Seneca County, New York

Rural Water Supply Operations Seminar & Drill

Tanker Shuttle Drill
April 5, 2009
Summary Report

Overview

- In April of 2009, the Seneca County, New York, Office of Emergency Services sponsored a 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 Seneca County to practice and improve water supply operations.
- This presentation is a summary of the tanker shuttle drill that was part of the seminar.

The Purpose

- The purpose of the rural water supply seminar was two-fold. First, the folks in Seneca County wanted a “refresher” on rural water supply operations and the opportunity to work together in a training environment.
- Second, the folks wanted an opportunity to refine their ability to run a tanker shuttle and operate a dump site.

The Seminar

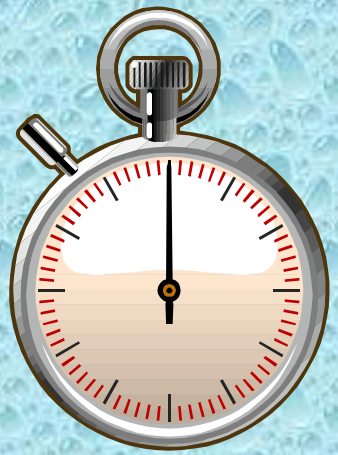
- In order to prepare for the tanker shuttle drill, participants attended a 6-hour refresher seminar on April 4th to review the basics of rural water supply operations.
- The seminar was held at the Romulus Fire Department located in Romulus, New York.
- Seminar topics included the history of rural water supply, types of water hauling vehicles, dump site operations, fill-site operations, tanker shuttle operations, and drafting.

The Drill

- The tanker shuttle drill was held on April 5, 2009, in Ovid 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!

Seneca County Drill Participants

The participants for the drill were from 13 different fire departments and the apparatus was representative of the type of water supply support that would respond to a fire in Seneca County.

Drill Participants

- Ovid Engine 1104
  - 1000 gpm pump w/1500 gal tank

- Ovid Quint 1131
  - 1500 gpm pump w/500 gal tank

Drill Participants

- Ovid Rescue Engine 1141
  - 1250 gpm pump w/500 gal tank

- Fayette Engine 403
  - 1500 gpm pump w/1000 gal tank

Drill Participants

- Fayette Tanker 421
  - 2400 gal tank w/400 gpm portable pump

- Lodi Tanker 821
  - 1500 gal tank w/500 gpm pump

Drill Participants

- Romulus Tanker 1321
  - 3000 gal tank w/250 gpm portable pump

- Varick Engine 1504
  - 1500 gpm pump w/2000 gal tank

Drill Participants

- Varick Rescue 1544
  - 375 gpm pump w/300 gal tank

- Varick Engine 1502
  - 1,000 gpm pump w/1500 gal tank

Drill Participants

- Border City Tanker 221
  - 3000 gal tank w/750 gpm pump
- Bellona Tanker 14
  - 3000 gal tank

Drill Participants

- Waterloo Tanker 1621
  - 2000 gal tank w/ 500 gpm pump

- Port Byron Tanker Pumper 1
  - 1500 gpm pump w/1500 gal tank

Drill Participants

- Canoga Tanker 321
  - 2000 gal tank w/250 gpm pump

The Drill Begins

The South Seneca High School in downtown Ovid, NY was chosen as the target hazard. With all personnel and apparatus staged at the Ovid firehouse, the drill commenced. Two engines, a quint, and three tankers were dispatched simulating a 1st alarm structure fire response. Ovid Quint 1131 is shown above arriving on the scene and getting set up.

Supply Engine Arrives

Fayette Engine 403 arrives and starts to set up as the dump site engine.

Crews Continue Setting Up

Fayette and Ovid crews work feverously to get the water supply set up before the 5-minute mark arrives. A 5-inch supply line is used to supply the quint.

1st Tanker Arrives

Romulus Tanker 1321 arrives on the scene and dumps its 3000 gallons into a 2500-gallon dump tank – or “portable pond” as they say in Seneca County. Chief Bill Palmer (Ovid FD) assumes the role of Incident Commander.

More Help Arrives

Around the 4-minute mark, Ovid Engine 1104 arrives and dumps its 1500 gallons. The crews grab the engine's dump tank and set-up it also.

Flow Measurement

Flow measurement for the drill was done through the use of the 1250 gpm nozzle on Quint 1131 and the recently calibrated flow meter on the rig's pedestal control panel.

250 gpm Flows at 7:14 minutes

Unfortunately, water did not start flowing until 7:14 minutes – it should have started at 5:00 minutes. The dump site engine was ready to flow water and the quint was ready to receive it – however, it just didn't happen due to a little bit of human error and miscommunication – kind of like a real fire scene.

Dump Site Engine

With operations underway, 250 gpm is an easy job for Fayette's recently acquired 1500 gpm engine.

Dump Site Operations

With water now flowing, crews begin working to expand the dump site so that the flow can be increased to 500 gpm at the 15-minute mark.

Dump Site Set-up

With three dump tanks now set up, jet siphons are needed so that water can be transferred to the primary drafting tank. A homemade PVC jet siphon is shown above being placed into operation.

Water Transfer Operations

With water now flowing, the transfer of water between tanks is critical to success. The PVC jet siphon appears to be working quite well.

Flow Moves to 500 gpm

At the 15:15-minute mark and with three dump tanks in operation, the flow is moved to 500 gpm with the plan to sustain that flow for the remainder of the drill.

Tanker Task Force Arrives

Additional tankers were grouped into Tanker Task Forces comprised of 3 tankers and an engine. In the photo above, a tanker from the first tanker task force is shown arriving.

Water Supply Officer

At the 16:10 minute mark, Command assigned a Water Supply Officer to coordinate the operation.

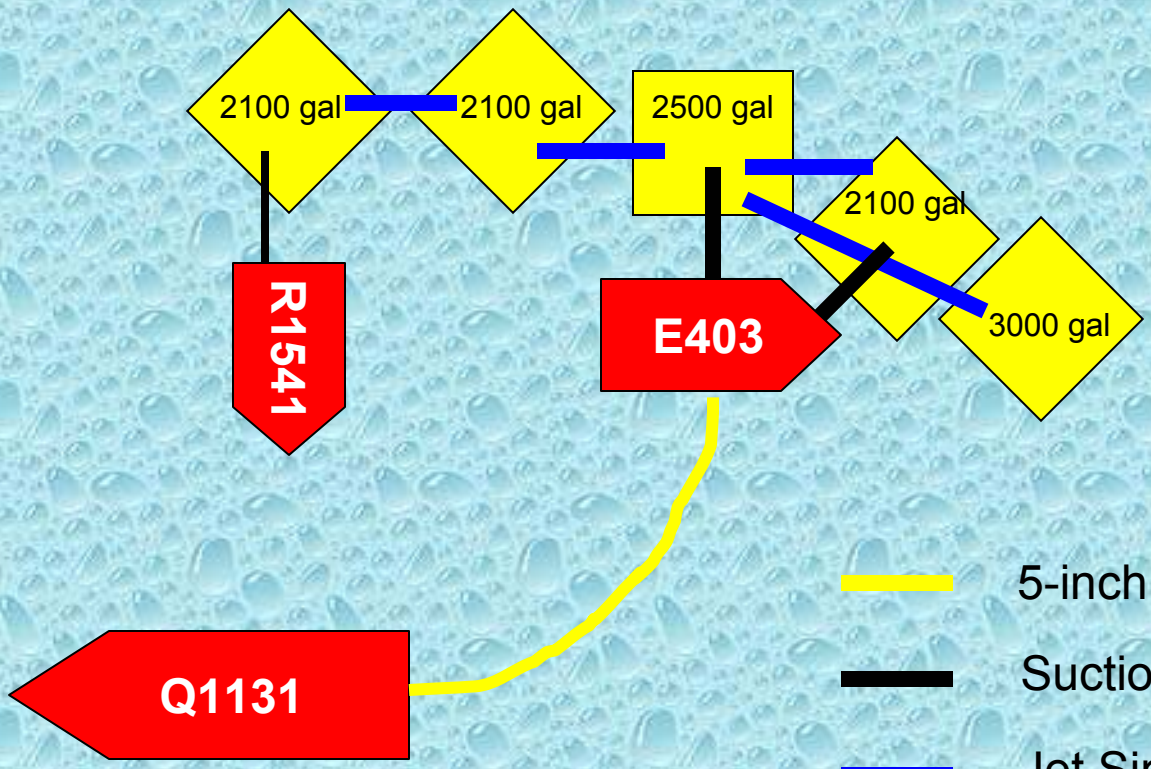
2nd Tanker Task Force

At 16:30-minutes, the 2nd Tanker Task Force is dispatched and the engine on the Task Force heads towards a hydrant in town to set up a secondary fill site.

Five Dump Tanks in Use

With more tankers arriving, the dump site is expanded to a five dump tank operation.

Dump Tank Layout



1st Tanker Returns

At the 32:10 minute mark, Romulus Tanker 1321 returns from the fill site. Tanker 1321 was the first tanker to dump in the shuttle operation and there were no tankers waiting to dump when Tanker 1321 returned to the dump site – so this was a critical point in the drill's timeline of events. Water was pumped from the five dump tanks while crews waited on the return of Tanker 1321.

Water Transfer Operations

Varick Rescue 1544 is shown above being used to run two of the jet siphons. The unit established its own draft and pumped the jet siphons which allowed the dump site engine to dedicate all of its pumping capacity for supplying the quint.

Homemade Jet Siphon

This homemade jet siphon consists of a section of 6-inch PVC pipe and a section of 1-inch steel pipe. Using this style of jet siphon can free up suction hose for other uses in a tanker shuttle operation.

Homemade Jet Siphon

An attempt was made to pitot the 6-inch PVC pipe to see if the flow could be measured. Unfortunately, no reading could be obtained. However, for reference, 1 psi from a 6-inch opening equals 1069 gpm using Freeman's formula for flow from a smooth bore nozzle/opening!!!

Water Transfer Operations

If needed, a 90-degree elbow attachment can be used on the 6-inch PVC jet siphons to help direct water discharge.

Water Transfer Operations

At the other end of the five tank arrangement, traditional suction hose jet siphon operations are used. In the photo on the right, a roof ladder is used to span the corners of three tanks so that water only has to be transferred once from the farthest tank (red).

Water Transfer Operations

In communities that depend entirely on rural water supply operations, fire trucks can never carry too much suction hose. The photo above illustrates why.

Tanker Shuttle in Operation

With the dump site set-up completed, tanker dumping operations begin to flow quite smoothly.

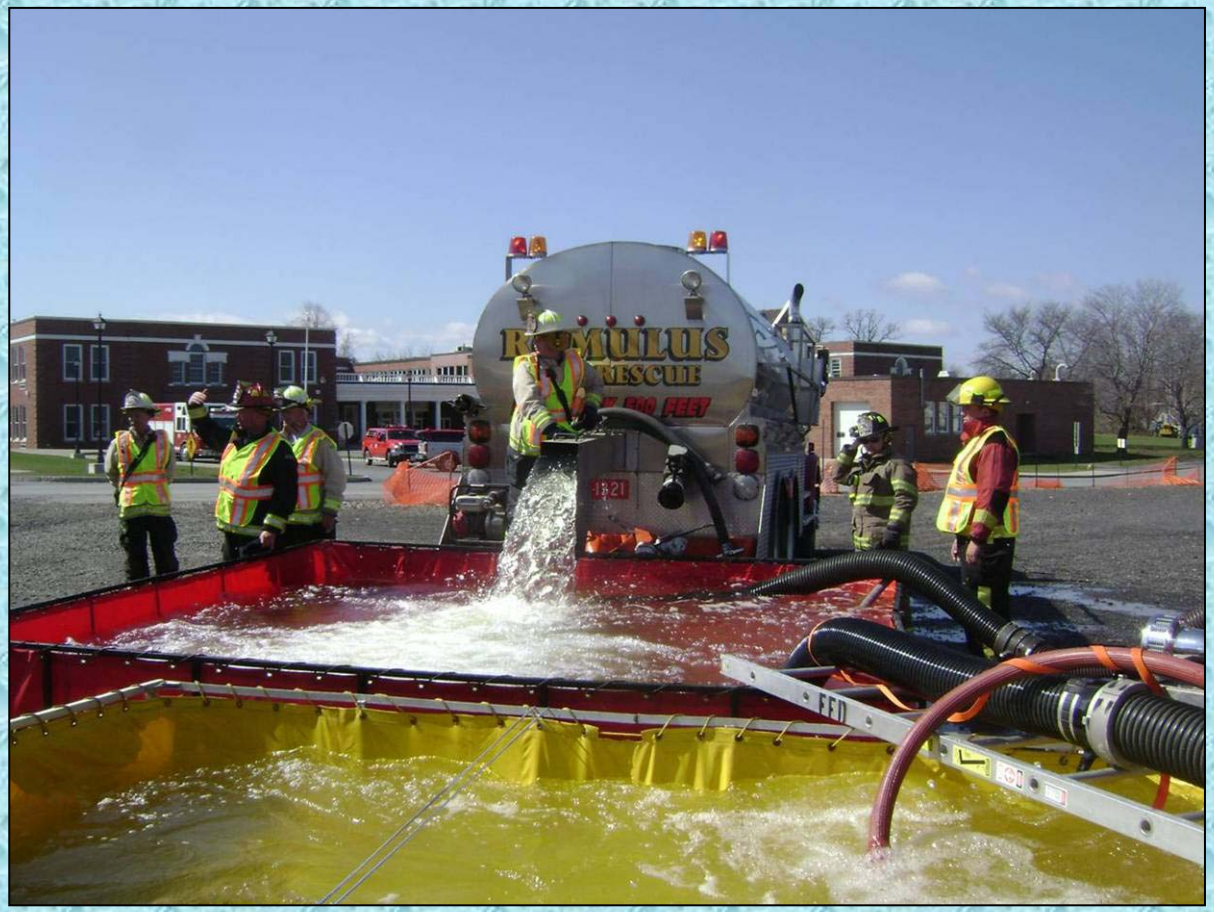
Flow is Increased Again

About halfway through the drill, crews wanted more of a challenge so the flow was increased to 1,000 gpm

Dump Site is Challenged

With the flow now at 1000 gpm, the dump site crews have to “be on their toes” in order to keep the water transfer operations going.

Dump Site Operations



The dump site crews did a fine job of transferring water and keeping the dump tanks full.

Multiple Tankers Dumping

The 5-dump tank arrangement allowed space for multiple tankers to position themselves for offloading their water. However, it is important to note that the dump site was located in the high school parking lot which provided plenty of space for tanker maneuvering.

The Fill Sites

- Two fill sites were used for the drill; a dry hydrant at a local pond and a traditional fire hydrant in the Town of Ovid.
- The dry hydrant at the pond was the initial fill site and was supported by Ovid Engine 1101, a 1,250 gpm pumper. This fill site provided a 6.2-mile round trip for rigs hauling water.
- The traditional fire hydrant was supported by Varick Engine 1504, a 1,500 gpm pumper. This fill site provided a 1.4-mile round trip.

South Town Building Road Fill Site

This recently installed dry hydrant at a local pond was used as the initial fill site for the drill. The dry hydrant was constructed using 8-inch PVC pipe reduced down to 6-inch PVC pipe with a 6-inch suction head.

South Town Building Road Fill Site

Ovid Rescue Engine 1141 (1250 gpm) with a crew of two persons arrives on the scene at the dry hydrant and begins setting up for fill-site operations.

2-Person Crew Sets Up Fill Site

One person and a step-ladder helped make the suction hose connection: this is rather ingenious. The ladder is carried on the rescue engine and was used here to help hold the hose in the correct position so one person could thread on the coupling.

Getting Ready to Fill Tankers

The driver of Rescue Engine 1141 works to complete the set-up so that tankers can be filled. The operation had to be ready for the first tanker as soon as it arrived.

1st Tanker Arrives

Romulus Tanker 1321 was the first tanker to arrive and the crews had to use a section of 3-inch hose to fill it because they did not have an LDH line ready to go. This first fill time was a bit slow but the switch to LDH soon made a difference.

LDH Manifold Used to Fill

The fill site crews worked quickly to get a 5-inch fill line in place. A LDH manifold is shown here being used to control the flow of water into the tanker. The manifold is reversed so that the 2-1/2" outlet can be used to drain/bleed off pressure.

5-inch Hose Used for Filling

With a 5-inch fill hose now in operation, tankers are filled very quickly – thus allowing them to get back to hauling water over this 6.2-mile route.

Both 4-inch & 5-inch Being Used

As operations progress, Rescue Engine 1141 establishes a 2nd fill line using 4-inch hose. This allows one tanker to be filled while a second tanker gets connected and stands ready.

Ovid Fire Hydrant Fill Site

Varick Engine 1503 (1500 gpm/2000 gal) was part of the 1st Tanker Task Force and responded to a fire hydrant in Ovid to set-up a second, tanker fill site. Because the hydrant had a flow less than 800 gpm, a 2,100-gallon portable tank was used to facilitate the tanker loading operation.

Ovid Fire Hydrant Fill Site

A control valve is placed on the hydrant and a hard suction hose is connected to the valve. The hydrant is turned on and the valve is turned off and only opened when needed to keep the portable tank full.

Ovid Fire Hydrant Fill Site

Engine 1503 uses its rear suction to draft from the portable tank and then pumps a 5-inch hose to a jumbo wye.

Ovid Fire Hydrant Fill Site

Above, fill-site personnel connect the fill line hose to a tanker in preparation for loading. The use of LDH allows the tanker to get back to hauling water on the 1.4-mile loop sooner.

Ovid Fire Hydrant Fill Site

The operator of Engine 1503 uses the 2,000 gallons from his onboard tank and the 2,100 gallons from the portable tank to fill tankers as they arrive at the site.

Ovid Fire Hydrant Fill Site

When filling operations begin, one person operates the hydrant valve with the responsibility of keeping the dump tank as full as possible. Doing this allows the engine to fill tankers at a rate of 1,000 gpm even though the hydrant supports only about 800 gpm.

The Results

- The drill ran a full 2-hours and the shuttle operation “stabilized” at 500 gpm at around the 32:00 minute point when the first tanker to dump (Romulus) returned from the fill site ready to dump again. Fortunately, the dump site had plenty of water “on the ground” in storage while awaiting the return of that first tanker.
- ***Water flow was never interrupted at the quint***, however, the 250 gpm flow was late getting started (7:14 minute mark). Some miscommunication and human error caused the delay in initial flow. Unfortunately – had this been a true ISO evaluation, the operation would have been considered a failure. Fortunately – it was a drill and it was considered a success because learning occurred.
- Approximately 83,380 total gallons were moved during the 112:46 minute event (the first 7:14 minutes no water was moved) resulting in an ***average flow of 739 gpm***. However, this rate was really only achieved in the 2nd half of the drill.

Lessons Learned

- Ten water hauling rigs, three engines, one quint, and a whole bunch of people were used to deliver the 739 gpm in this drill – emphasizing the need to call for help early at a real fire.
- When calling for help, call for it in bundles or clusters. Many jurisdictions have been successful in the use of the Tanker Task Force concept - regardless of differences in local SOPs for fire fighting operations.

Lessons Learned

- When setting up an elevated master stream as the first water flow device in an ISO drill, one must consider the vehicle's set-up time needed for aerial operations.
- Most folks who are successful in the ISO 2-hour drill lead off with a 250-gpm handline or portable monitor and then transition to an elevated master stream if needed. Using this approach allows almost 15-minutes for aerial device set-up.

Lessons Learned

- When setting up multiple dump tanks – take into consideration the layout and the need to accommodate both rear and side offloading tankers.
- Side dumps in addition to rear dumps provide greater flexibility in tanker offloading operations.

Lessons Learned

- Designating a Water Supply Officer early in an incident generally helps make operations go smoother because the Incident Commander is freed up to handle his or her other duties.
- The use of jet siphons improves the transfer of water between dump tanks and dedicating one person to operate the jet siphons generally makes the process function better.

Lessons Learned

- Jet siphons consume pump capacity; consider using a separate pumper to run jet siphons when attempting flows approaching 1000 gpm. The Varick rescue unit worked out great at this drill – it pumped two jet siphons.
- 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 identified a couple of areas where improvement can be made. It also showed that smaller tankers can certainly be successful in moving water when they can dump and fill fast.
- Many thanks to the Seneca County Office of Emergency Services for sponsoring the program and to all of the fire departments who provided support to the seminar.

www.GotBigWater.com

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