Marion County Fire District #5
Marion County, Kansas

Rural Water Supply Operations Seminar & Drill

Tanker Shuttle Drill
April 18, 2010
Summary Report

Overview

- In April 2010, Kansas' Marion County Fire District #5 sponsored a rural water supply operations seminar.
- The seminar, which was delivered by GBW Associates, LLC of Westminster, MD was a joint training effort between several local fire departments 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 review the basics of rural water supply operations and to practice water supply operations in a non-hydranted setting.

The Seminar

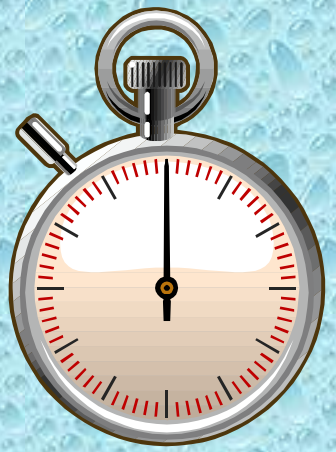
- The seminar started with a 6-hour session to review the basics of rural water supply operations.
- The review session was conducted in the community hall at the Marion County Park and Lake located outside of Marion, Kansas.
- Seminar topics included the history of rural water supply, tanker construction, dump site operations, fill-site operations, tanker shuttle operations, and drafting.
- Seminar participants were from several areas of Kansas.

The Drill

- The tanker shuttle drill was held on April 18, 2010, at the Marion County Lake.
- 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 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!

Marion County Drill Participants

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

Drill Participants

- Lincolnville Engine 1
  - 1,500 gpm pump w/1,000 gal tank

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

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Drill Participants

- Ramona BT3
  - 1,700 gal tank w/ 175 gpm pump and 3,000 gal dump tank

- Marion FD5
  - 2,600 gal tank, w/175 gpm pump, and 3,000 gal dump tank

Drill Participants

- Solomon Tanker 613
  - 3,000 gal tank w/1,250 gpm pump and 3,000 gal dump tank

- LincolnVille B2
  - 1,200 gal tank w/175 gpm pump, CAFS, and 3,000 gal dump tank

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Drill Participants

- Lehigh Engine 2
  - 750 gpm pump w/500 gal tank

- Lehigh Engine 1
  - 750 gpm pump, w/500 gal tank

Drill Participants

- Marion FD3
  - 750 gpm pump w/500 gal tank

Preparation

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

The Drill Begins

With everything set, units were dispatched simulating a typical response for a structure fire. Because the lake provided good locations for a dump site and several fill sites, it was used for the drill. Lehigh Engine 1 and Marion's tanker arrived on the scene and began setting up for dump site operations. The stopwatch was started when the Engine 1 came to a stop and the driver engaged the parking brake.

Dump Site Set-up

Crews hustled and worked together to stretch hose lines and set-up a dump tank.

Dump Site Set-up

Folks work to connect the 4-1/2-inch suction hose so that Engine 1 can start drafting.

Water Flow Starts

At the 6:16 minute mark, the first tanker was dumping water and at 7:48 minutes water flow was started at 250 gpm. (The photo above shows the moment that water flow started - it quickly got much better than that!)

Flow Measurement

An Akron flow test kit with a fixed pitot was used to measure the flow.

Dump Site Operations

A second dump tank is placed into operation and an “inch worm” style jet siphon made from 4-inch PVC pipe is used to support water transfer operations.

Dump Site Operations

Ramona Brush Tanker 3 arrives and dumps its 1,700 gallons of water through its 10-inch side dump.

Command Structure

Chief Mike Regnier of the Marion VFD assumed the role of Incident Commander.

Dump Site Operations

Solomon Tanker 613 is the third arriving tanker providing 3,000 gallons of water and a 3,000 gallon dump tank.

Dump Site Operations

Tanker 613 offloads its 3,000 gallons through one of its 10-inch side dumps.

A Problem Arises

A 4-1/2-inch low level strainer was needed for the dump tank – however, it was not immediately available. Fortunately, one arrived pretty soon. The real trick was installing it without interrupting the operation.

Flow Moves to 500 gpm

At the 16:00 minute mark, flow is moved to 500 gpm.

More Tankers Arrive

More tankers begin to arrive just in the “nick of time” as dump tank levels dwindle and the flow moves to 500 gpm.

1st Tanker Returns

At the 22:00 minute mark, Marion's tanker returns from the fill site and offloads its water. This was the first tanker to return.

LincolnVille B2 Offloads

More water arrives just in time to support the higher flow rate.

Drains

Drains are best positioned by tying them up on the inside of the tank – this reduces the leakage problem shown above.

Dump Site Operations

Lehigh Engine 2's front-mounted 750 gpm pump gets a workout drafting and pumping to the jet siphons and the portable monitor.

Dump Site Expands

The dump site crews expand to a three-dump tank operation. They are shown above deploying Tanker 613's 3,000 gallon dump tank.

Jet Siphons

Another jet siphon is set up to transfer water from the third tank. The ladder is used to support the hose while keeping the tanks a bit farther apart.

Jet Siphon

This photo shows what a jet siphon stream is supposed to look like. When the stream is solid, full flow is being achieved.

Dump Site Operations

The three tanks are adequately spaced out to support the large tankers and to allow two tankers to dump simultaneously if needed.

Dump Site Operations

Ramona's engine was going to draft and run jet siphons but a decision was made to use the engine to haul water instead – this decision proved useful.

Dump Site Operations

With three tanks set up, the operation begins to stabilize. However, the primary suction hose still remains a bit problematic in that the strainer keeps wanting to flip over.

Pump and Run

Lehigh's Engine 1 pumps off its 500 gallons of water through 3-inch hose allowing it to stay out of the way of the tankers.

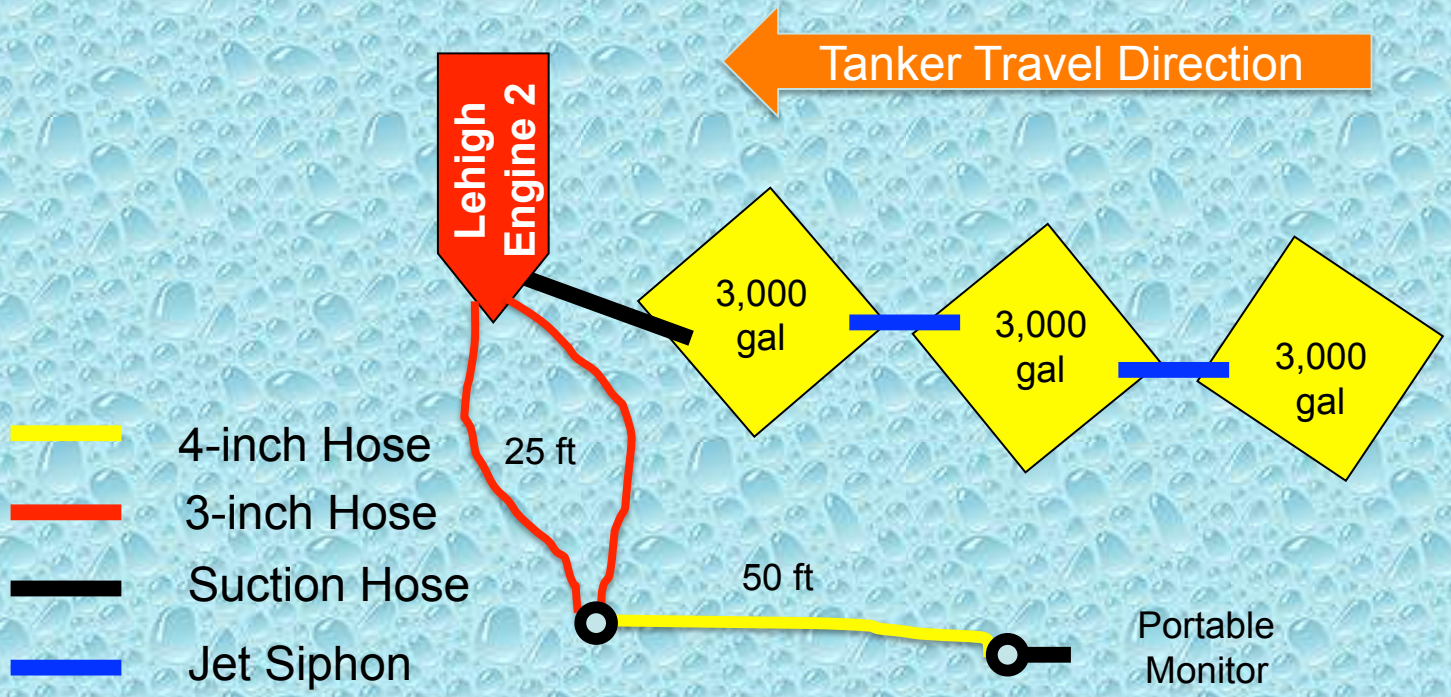
Things Get Tight!

What is missing in the photo above? Tankers! The time came when no tankers were in line waiting to dump. This situation is one indicator of exceeding the capacity of the shuttle.

Two Tankers Arrive

Fortunately, within about 3 minutes, two tankers and an engine arrive in time to keep the water flowing.

Dump Site Layout



The Fill Sites

- Marion County Lake has a “loop” road that runs along the perimeter of the lake area.
- There are numerous locations along this road where tanker fill sites can be established.
- For this drill – two sites were used – one at the dam’s spillway and one near The Whistle Cove.
- Because the perimeter road was used as the primary travel route for the shuttle, both fill sites had a 3-mile round trip – however, the spillway site was set up first.

Spillway Fill Site

This fill site was located near the dam's spillway and near a boat ramp. Lincolnville's Engine 1 (1,500 gpm) was assigned as the fill site engine.

Spillway Fill Site

Engine 1's operator is practicing good drafting principles by using a discharge as a recirculation line in order to maintain a prime.

Spillway Fill Site

The tanker fill station was comprised of a LDH manifold fed by a 4-inch supply line. Two, 50-ft long, 3-inch fill lines were used to connect to the tankers and they were trimmed-out with cam-lock fittings.

Spillway Fill Site

Solomon's tanker is shown above being filled at the Spillway Fill Site. This tanker uses check valves in its fill lines instead of gated valves.

Cove Fill Site

Marion's FD3 (750 gpm) established a second fill site about 20-minutes into the drill. The pumper's front mounted pump made accessing the draft site rather easy.

Cove Fill Site

Marion's operator added a "pony" section of suction hose (2-1/2-inch) and was able to improve the capacity of the 750 gpm pump. This helped bring the fill site closer to the desired 1,000 gpm fill rate. In addition, cam-lock fittings were used when making tanker connections.

Cove Fill Site

Ramona's BT3 is shown above getting filled at the Cove Fill Site. The 3-inch line proved worthy of filling the tanker's 1,700-gallon tank.

Cove Fill Site

Lincolnville's "deuce and a half" gets filled at the Cove Fill Site. The draft pumper was using a 50-ft section of 3-inch hose – so that friction loss could be kept to a minimum. However, a section of 4-inch hose would have worked better!

The Results

- The drill was stopped after 2 hours.
- Water flow was interrupted three times during the drill – but each time, the problem was corrected by quick thinking crews and flow was restarted.
- An estimated total of 40,840 gallons were moved during the 102-minute event resulting in an ***average flow of 400 gpm***. (No water was moved for the first 7.8 minutes during set-up and then water was lost for a total of 10.15 -minutes in the first half of the drill)

Lessons Learned

- Four water hauling rigs and five pumpers were used to deliver the 400 gpm for the duration of this drill – once again emphasizing the need to call for help early in an incident.
- The first 5 to 10 minutes of the operation are critical when establishing that initial flow – crews have to be ready and equipped to problem-solve issues that arise..

Lessons Learned

- Departments should drill on setting up initial water supply operations in 5-minutes or less.
- Transferring operations from onboard (booster) tank water to drafting generally requires some type of control valve mechanism on the suction side of the pump. (Keystone valve, MIV, etc).
- All size tankers can contribute to the overall delivery rate – some will just be more efficient in the process than others.

Lessons Learned

- 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.
- 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.

Summary

- The drill was a success. It showed the value of equipment interoperability and revealed that 400 gpm is a reasonable goal for the resources that were used.
- Many thanks to the Marion County Fire District #5 for sponsoring the program and to all of the fire departments that provided support to the seminar.

www.GotBigWater.com

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