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Roosevelt Fire District
Hyde Park, New York

Rural Water Supply Operations Seminar
LDH Relay Pumping Drill – August 18, 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 Roosevelt Fire District's Station 2 located in Hyde Park, New York.
- 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 the Hyde Park and Dutchess County area.
- Instructors for the program were Mark Davis, Alan Butsch, and Tim Legore.

The 1-Mile Relay Pumping Drill

- The relay pumping drill was held near the Dutchess County Department of Emergency Response facility.
- 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 LDH using various arrangements of pumpers.
- Three separate pumping scenarios were tested – all involved pumping water through 5,100 feet of 5-inch hose and overcoming an elevation change of 165 feet.

Water Supply Drill Participants

- *The participants for the drill were from eight different fire departments in the Hyde Park area. The pumping apparatus was representative of the type of water supply support that would respond to a structure fire in the southern part of Dutchess County.*

Drill Participants

- Roosevelt FD Engine 63-12
  - 1,500 gpm pump w/1,000 gal tank
- Roosevelt FD Engine 63-14
  - 1,000 gpm pump w/1,000 gal tank

Drill Participants

- LaGrange FD
  Engine 47-14
  - 1,750 gpm pump w/500 gal tank

- Fairview FD
  Engine 41-12
  - 1,250 gpm pump w/500 gal tank

Drill Participants

- Hyde Park
  Tower Ladder 46-45
  - 1,500 gpm pump
    w/500 gal tank

The Water Supply Source

The water supply source for the relay pumping drill was a manmade lake located near the Dutchess County training center. The lake was formed as a result of a flood control dam. The dam was used as the suction point for the supply pumper in the drill.

Roosevelt Engine 63-14

Engine 63-14 operated as the lone relay pumper in the first evolution. The 1,000 gpm pumper carries 3,000 feet of 5-inch LDH - plus all of the appliances and adaptors to make a long lay of LDH work.

LaGrange Engine 47-14

Engine 47-14 served as the attack pumper in the relay drill. The 1,750 gpm pumper also carries 3,000 feet of 5-inch LDH and a multitude of LDH appliances.

The Drill Begins

The drill started with Roosevelt Engine 63-12 (1,500 gpm) establishing a water supply at the dam. The crew used several lengths of 6-inch suction hose and a floating strainer to reach the "best" suction point for drafting.

Laying Out

With a water supply secured, Roosevelt Engine 63-14 began laying out its 3,000 feet of LDH. A LDH manifold was used at the source pumper in case additional lines were needed to supply the operation.

Laying Out

Engine 63-14 lays out its 5-inch LDH. Although this photo looks like the pumper is driving about 60 mph, the hose was laid at a much more moderate speed. The roadway was closed to regular traffic during the drill period.

In-Line Relay Valve

Knowing that a couple of flow tests would be completed during the relay pumping drill, a TFT Oasis valve was inserted at the 1,500-feet mark of the initial hose lay. The Oasis valve is TFT's version of a hydrant valve that can also be used as an in-line relay valve. All that is needed is one adaptor. A Humat valve can also be used as can the old Jaffrey Z-valve. An in-line relay valve allows a pumper to be added in the middle of a hose lay without shutting down water flow.

The Relay Pumper

After laying out all of its 5-inch LDH, Engine 63-14 begins to set up as the relay pumper. The plan was to pump to LaGrange Engine 47-14 through its 3,000 feet of 5-inch LDH. However, because of space limitations, Engine 47-14 only laid out 2,100 feet of LDH.

The Relay Pumper

Because Engine 63-14 does not have a “high-flow” discharge, a double-clappered siamese was used to support the expected flows.

The Relay Pumper

Engine 63-14 is all set and ready to receive water from the supply pumper.

The Relay Pumper

With water now at the relay pumper, the operator makes the needed adjustments in order to send the water to the attack pumper.

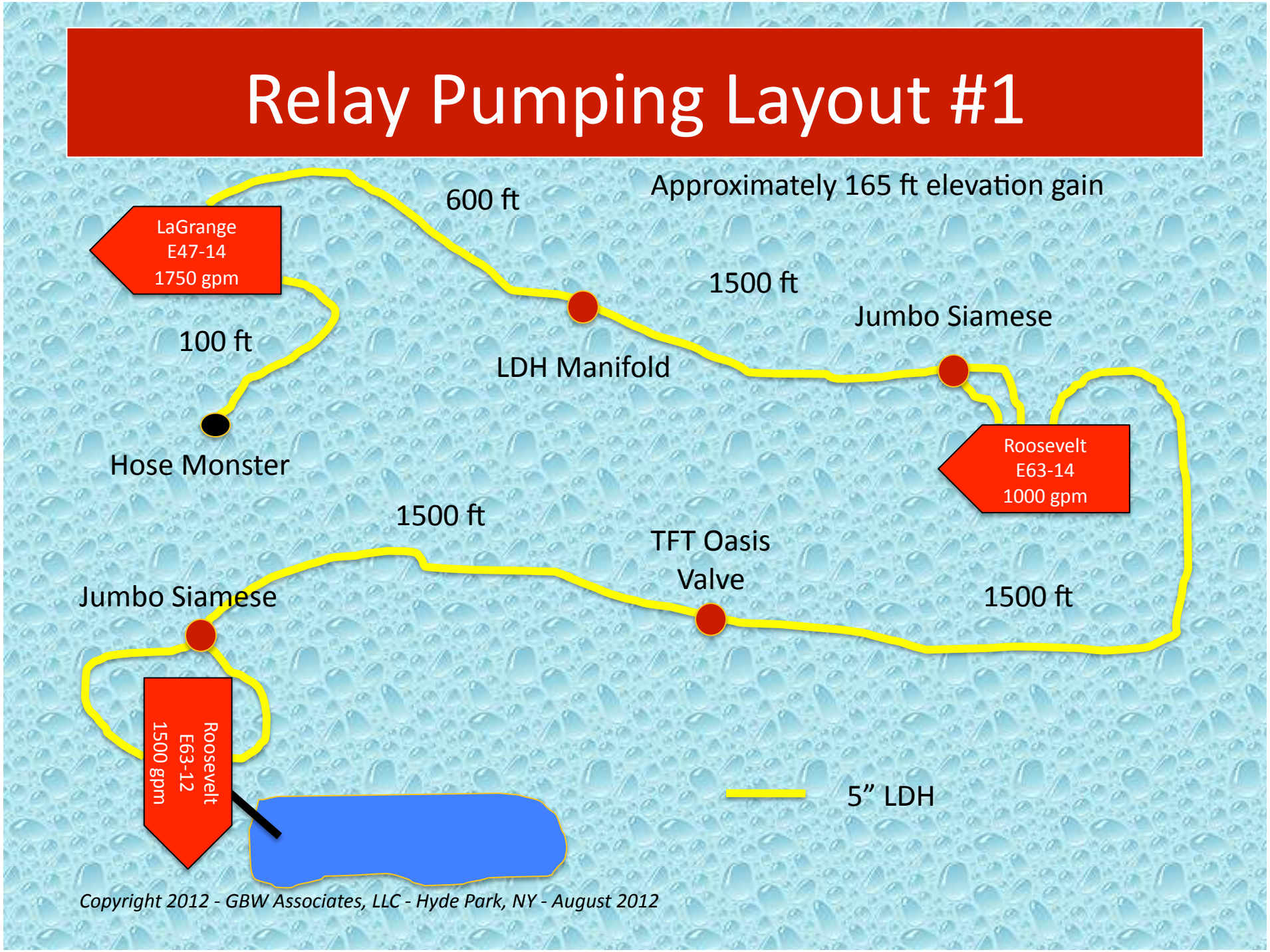
Water to the Attack Pumper

The two lines feeding the siamese are charged and water is on its way to the attack . The kinks removed themselves once the hose was completely charged.

The Attack Pumper

Engine 47-14 receives water through the 2,100 feet of 5-inch LDH that it laid out. The plan had been to lay all 3,000 feet, but space did not permit that amount of hose to be laid. Thus, the total lay was 5,100 feet of 5-inch LDH. A Hose Monster device was used to accurately measure the flow.

Relay Pumping Layout #1



Layout #1 Results

- Using the three pumper configuration, three flow tests were conducted.
- The source pumper (E63-12) and the relay pumper (E63-14) were instructed to set their discharge pressure to 100 psi.
- The attack pumper (E47-14) was instructed to discharge as much water as possible – to the point of zero intake pressure.

Layout #1 Results

- With the source and relay pumpers discharging at 100 psi a flow of 250 gpm was achieved at the Hose Monster.
- The source and relay pumpers were then instructed to discharge at 150 psi; a flow of 754 gpm was achieved.
- The source and relay pumpers were then instructed to discharge at 175 psi; a flow of 1,067 was achieved.

A Second Relay Pumper

Tower Ladder 46-45 (1,500 gpm) was added at the TFT Oasis valve located in the middle of the initial 3,000 ft hose lay.

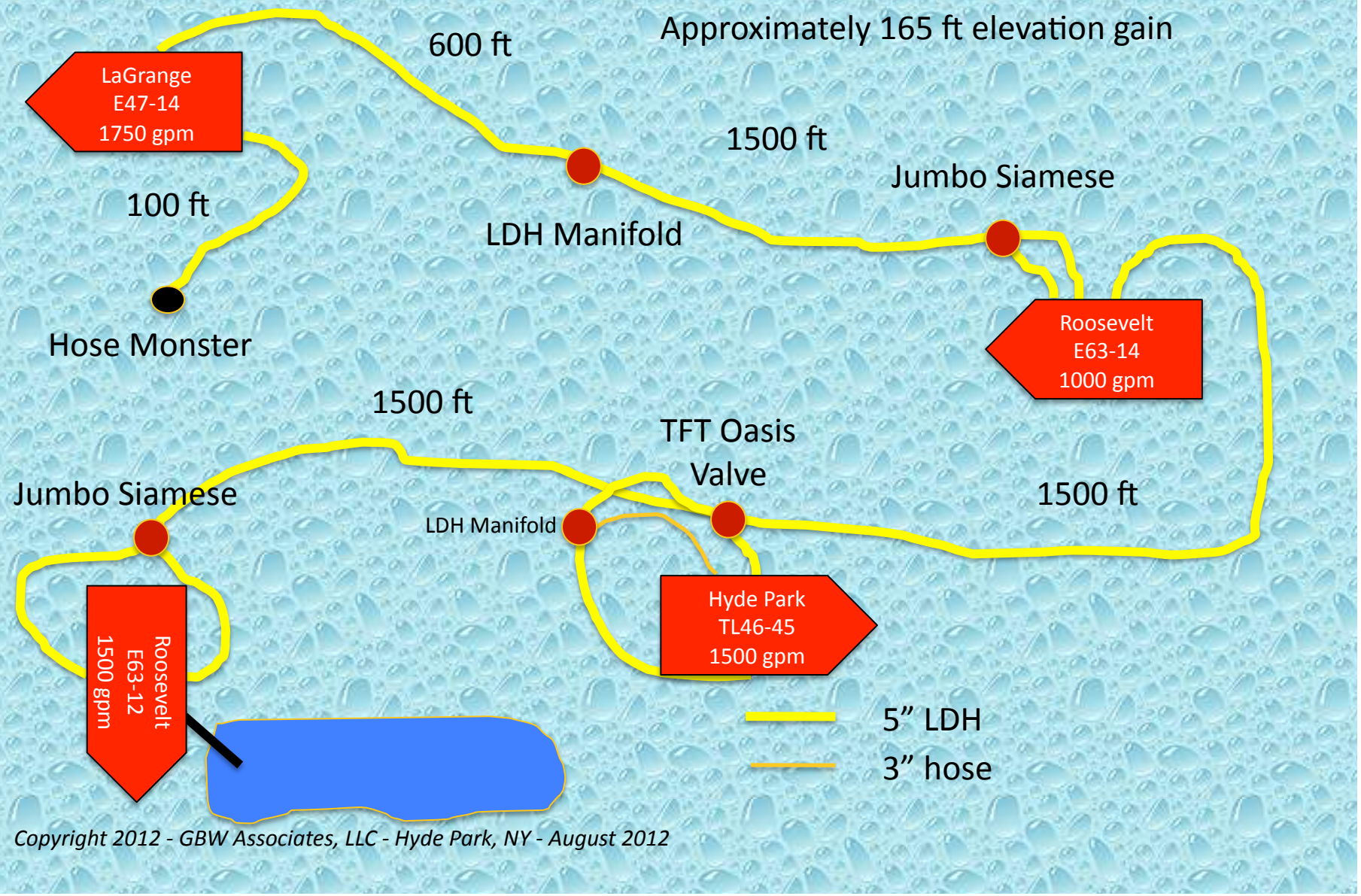
A Second Relay Pumper

The TFT Oasis valve allowed TL 46-45 to insert itself as a relay pumper without having to stop the water supply to the next pumper. The manifold was added by the operator in order to provide additional supply lines if needed.

A Second Relay Pumper

The tower was limited in its LDH discharges, so a smaller hose line was used to supplement the flow.

Relay Pumping Layout #2



Layout #2 Results

- Using a four pumper relay configuration, three flow tests were conducted.
- The source pumper (E63-12) and the two relay pumpers (TL46-45 and E63-14) were instructed to set their discharge pressure to 100 psi.
- The attack pumper (E47-14) was instructed to discharge as much water as possible – to the point of zero intake pressure.

Layout #2 Results

- With the source and relay pumpers discharging at 100 psi a flow of 507 gpm was achieved.
- The source and relay pumpers were then instructed to discharge at 150 psi; a flow of 956 gpm was achieved.
- The source and relay pumpers were then instructed to discharge at 175 psi; a flow of 1,158 was achieved.

The Third Relay Pumper

Fairview Engine 41-12 was added as a third relay pumper. The pumper was inserted 1,500-feet past Roosevelt E63-14 at the LDH manifold that had been left by the LaGrange pumper.

The Third Relay Pumper

Because the water flow had to be stopped in order to disconnect from the LDH manifold, the crew of four had to hustle to make the changeover.

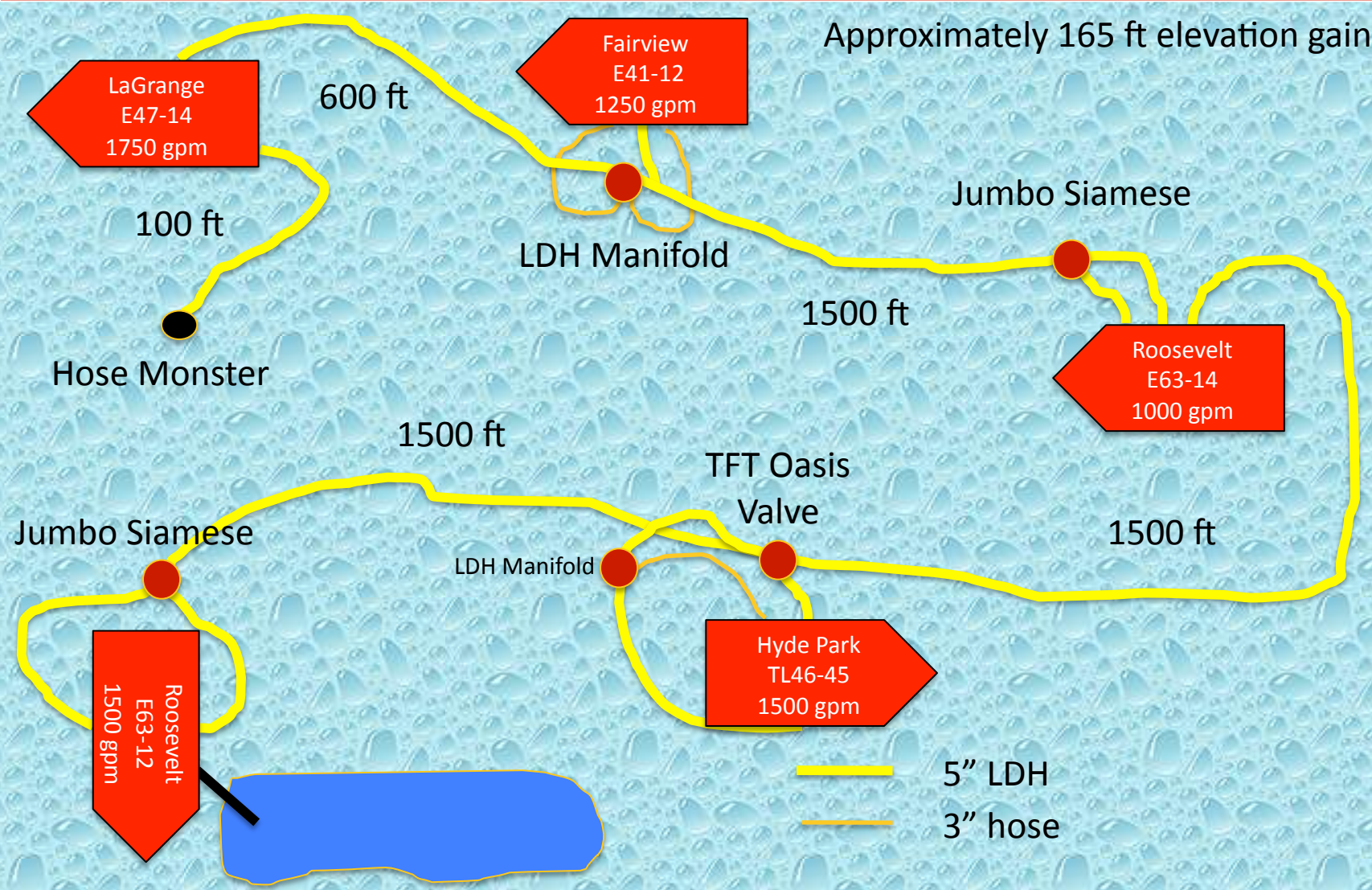
The Third Relay Pumper

While the LDH manifold does not provide an uninterrupted flow option when adding a relay pumper. It does allow more flexibility than just separating a hose coupling and “hopping” in-line.

The Third Relay Pumper

Engine 41-12 pumped two, 3-inch lines to support the relay operation since they did not have a full-flow high-flow discharge. The set-up worked just fine.

Relay Pumping Layout #3



Layout #3 Results

- Using a five pumper relay configuration, three flow tests were conducted.
- The source pumper (E63-12) and the three relay pumpers (TL46-45, E63-14, and E41-12) were instructed to set their discharge pressure to 100 psi.
- The attack pumper (E47-14) was instructed to discharge as much water as possible – to the point of zero intake pressure.

Layout #3 Results

- With the source and relay pumpers discharging at 100 psi a flow of 956 gpm was achieved.
- The source and relay pumpers were then instructed to discharge at 150 psi; a flow of 1,359 gpm was achieved.
- The source and relay pumpers were then instructed to discharge at 175 psi; a flow of 1,550 was achieved.

Summary of Results

	Hose Layout	100 psi Test	150 psi Test	175 psi Test
3 Pumpers	5,100 feet	250 gpm	754 gpm	1,067 gpm
4 Pumpers	5,100 feet	507 gpm	956 gpm	1,158 gpm
5 Pumpers	5,100 feet	956 gpm	1,359 gpm	1,550 gpm

The results of the flow tests illustrate the capability of 5-inch LDH and the importance of adding relay pumpers when increased flow is needed.

It is interesting to note that 3 pumpers moved 1,000 gpm almost a mile and over a 165-ft elevation gain – that is impressive! Of course, so is 1,500 gpm with 5 pumpers!

The Lessons Learned/Reinforced

- There will be times when it is not possible to place the largest pumper at the water source.
- 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

- 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 Roosevelt Fire District for sponsoring and hosting this seminar.

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This program was developed by
GBW Associates, LLC

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