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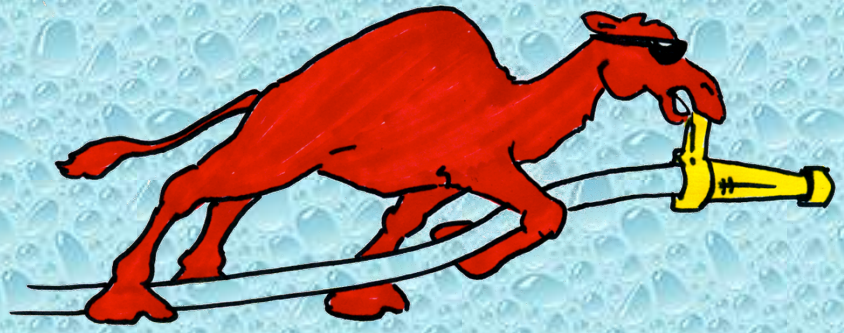


Stanley Fire Department
Stanley, Iowa

Rural Water Supply Operations Seminar
LDH Relay Pumping Drill – November 10, 2012
Summary Report

The Purpose

- The purpose of the seminar and drill was to review the basics of large diameter hose (LDH) and relay pumping 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 4-hour classroom session to review the principles of LDH and relay pumping operations.
- The review session was held at the Independence Fire Department in Independence, Iowa.
- Seminar topics included the types of LDH and LDH appliances, LDH operations and best practices, and the key points of relay pumping operations.
- Seminar participants were from Iowa and Kansas with the majority being from northeast Iowa.
- Instructors for the program were Mark Davis and Alan Butsch.

The Relay Pumping Drill

- The relay pumping drill was held along the Wapsipinicon River in downtown Independence at the site of the historic Wapsipinicon Mill.
- The goal of the drill was to practice a large-scale relay pumping operation and to see how much water could be delivered through 5-inch and 6-inch LDH using a three pumper configuration.

Water Supply Drill Participants

- *The participants for the drill were from seven different fire departments in the northeast Iowa area. The pumping apparatus was representative of the type of water supply support that would respond to a structure fire in Independence.*

Drill Participants

- Independence FD Engine 3
  - 1,250 gpm pump
- Manchester FD Engine 176
  - 1,250 gpm pump

Drill Participants

- Palo FD
  Engine 344
  - 1,250 gpm pump

- Vinton FD
  Ladder 1
  - no pump
    w/100-ft ladder

The Water Supply Source

The water supply source for the relay pumping drill was a manmade lake along the Wapsipinicon River in downtown Independence. The lake was near an old flour mill and provided ample water for the drill

The Drill Begins

The drill started with Independence Engine 3 (1,250 gpm) establishing a water supply at the dam. The crew set up dual suctions using 30-feet of 6-inch suction hose and 20-feet of 4-1/2-inch suction hose to reach the water. Both suction lines were equipped with a barrel strainer.

Supply Pumper Set-up

Because of the limited quantity of suction hose, the pumper was parked parallel to the water's edge and the driver side suction hose was run underneath the pumper.

Supply Pumper Set-up

Ideally – dual, 6-inch suctions would have provided a better flow – however, sometimes you have to use what is available.

Supply Pumper Set-up

The driver side suction was run underneath of the pumper. Thirty feet of 6-inch suction hose was needed to reach the water – but the operation worked just fine.

Feeding the 6” LDH

Because Engine 3 did not have a high-flow discharge, four, 3-inch lines were used to supply a jumbo siamese via two smaller siamese fittings. Again – not a perfect situation, but it worked just fine.

The 6-inch LDH

The 6-inch LDH was supplied by the Stanley FD. The hose was recently purchased as part of a large, federal grant for water supply equipment. The grant also included several thousand feet of 5-inch hose plus many LDH appliances and fittings. Six-inch LDH is supposed to be able to move 2,000 gpm.

The Hose Layout

The site of the drill was a park along the river where hose could be laid out away from the supply pumper and then back to the same area – thus creating a big loop. The 6-inch (yellow) hose is going "away" from the supply source.

Pressure Measurement

An in-line pressure gauge was used around the 1000-ft mark in the 6-inch hose lay so that friction loss could be observed. Even at the highest flow point, there was very little (<20 psi) friction loss in the entire length of 6-inch hose!

The 1st Relay Pumper

Manchester Engine 176 (1250 gpm) was the first relay pumper and it was located at the end of the 6-inch hose lay. A Task Force Tips Oasis valve was used as an in-line relay valve. An in-line gauge (orange) was also used to measure friction loss.

The 1st Relay Pumper

Using the relay valve makes the insertion of a relay pumper very easy. The water flow does not have to be stopped to connect the pumper. Once all of the hose is connected – it is simply a matter of opening one valve.

The 1st Relay Pumper

A short length of 6-inch hose was used to feed the relay valve. The hose was connected to the high-flow discharge – however, it was unclear if the discharge was capable of full-capacity.

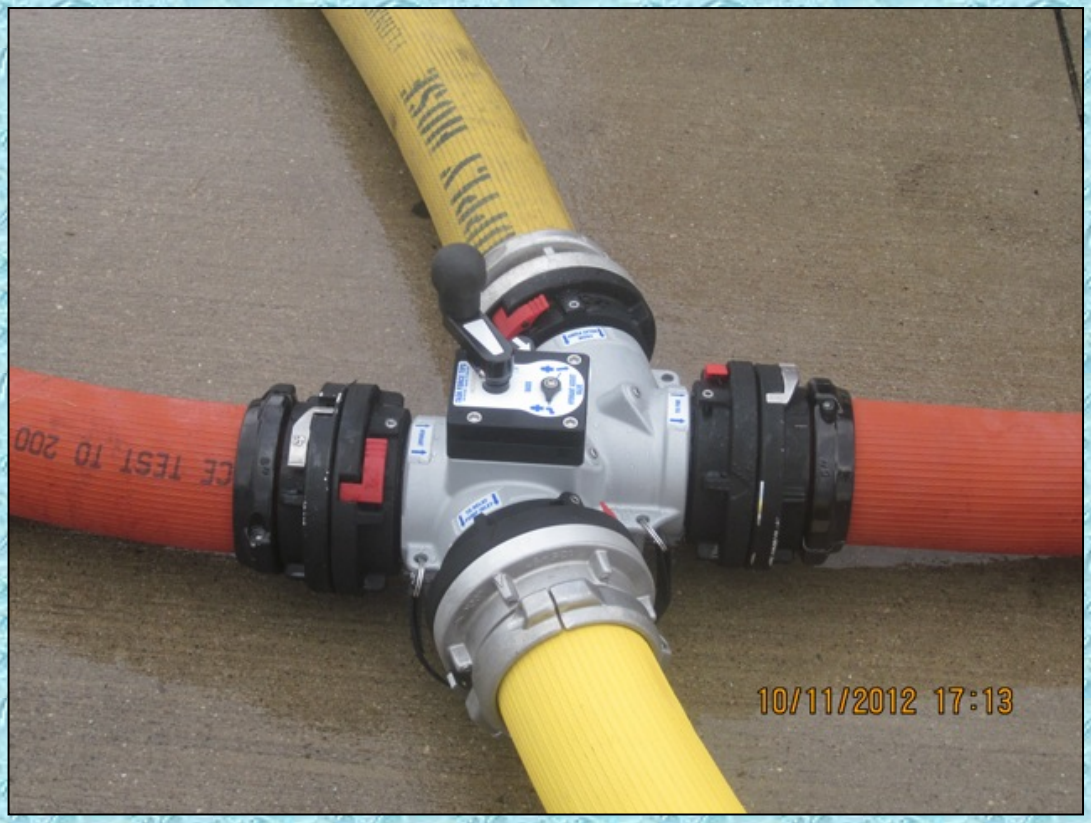
5-inch LDH Layout

From Engine 176, the water traveled down 1100-feet of 5-inch hose to Palo Engine 344 – which served as the second relay pumper.

The 2nd Relay Pumper

Palo Engine 344 (1250 gpm) was used as the second relay pumper. It too connected to a TFT Oasis valve. The pumper had a throttle problem and never was able to support the operation.

The Oasis Valve



The Oasis valve is really just a newer version of the old “Z-valve” that many folks in New England carried for relay pumping operations. The Oasis valve can be used for hydrant operations and relay pumping.

Water Flow

Water flow was handled at the Vinton ladder truck which was 1100-feet from the Palo pumper. At first, flow was measured through a Hose Monster flow diffuser. At the end of the drill, flow was switched to the Vinton truck.

Debriefing

A debriefing was done at the end of the drill to review the results and to summarize the important parts of building a relay pumping operation.

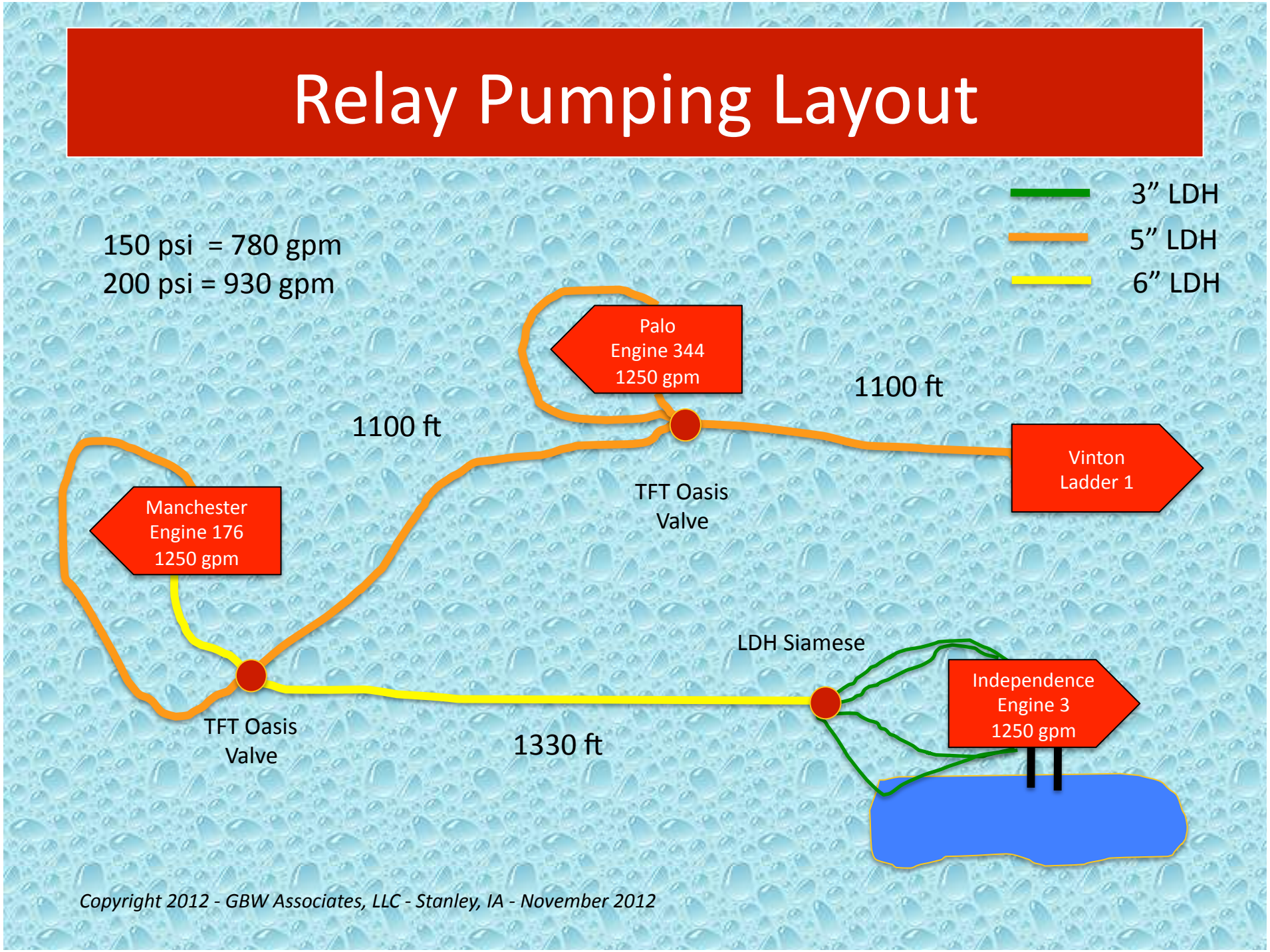
Picking Up the Hose

When the drill was over, it was time to pick up 3500 feet of hose! The Stanley FD had a stake body style flatbed truck that was equipped with a "Hose Mule" loading device that helped to make the loading process simpler.

Hose Mule

All of the 6-inch LDH was picked up and packed using the special loading device.

Relay Pumping Layout



The Results

- Using the three pumper configuration, two flow tests were conducted.
- The first test used just the source pumper discharging at 150 psi – and a flow measurement was recorded.
- The pressure was then increased to 200 psi and a second flow measurement was recorded.

The Results

- With just the source pumper discharging at 150 psi, a flow of 780 gpm was achieved at the Hose Monster.
- When the discharge pressure was moved to 200 psi, a flow of 930 gpm was achieved at the Hose Monster.
- Flow was changed over from the Hose Monster to the Vinton ladder truck, but there was no change in the results.

The Results

- The plan was to next insert the relay pumpers.
- Manchester Engine 176 (1250 gpm) was inserted into the relay – however, its presence made NO difference in the flows attained.
- Palo Engine 344 (1250 gpm) was also inserted, but had a malfunctioning throttle and the pumper was removed from the relay.
- Thus – the entire time, only one pumper really pumped water – and that was the source pumper.

Summary of Results

	Hose Layout	150 psi Test	200 psi Test
3 Pumpers	3,530 feet	780 gpm	930 gpm

The results of the flow tests do not fully illustrate the capability of 5” or 6” LDH. The three pumpers should have been able to deliver over 1250 gpm but they could not.

We were not able to determine exactly why the flow was limited but we speculate the following:

- the high-flow discharges were limited in discharge capacity
- motor horsepower was limited, thus limiting pump output
- one of the electronic intake valves was not open completely

The Lessons Learned/Reinforced

- When building long relays and expecting flows in excess of 1,000 gpm, it is important to place a large capacity pumper at the water source. Even with dual suctions in use, the source pumper at this drill was limited in its ability to draft and push water because of its smaller motor size.
- Using some type of control valve in the middle of long hose lays allows for a relay pumper to be inserted later into the event.
- If practiced and executed well, a relay pumping operation can support a larger flow with fewer resources as compared to a tanker shuttle over a 1.0-mile distance.
- A critical item in the success of a LDH relay pumping operation is having a sufficient number and type of LDH appliances and adaptors.

Summary

- Even though the resulting flows were lower than expected, the relay pumping drill was a success. For the new folks, they got to see how a relay pumping operation can support a sustained fire flow over a long distance.
- For the older, experienced folks, it was a chance to "brush up" on their skills and knowledge.
- 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 Stanley and Independence FDs for sponsoring and hosting this seminar.

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