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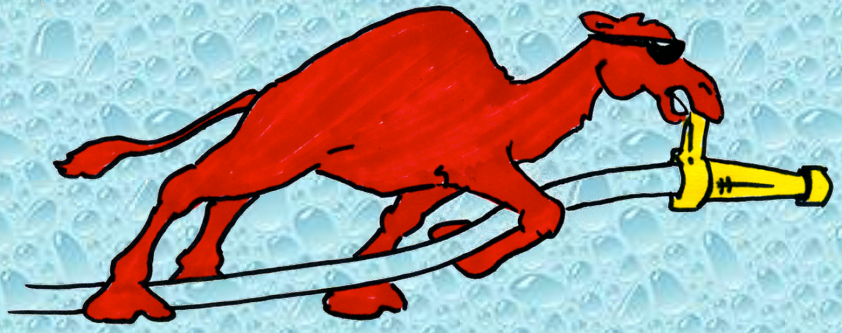


Cold River Area Fire Chief's Association

&

The New Hampshire Fire Academy

Lempster, New Hampshire

Rural Water Supply Operations Seminar

2-hr Water Supply Drill – April 15, 2012

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 drill also allowed mutual aid companies to work together in a real-life training situation.

The Seminar

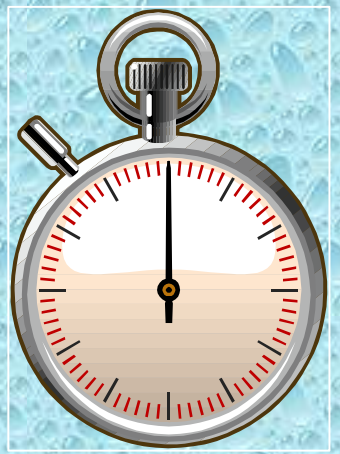
- The seminar started with a 6-hour session to review the basics of rural water supply operations.
- The review session was held at the Goshen-Lempster Co-Op School located in Lempster, New Hampshire.
- Seminar topics included the history of rural water supply, tanker construction, dump site operations, fill-site operations, tanker shuttle operations, and drafting.
- Seminar participants were from the Cold River Area.

The 2-hour Water Supply Drill

- The tanker shuttle drill was held at the Goshen-Lempster Co-Op School on April 15, 2012.
- 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

- The ISO 2-hour Water Supply Delivery Test has three critical time segments:
  - 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 seventeen different fire departments in the Cold River Area. The water hauling apparatus was representative of the type of water supply support that would respond to a structure fire in the Southwestern New Hampshire District Fire Mutual Aid.*

Drill Participants

- Lempster 76 Engine 2
  - 1,250 gpm pump w/1,000 gal tank
- Lempster 76 Tanker 1
  - 500 gpm pump w/1,800 gal tank

Drill Participants

- Marlow 21 Engine 1
  - 1,250 gpm pump w/1,000 gal tank
- Goshen 77 Engine 1
  - 1,000 gpm pump w/1,500 gal tank

Drill Participants

- Goshen 77 Engine 2
  - 1,250 gpm pump w/1,000 gal tank
- Gilsum 12 Tanker 1
  - 250 gpm pump w/1,500 gal tank

Drill Participants

- North Walpole 45 Engine 2
  - 1,500 gpm pump w/1,000 gal tank
- Newport Engine 2
  - 1,500 gpm pump w/1,800 gal tank

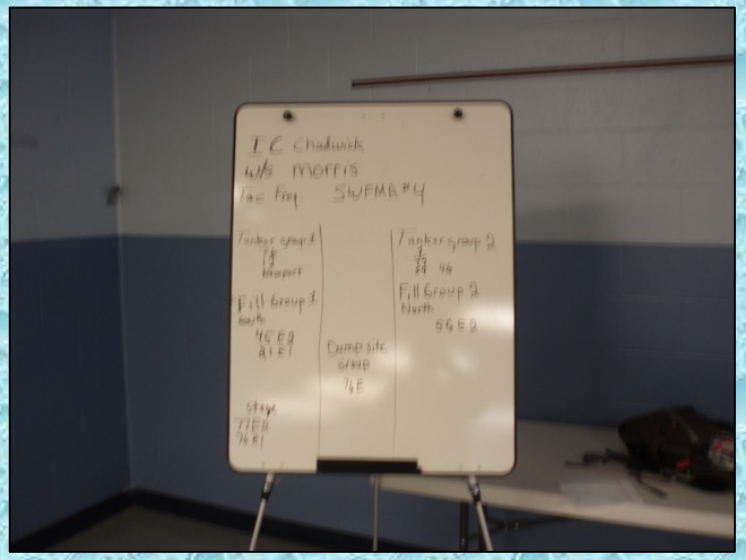
Drill Participants

- Alstead 1 Tanker 1
  - 500 gpm pump w/3,000 gal tank
- Charlestown 54 Tanker 1
  - 500 gpm pump w/1,800 gal tank

Drill Participants

- Claremont 56 Engine 2
  - 1,500 gpm pump w/1,000 gal tank
- Acworth 46 Engine 1
  - 1,250 gpm pump w/1,500 gal tank

Preparation



Units began the drill at the Goshen-Lempster School where a briefing was given by AC Ted Tillson of the Lempster FD. Crews then boarded their rigs and waited for the dispatch of the event.

The Drill Begins

With everyone ready, the drill was started. Lempster 76 Engine 2 was first to arrive with Lempster 76 Tanker 1 not too far behind. When 76 Engine 2's driver brought the rig to a stop, the timer was started.

The Drill Begins

The four person engine crew went to work stretching hose in preparation to start flowing water. A 4-inch line was stretched to support a flow measuring device that was used in lieu of a nozzle for more accurate flow measurement.

Nurse Tanker or No Nurse Tanker?

76 Engine 2 had laid out about 300-ft of 4-inch supply line from the planned dump site area. When the Lempster tanker was the next arriving unit, a decision had to be made to either operate it as a nurse tanker or to begin setting up a dump tank. The dump tank set-up was chosen.

Thinking Ahead

Realizing that the single, rear discharge on the pumper might not support the higher flows that were expected, the engine crew took time to use two smaller lines from individual discharges in hopes of being able to hit the 1,000 gpm flow mark without incident.

Dump Site Operations

A 2-way gated valve was used and was supply by a 50-ft length of 2-1/2” hose and a 50-ft length of 3-inch hose – both supplied by 2-1/2” discharges on the pumper.

Water Flow Starts

At the 5:00-minute mark, a flow of 280 gpm was started through the flow measuring device. An attendant was assigned to monitor flow readings.

Dump Site Set-up

With no nurse tanker operation in place – the crews really hustled to get that first dump tank (2,000 gallons) set up. At the 6:24-minute mark, water was being dumped into the tank. However, note that the pumper is not yet ready to draft. This was a bit of a problem.

Dump Site Set-up

The race is on to get the dump site pumper in operation drafting from the dump tank.

Dump Site in Operation

The crew did a great job of working together to overcome some minor problems and drafting operations were soon under way.

Dump Site Operations

With the arrival of additional tankers, the dump site grew with the deployment of a second dump tank (1,500 gallons).

Dump Site Operations

Water flow still hadn't stabilized and Newport's tanker was needed to dump its load of water directly into the primary dump tank.

A Problem Arises

While setting up for jet siphon operations in the second dump tank, the issue of thread type arose. Seems that the 1-1-/2-inch hose had pipe thread and the jet siphon had National Standard thread – thus an adaptor was needed – which of course took some time to locate.

3rd Dump Tank

Knowing that they wanted to eventually expand the flow, a third dump tank (2,100 gallons) was deployed.

Dump Site Operations

With still just two dump tanks in operation, Alstead's tanker has to dump into the primary drafting tank while jet siphons are set up.

Dump Tank Drains

Dump tank drains can create an unnecessary mess when they are not properly secured. A dump site is a wet place to begin with and anything that can be done to reduce more spilled water is a great help. One choice is to tie up the drains on the inside of the tank instead of on the outside as shown above.

Dump Site Operations

Ahhh…the right adaptor was found and the first jet siphon was ready to go – just waiting on some water in the dump tank.

Dump Site Operations

The third dump tank has water in it and awaits a transfer device. Probably not the best scenario because this water is "trapped" until a jet siphon is put into operation.

Water Transfer Operations

Acworth's tanker dumps its water into the second dump tank now that a jet siphon is ready and in position.

Water Transfer Operations

A second jet siphon is assembled and placed in the third dump tank. Water transfer operations are ready to begin from the 3rd dump tank.

Water Transfer Operations

The jet siphon on the 4-1/2-inch suction hose is working just fine as a water transfer device.

Water Transfer Operations

The 6-inch jet siphon from the 2nd dump tank is also working just fine in transferring water.

Water Flow Increased

At the 28:00 minute mark, flow was increased to 504 gpm.

Dump Site Operations

This photo depicts an interesting observation. Flow has moved to 500 gpm and there are no tankers waiting in line to dump their water. A problem perhaps?

Dump Site Operations

Fortunately, another tanker arrived in a short period of time before water was exhausted.

Dump Site Operations

When water flow from a dump chute reaches this level it is time to “cut and run”. Efficiency is only going to drop if folks wait for all of the water to offload.

Dump Site Operations

When both rear and side dumping tankers are involved in a shuttle operation, it is best to make arrangements for the rear dumping tankers to offload their water in a position where they don't block out side dumping tankers. Goshen's 77 Engine 1 is shown here dumping in the last dump tank – thus leaving room for side dumping tankers to pass on the left.

Dump Site Operations

When having to use a detachable chute for offloading, one choice is to just leave the chute at the dump site rather than using up valuable time stowing it back on the tanker.

Dump Site Operations

Being supplied through both a 4-inch and a 2-1/2- inch supply line, the attack engine moves the flow to 825 gpm at around the 48:00 minute mark.

Increasing Pump Capacity

In order to increase the pumping capacity of the 1,250 gpm supply pumper, the crew added an additional suction. By adding in the 2-1/2-inch suction the pumper was able to improve its pump capacity and operate the two jet siphons without jeopardizing the flow to the attack engine.

Dump Site Operations

One issue that arose was the transition to tankers offloading off of their rear dumps. Somehow, one tanker backed up to dump and then others soon followed. While not a huge issue, it did result in reduced efficiency and created more issues with trying to sustain the flow.

A 4th Dump Tank

A fourth dump tank (1500 gallons) was deployed around the 56:00-minute mark with intentions of increasing flow once again.

Dump Site Operations

With the flow now much higher, tankers were needed to dump the moment that they arrived at the dump site.

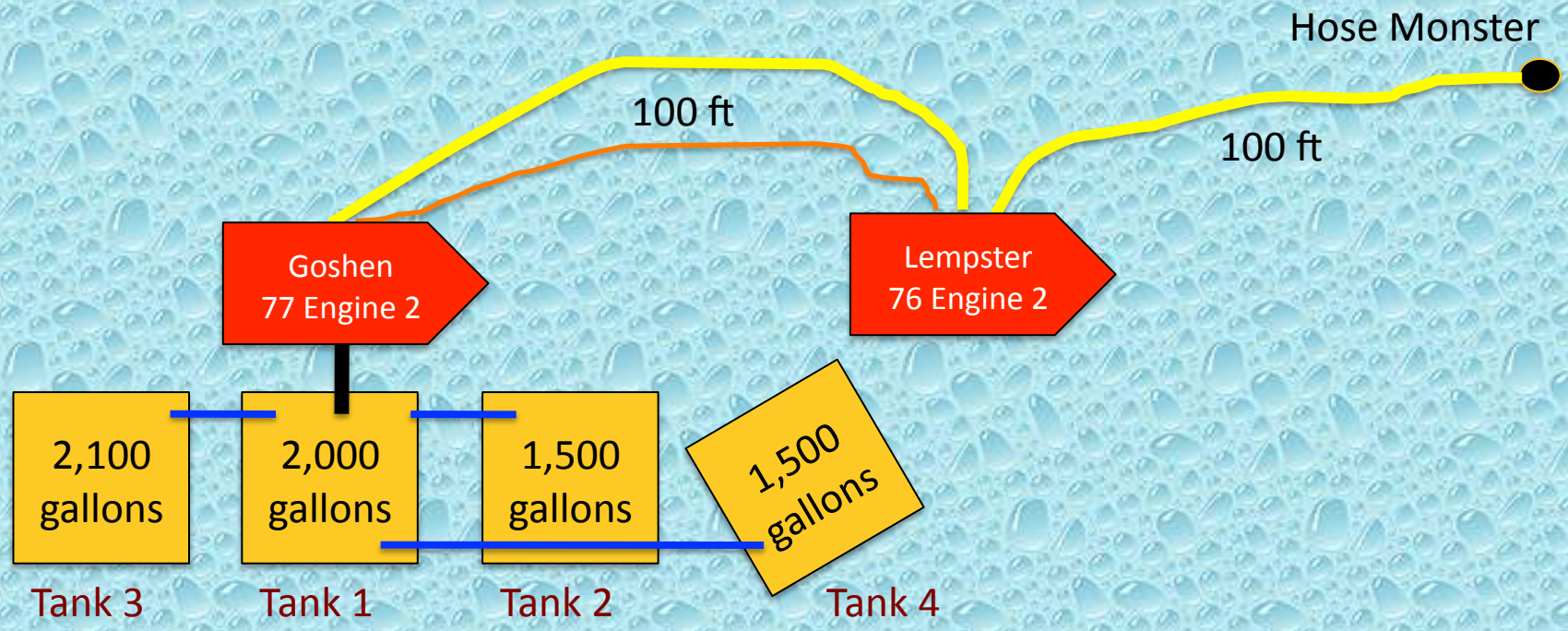
Dump Site Operations

Even the smaller, older tankers like this one (1952) made a difference in terms of supporting the flow. The key to success is learning how to best utilize these types of rigs in a water hauling operation.

Dump Site Operations

A 250 gpm portable pump was used to run the jet siphon for the 4th dump tank. However, the 4th tank was never really used much because water was almost always needed in the primary dump tank. This was a sign that the operation had maximized the capability of the water hauling rigs and that in order to move to a higher flow – more tankers or improved filling operations would be needed.

Dump Site Layout



The Fill Sites

- For this drill – three fill sites were used.
- One site was a brook that provided a 3-mile round trip for the units hauling water.
- The brook provided adequate water volume to support the drill and access was not a problem.
- A single, 1,500 gpm pumper was used at the brook to support the tanker fill station.

The Fill Sites

- The other two fill sites were co-located at Dodge Pond – which was south of the drill site.
- The pond provided ample water to support two, tanker fill stations and provided a 4-mile round trip for the units hauling water.
- A 1,250 gpm and a 1,500 gpm pumper were used at the pond.

Pond Fill Site

Marlow 21 Engine 1

Lempster 76 Tanker 1

A large pond (Dodge Pond), equipped with a dry fire hydrant, was used as a fill site for this drill. As happens sometimes in real life, a tanker arrived at about the same time as the fill site pumper. A point worth noting here is that if the tanker had been a vacuum tanker, it could have self-loaded and been on its way back to the dump site by the time the fill site pumper got set up.

Pond Fill Site

Marlow 21 Engine 1 (1,250 gpm) pulled into position near the dry fire hydrant and the crew went to work setting up a tanker loading station.

Pond Fill Site

The Marlow crew elected not to use the dry hydrant because of some previous problems with the hydrant. So they set up to draft directly from the pond.

Pond Fill Site

Meanwhile, the Lempster tanker crew helped set-up the tanker fill hose and got their rig into position for loading as soon as the Marlow pumper achieved a draft.

Pond Fill Site

The final connection was made and the pumper quickly picked up the draft.

Pond Fill Site

With the fill site now operational, the tanker was filled quickly using a 4-inch hose line.

Pond Fill Site

A little bit unorthodox but it worked. The Marlow crew decided to use the dry fire hydrant as their drafting circulation line. They found enough fittings and adaptors and pumped back into the dry hydrant – which actually did a nice job of flushing it out. One word of caution – this dry fire hydrant was constructed of steel pipe, and thus, pressurizing the pipe was not an issue. Crews would have to have been more careful pressurizing plastic pipe.

Pond Fill Site

North Walpole 45 Engine 2 (1,500 gpm) set-up a tanker fill site on the other side of the pond at a boat launch area.

Pond Fill Site

Because the water level was shallow near the shore, 30-feet of suction hose was needed to get the strainer into a proper location.

Pond Fill Site

The crew used an LDH manifold to set up a variety of fill lines in order to accommodate the variety of tanker fill connections.

Brook Fill Site

Claremont 56 Engine 2 (1,500 gpm) established a tanker fill site at a brook.

Brook Fill Site

The two-person crew did a nice job of getting the site set-up and equipped to fill tankers. A 4-inch hose line was used as the tanker fill line.

Using Your Head?

While the brook had plenty of water, the pumper was a little short on suction hose causing the barrel strainer to be right at its point of effective use. At high flow, a vortex would start. To remedy the situation, the crew used a hard as a vortex inhibitor – it worked just fine!

Brook Fill Site

One issue that arose at this fill site was the need for adaptors and fittings because many of the tankers did not use the same fitting – which slowed down the tanker fill process.

Brook Fill Site

Another item that would have helped would have been the use of an LDH manifold or control valve so that the pump operator did not have to control the fill. However, the site was filling tankers at around 900 gpm.

Waiting in Line for Water

Another issue that actually affected the overall flow rate of the shuttle was the waiting in line to fill at this fill site while the pond site had no one waiting in line. Once the distribution of tankers to fill sites was corrected, flow sustainability was significantly improved.

The Results

- The drill was stopped at the 2:15-hour mark.
- Water flow was interrupted a number of times during the drill – each time due to just a simple error.
- 39,068 gallons of water were flowed through the attack engine during the drill producing an average flow rate of 529 gpm during the 74-minutes that water was flowing.

The Lessons Learned

- If the nurse tanker mode of operation is not going to be used, then crews need to be very proficient at setting up the first dump tank. At this drill, there was a delay in deciding what to do with the first tanker.
- The first arriving tanker was equipped with a 500 gpm but the decision was to move directly to a dump tank operation. The decision was bit delayed which resulted in the attack pumper running out of water after about 3-1/2-minutes.

The Lessons Learned

- Had the first tanker set up to pump its water to the attack engine, then additional time would have been gained to set up the dump tank.
- As it was, the dump tank set up was hurried and a couple simple errors resulted in a delay in obtaining a draft and thus, the attack engine losing water.

The Lessons Learned

- Interoperability is important at a large, water hauling event. At this drill, there was a problem with thread types and that delayed the ability to get a second dump tank up and running. Once the adaptor was located, the water transfer process went very smooth. But locating that adaptor consumed valuable time.
- A tanker fill-site needs to run like a NASCAR pit stop. Anything that slows down the loading of tankers is going to reduce the efficiency of the tanker shuttle. At this drill, tanker fill connections varied and fill times were slowed while crews worked to make the right connection.

The Lessons Learned

- Tankers should be outfitted with quick-connect devices on their direct fill lines and rural pumpers should carry additional quick-connect devices for use at tanker fill sites.
- When using LDH without a high-flow discharge, take the time to combine (or manifold) multiple small lines into the LDH as opposed to connecting the LDH to a 2-1/2-inch outlet. At low flow rates, the small outlet will work, but as flows reach pump capacity, flow restriction will occur and changing hose layouts may not be able to be done without shutting down pumping operations – so plan ahead!

The Lessons Learned

- Jet siphons, suction hose, and dump tanks are needed at most every dump tank operation – therefore, it is wise to carry those items on every tanker.
- The "bundling" of water hauling mutual aid resources has proven successful in many drills. The tanker task force concept is an effective process for requesting and using additional rural water supply resources.

The Lessons Learned

- Tankers should be marked on all four sides with their unit numbers. When operating at large, mutual aid incidents, group supervisors and command staff may not recognize a tanker – so identification markings are important.
- The distribution of tankers going to the various fill sites needs to be closely monitored so that any one site does not get overloaded. The brook fill site got overloaded at this drill which really impacted the ability to sustain water flow at the dump site.
- Radio communications are critical and water supply operations should be handled on a separate tactical channel.

Summary

- The drill was a success. For the new folks, they got to see how dump tank operations work.
- 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.
- Many thanks to the Cold River Area Fire Chief's Association and the New Hampshire Fire Academy for sponsoring and hosting this seminar.

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