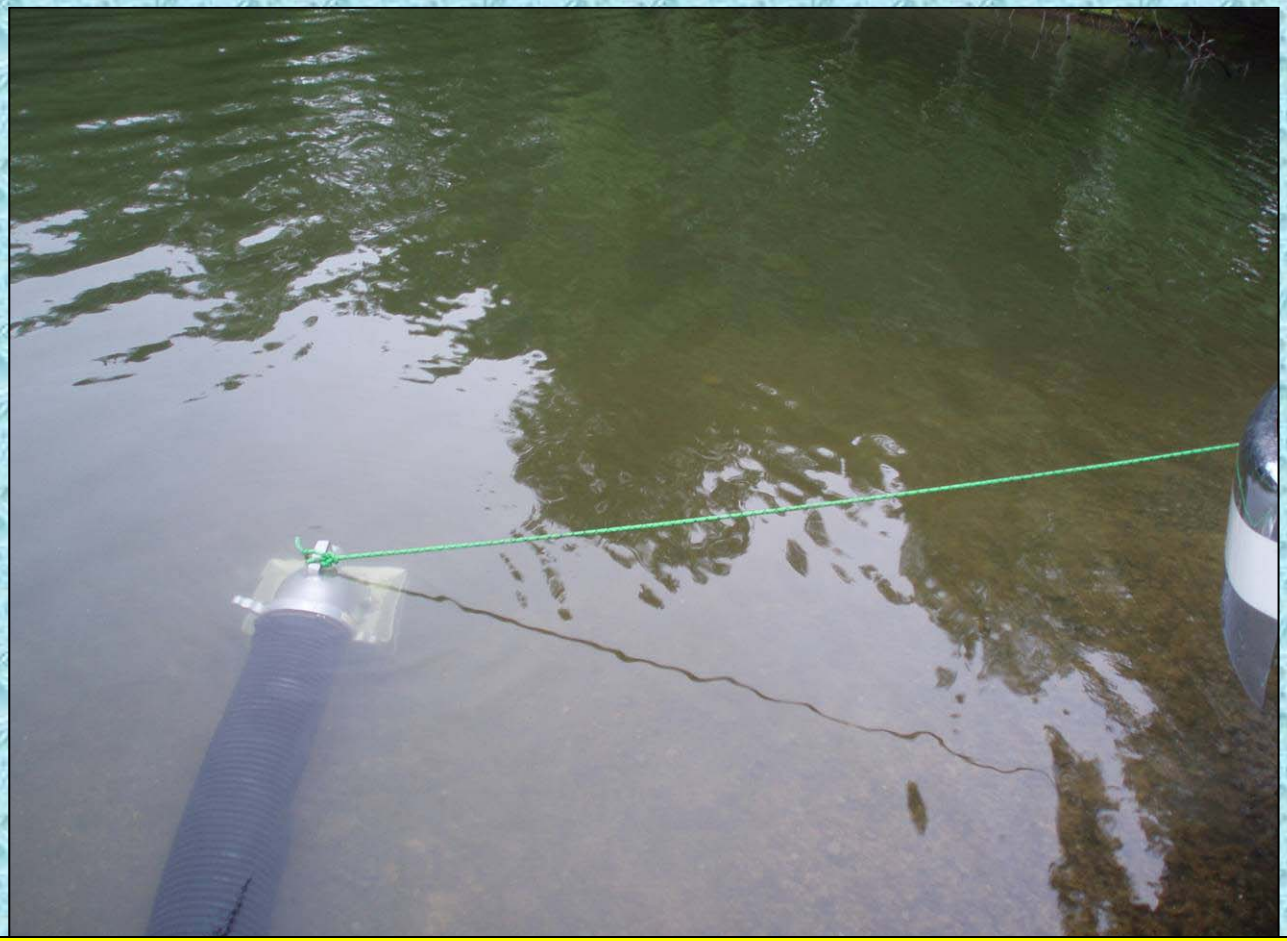
Lake Fill Site

Hammondville Engine 1 (1,250 gpm) sets up to draft on the boat ramp at the lake. A 5-inch line is used to support tanker fill operations.

Good Positioning

Hammondville gets in a good position to maximize drafting. By getting the pump as close to the water as possible, lift is minimized thus increasing pumping capacity.

Low Level Strainer



A low level strainer is used on the boat ramp to access the lake's water.

LDH Use

Another good use of LDH to improve pumping capacity to the fill appliance. This 5-inch hose maximizes the pumper's capability.

Not Pretty But Functional

A couple of appliances were needed to make this work, but the crews are using LDH to fill tankers which means better efficiency. With the manifold reversed, a 2-1/2-inch outlet can be used as a drain when breaking a fill connection on a tanker.

4-inch Hose Being Used to Fill

Sylvania's Tanker 1 is shown being filled using 4-inch LDH connected to one of the tanker's direct fill lines.

Filling One at a Time

The fill site crew at the lake does a good job of filling one tanker at a time – thus committing maximum pump capacity to one tanker at a time. Note that both tankers are hooked up, but only one is being filled.

Adaptors

Quick connect adaptors such as Storz couplings and CamLok fittings can really reduce loading time. Much improvement occurred in this area from the 2008 drill.

Fill Site Crew

Ideally, a fill-site crew should try to operate like a pit crew at a NASCAR race – quick and efficient. That was the case at this fill site!

Hydrant Fill Site

Powell Engine 1 (1,250 gpm) operates this fill site using a hydrant.

Big Water Hook-up

The fill site crew did a great job of “dressing out” the hydrant so that maximum water could be obtained.

Big Water Hook-up

By putting a valve on one of the outlets, additional water can be obtained without having to shut down the hydrant.

LDH Used to Fill Tankers

Like the lake fill site, crews use LDH to fill tankers at this fill site as well. Sylvania Tanker 2 is shown here being filled.

Big Lines Reduce Time

Connections and hose size make a big difference in fill times.

Hydrant Problem

Because the hydrant was on the very outskirts of the water system, flow was less than 1,000 gpm. When filling tankers, the residual pressure dropped to about 15 psi. It wasn't great, but it worked.

Southern BBQ for Lunch

What would a DeKalb County function be without some good old southern cooking. Lunch was catered by TL's BBQ and it was finger licking, lip smacking good – as advertised!

The Results

- The drill was stopped after 2 hours.
- ***Water flow was only interrupted once – for 15 seconds - very early in the drill.***
- An estimated total of 94,000 gallons were moved during the 116-minute event (first 4-minutes no water was moved) resulting in an ***average flow of 810 gpm***. However, this rate was really only achieved in the 2nd half of the drill.
- However, 810 gpm was a 117 gpm improvement over the results from the 2008 drill – CONGRATULATIONS!

Lessons Learned

- Nine water transport rigs and five pumpers were used to deliver the 810 gpm for the duration of this drill – once again emphasizing the need to call for help early in an incident.
- The use of 2-1/2-inch supply line just doesn't work very well for flows over 250 gpm. Had Sylvania Engine 2 not been equipped with 5-inch LDH, the results most likely would have been bad. The crews are congratulated on their quick thinking to get that 5-inch line into service.

Lessons Learned

- Side dumps in addition to rear dumps provide greater flexibility in tanker offloading operations.
- Designating a Dump Site Leader (officer) to direct dump site operations helps make things go smoother.
- The use of jet siphons improves the transfer of water between dump tanks and dedicating one person to operate the jet siphons makes matters even better.

Lessons Learned

- Jet siphons consume pump capacity; consider using a separate pumper to run jet siphons when attempting flows approaching 1000 gpm.
- All size tankers can contribute to the overall delivery rate – some will just be more efficient in the process than others.
- When setting up multiple dump tanks, avoid setting them up in a manner that requires water to be transferred multiple times before it gets to the primary drafting tank.

Lessons Learned

- Small fill lines slow down tanker fill operations. Even if a tanker has a 2-1/2-inch direct fill connection – use an adaptor and connect LDH to that connection.
- Threaded connections slow down fill site operations – consider using cam-lock or Storz-style fittings.
- Adaptors are critical – every tanker should carry multiple adaptors so that they can support all types of fill scenarios.

Summary

- The drill was a success. It showed the value of equipment interoperability and revealed that operations really had improved since 2008. There were few adaptor issues and tanker fill times really improved.
- The improvement in tanker filling most likely contributed to the higher flow results for the 2009 drill.
- Many thanks to the DeKalb County Association of Fire Departments for sponsoring the program and to all of the fire departments and vendors who provided support to the seminar.

www.GotBigWater.com

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