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Shelby County First Battalion
Shelby County, Alabama

LDH Relay Pumping Seminar
Relay Pumping Drill – May 20, 2017
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 Civic Center in Pelham, Alabama.
- 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 Shelby County area.

The 2,200 ft Relay Pumping Drill

- The relay pumping drill was held in the parking lot of the Civic Center.
- 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 2,200 feet of 5-inch hose.

Water Supply Drill Participants

- *The participants for the drill were from several different fire departments in the Pelham 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 Shelby County.*

Drill Participants

- Brierfield Engine 203
  - 1,500 gpm pump
- Montevallo Engine 83
  - 1,500 gpm pump

Drill Participants

- Pelham Engine 92
  - 1,250 gpm pump
- Alabaster Engine 11
  - 1,500 gpm pump

The Water Supply Source

The water supply source for the relay pumping drill was Cahaba Valley Creek which was located to the rear of the Pelham Civic Center. The creek had plenty of clean water and access was made using 50-feet of 6-inch suction hose and a Kochek floating barrel strainer. The lift at the draft site was under 15-feet.

Hose Lay Out

The hose layout was accomplished using Brierfield Engine 203's and Montevallo Engine 93's 5-inch supply hose. In total, 2,200 feet of 5-inch hose was laid out in an accordion fashion in the Civic Center parking lot.

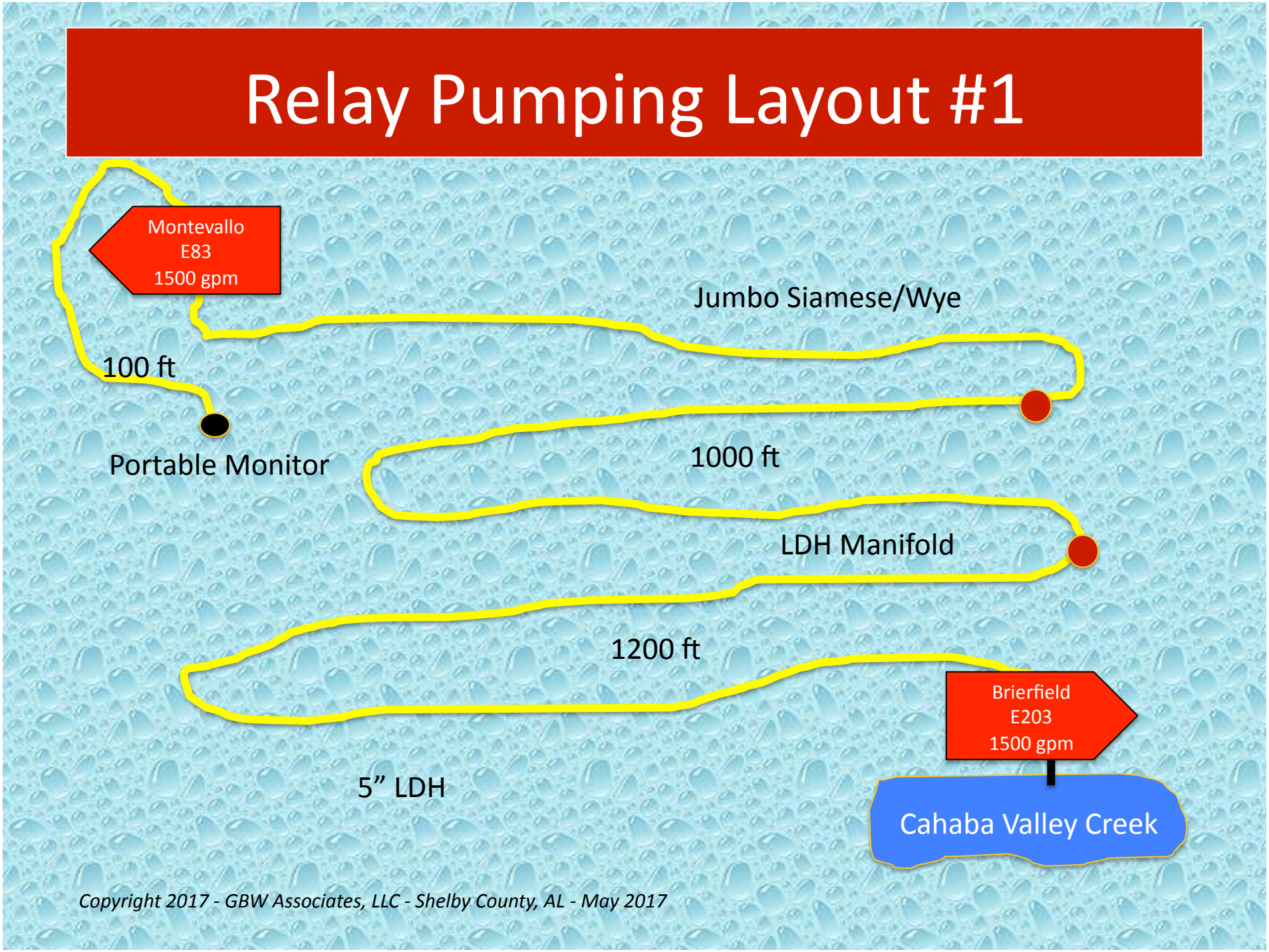
Hose Lay Out

At around the 1,200 ft mark from the supply pumper, an LDH manifold was inserted with the intent of inserting a relay pumper at that location sometime during the drill.

Flow Measurement

All water flow was measured at a portable monitor equipped with a 2-inch tip. A hand-held pitot gauge was used to capture the flow readings.

Relay Pumping Layout #1



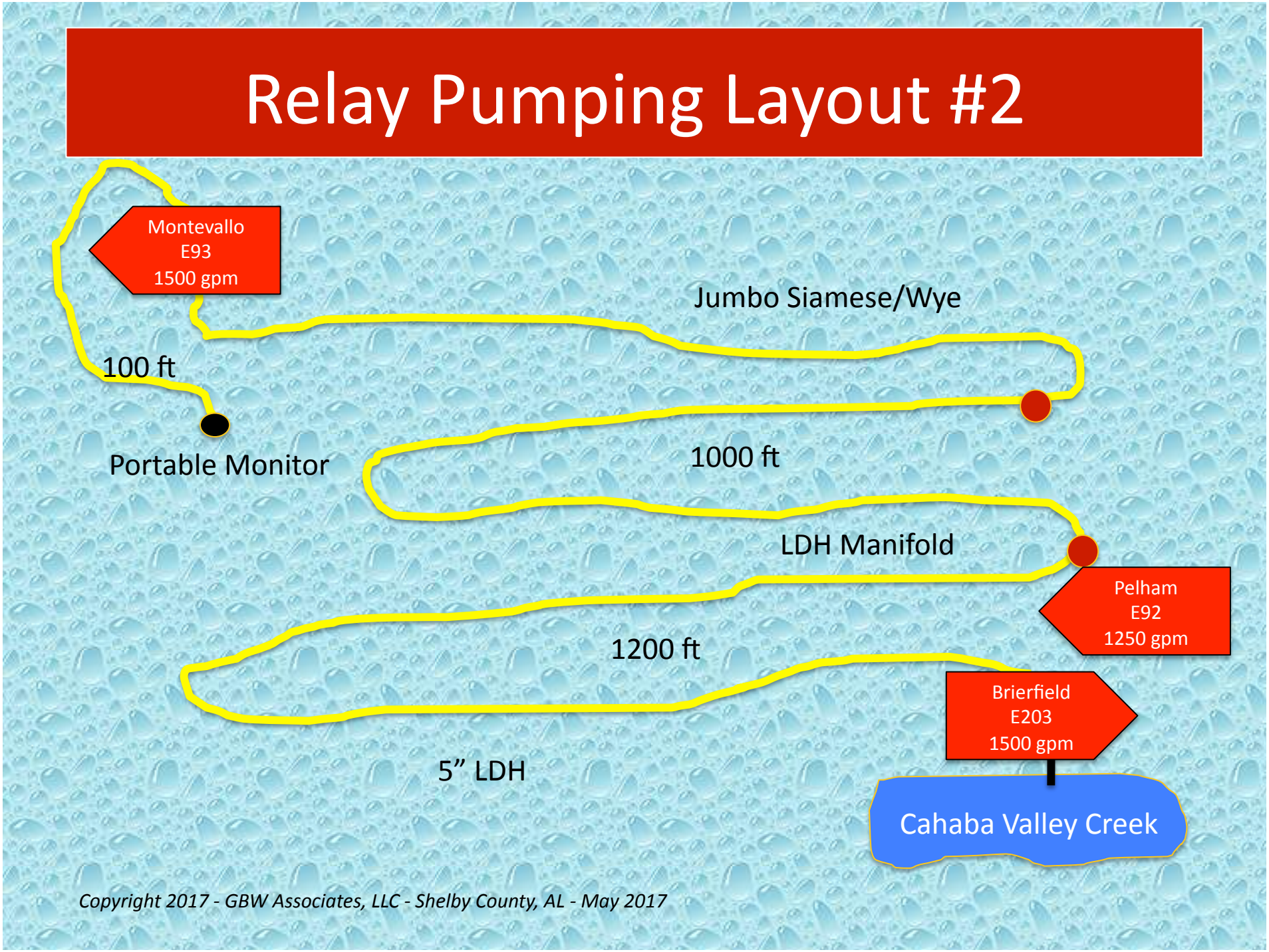
Layout #1 Results

- Using the two pumper configuration, two flow tests were conducted.
- The source pumper (E203) was instructed to set their discharge pressure to 100 psi.
- The attack pumper (E83) was instructed to discharge as much water as possible – to the point of zero intake pressure.

Layout #1 Results

- With the source pumper discharging at 100 psi and the attack pumper maximizing output a flow of 693 gpm was achieved at the portable monitor.
- The source pumper was then instructed to discharge at 150 psi and the attack pumper maximized output; this setup produced a flow of 1,036 gpm.

Relay Pumping Layout #2



Adding a Relay Pumper

The first relay pumper added to the hose layout was Pelham Engine 92, a 1,250 gpm pumper. The crew added their rig in at the LDH manifold which was located 1,200 feet from the source pumper.

Adding a Relay Pumper

The difficulty of adding the pumper in at the LDH manifold was that water flow to the attack pumper had to be interrupted. The pumper crew did a great job of getting everything ready for the switchover and then made that switchover in under 3-minutes.

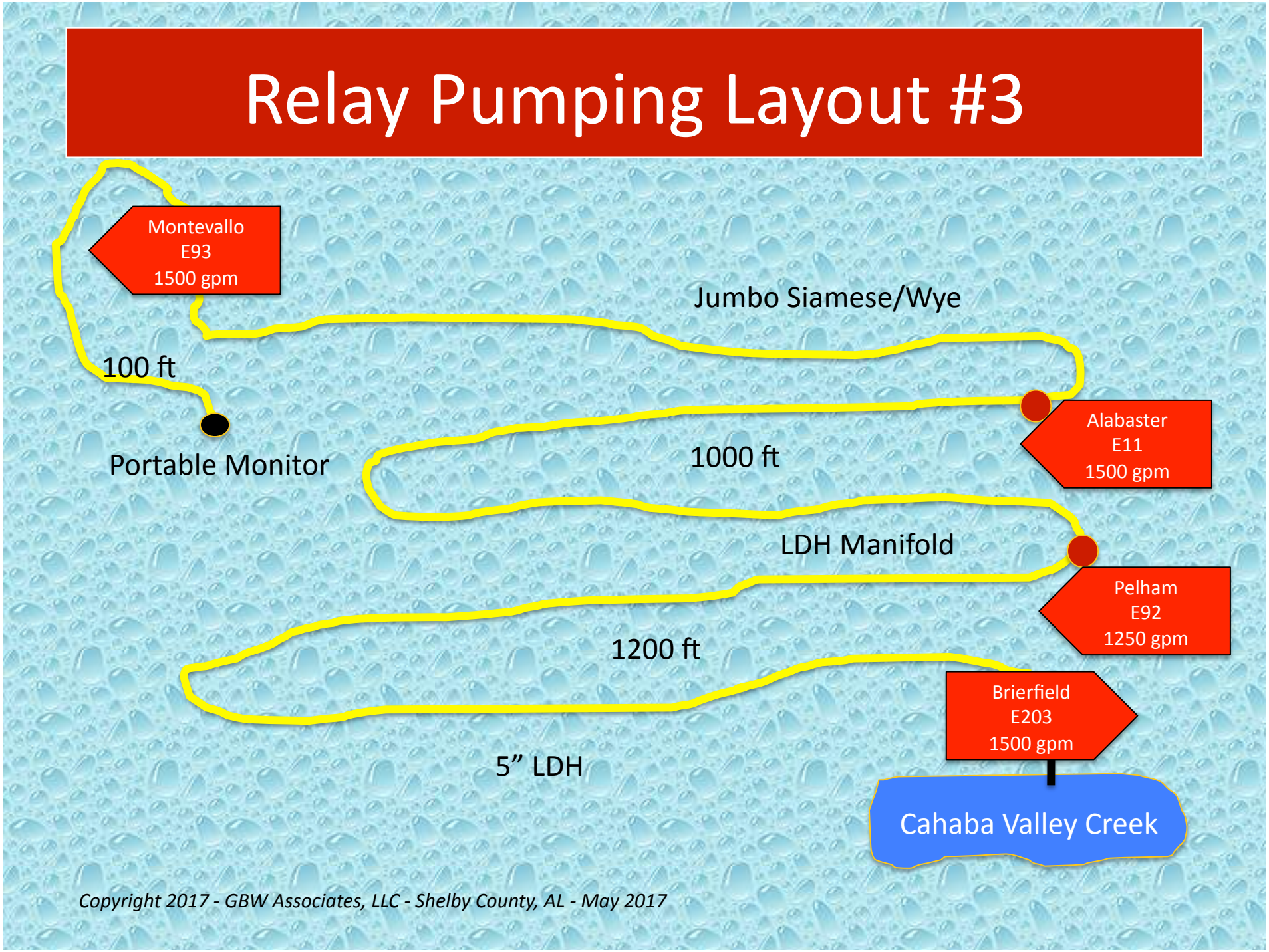
Layout #2 Results

- Using the three pumper relay configuration, two flow tests were conducted.
- The source pumper (E203) and the relay pumper (E92) were instructed to set their discharge pressure to 100 psi.
- The attack pumper (E83) 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 788 gpm was achieved.
- The source and relay pumpers were then instructed to discharge at 150 psi; a flow of 1,230 gpm was achieved.

Relay Pumping Layout #3



Adding a Second Relay Pumper

Alabaster Engine 11 (1,500 gpm) was added as a second relay pumper. Their rig was inserted around the 1700 ft mark from the source pumper. A homemade relay valve setup was made using a jumbo wye and a clappered siamese and was inserted before the drill started.

Adding A Second Relay Pumper

The relay valve arrangement allowed the pumper to be added into the relay pumping without shutting down the water flow to the attack pumper.

Adding A Second Relay Pumper

Engine 11's crew simply hooked up an intake line from the jumbo wye and then discharged into the clappered siamese. Once the changeover was made, the wye was closed going to the original side of the siamese.

Layout #3 Results

- Using a four pumper relay configuration, two flow tests were conducted.
- The source pumper (E203) and the two relay pumpers (E92 and E11) were instructed to set their discharge pressure to 100 psi.
- The attack pumper (E83) 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 1,128 gpm was achieved.
- The source and relay pumpers were then instructed to discharge at 150 psi; a flow of 1,310 gpm was achieved.

Summary of Results

	Hose Layout	100 psi Test	150 psi Test
2 Pumpers	2,200 feet	683 gpm	1036 gpm
3 Pumpers	2,200 feet	788 gpm	1230 gpm
4 Pumpers	2,200 feet	1128 gpm	1,310 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 2 pumpers moved 1,000 gpm over 2,000 feet from a draft source. That result has huge implications when thinking about protecting downtown areas of small communities where static water sources are present nearby.

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.
- A critical item in the success of a LDH relay pumping operation is having a sufficient number and type of LDH appliances and adaptors.
- A review of the results show that the upper end of the flow did not significantly increase as more pumpers were added; this most likely means that the source pumper was maximized in terms of output.

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 Shelby County EMA and the Alabama Fire College for sponsoring and hosting this seminar.

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This program was developed by
GBW Associates, LLC

For more information contact us at
thebigcamel@gotbigwater.com