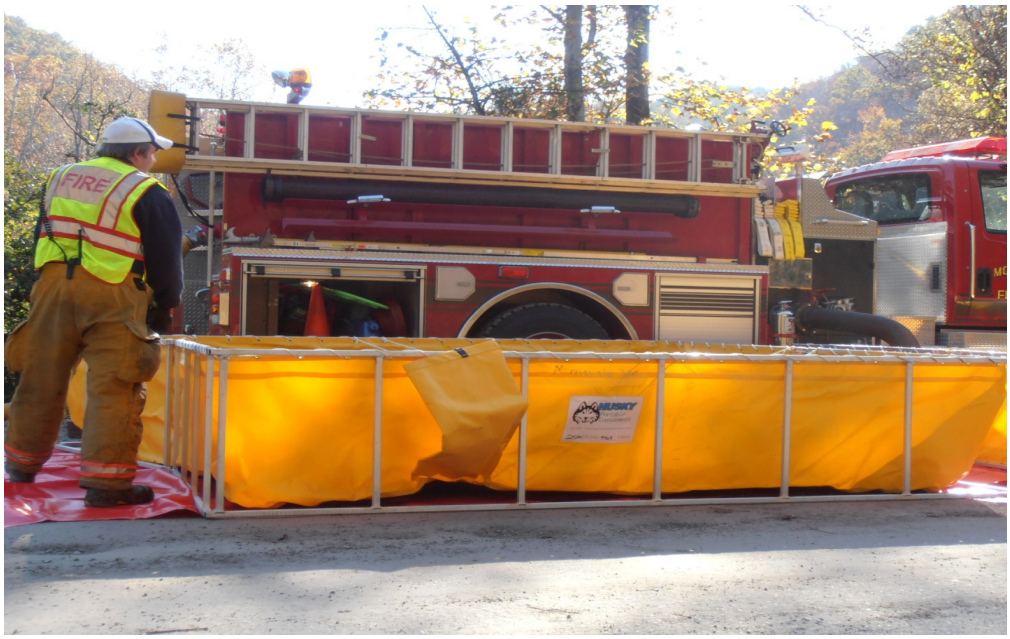
Delivering BIG WATER with Vacuum Fire Tankers

Based on the October 23, 2011 Morrisvale FD Tanker Shuttle Drill

By: Charles D. Clark

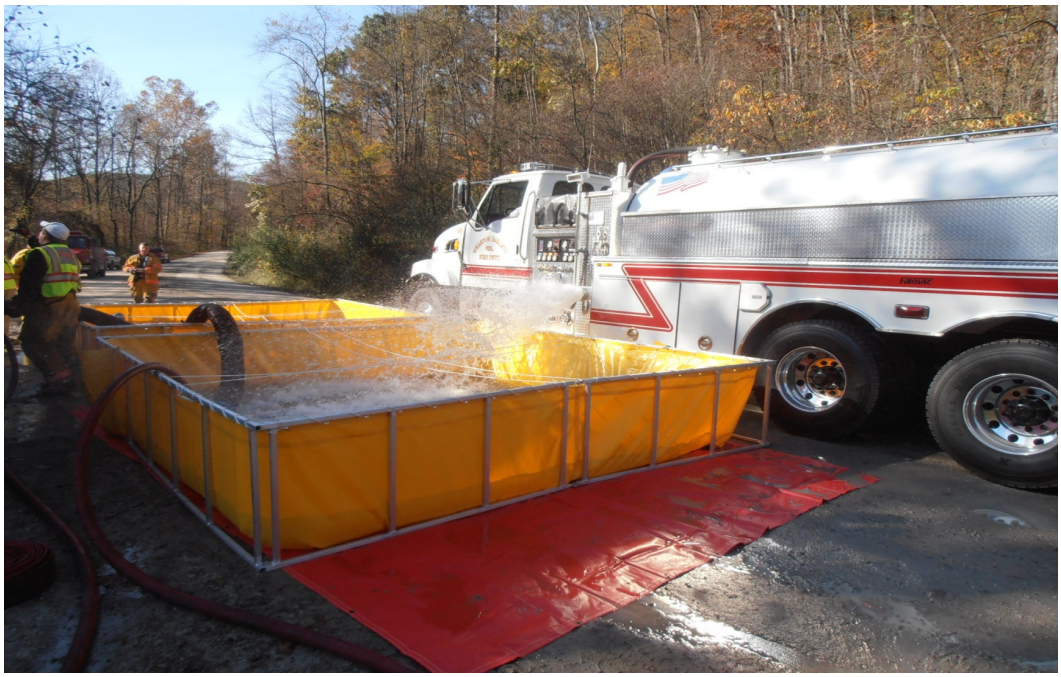
Three members from our department drove from Ohio to West Virginia to observe the tanker shuttle drill. Wow! What an eye opening experience it was to see five vacuum tankers hauling water all at one time. Morrisvale FD demonstrated the ability to move a large volume of water with a small number of people. You must see their drill on *www.GotBigWater.com*. Let me share some observations from that drill:



-Efficient set up of dump site. The Morrisvale FD carries their suction hose on their pumper below the ladders at chest height with the low level strainer preconnected. This makes it possible for one person to gently take the suction hose off the truck. Compare this to two people climbing and two people on the ground working to get suction hose down off the top of a pumper. At one time they had a front mount pump with the suction hose preconnected.

Morrisvale FD had the dump site completely set up and flowing water within the I.S.O. recommended 5 minutes -with minimal man power (4 people -2 on pumper and 2 on tanker)! All this efficiency allowed them to achieve a rare accomplishment-they did not tie up a nurse tanker to buy time for the dump site to be set up. What does this make possible? That first tanker on the scene dumps its water and is quickly on the way to get refilled and return in time to meet your water supply needs at what could be called that golden 15-20 minute mark. This is the critical block of time before mutual aid water arrives on the scene.

During their I.S.O. inspection in 2004 Morrisvale FD was required to set up their dump site with just 2 people! Their average turnout for a fire run was 8 people. The I.S.O. inspector only allowed 8 people to participate in the tanker shuttle test. The I.S.O. test causes us to develop real practical skills. We can expect a water supply pumper and tanker to each be staffed with only one person each. It should be the goal of any department serious about moving water to set up with just 2 -it just takes using that good old Yankee Ingenuity that is so common among fire fighters.



-<u>Prompt return of first tanker to dump site is critical</u>. During a real fire situation when manpower is low and mutual aid is slow the 15-20 min. point is when you could expect to run low on water –especially if you are pumping more than the minimum of 250 GPM on the fire. In the above photo **the first Morrisvale vacuum tanker**(behind the fire fighter with the white hat) **was refilled and waiting to move in to dump for the second time before the first mutual aid tanker was finished dumping its <u>first</u> load of water** (at approximately the 17.5 min. mark of the drill). That is exceptional! During most drills it is nearly 30 minutes before the first tanker to dump returns from the fill site.

I've estimated the following times for this first vacuum tanker:

1. set up dump tank:……1.5 min.
2. dumped 2,000 gal. water: 1 min.
3. drove to the fill site:……4 min.
4. set up the fill site:…….. 5 min. (as allowed by I.S.O.)
5. refilled with water:…….. 2 min.
6. and drove back to the
   dump site:……..4 min.

Total: ……17.5 min.

During the next tanker cycle this truck would not have to set up a dump site <u>and</u> a fill site. You could easily make the round trip in about 12 minutes. 2,000 gal./12min. = 167 GPM. If you figure four 2,000 gal. vac. tankers @ 167 GPM = 668 GPM; one 3,000 gal. vac. tanker @ 225 GPM; and one 2,500 gal. conventional tanker @ 120 GPM you total 1,013 GPM. These calculations are proven accurate by the fact that the group of 6 tankers delivered 1,012 GPM during the last 33 minutes of the drill (almost three tanker cycles).

-<u>If you need mutual aid to supply a pumper at a dry hydrant to fill conventional tankers how soon will the water from that fill site be available</u>? Whether you follow the I.S.O. formula or real life we can expect to be at least 20 minutes into the incident before a mutual aid pumper or tanker is available. (A tanker might respond first and it could be longer than 20 minutes before a mutual aid pumper is on the scene.) Give that pumper crew 5 minutes to set up the fill site. It will take approximately 3-4 min. to refill the tanker; allow 4 minutes to drive back to the fire scene.

Total elapsed time for the first <u>conventional</u> tanker to return: 20+5+3+4 = **<u>32 minutes</u>**

–do you have 27 minutes of water on your first response? 250 GPM X 27 min. = 6,750 gal. (0 gal. 1st 5 min.)

First vacuum tanker to dump could set up dump site, set up fill site, & return in:. **<u>17.5 minutes</u>**

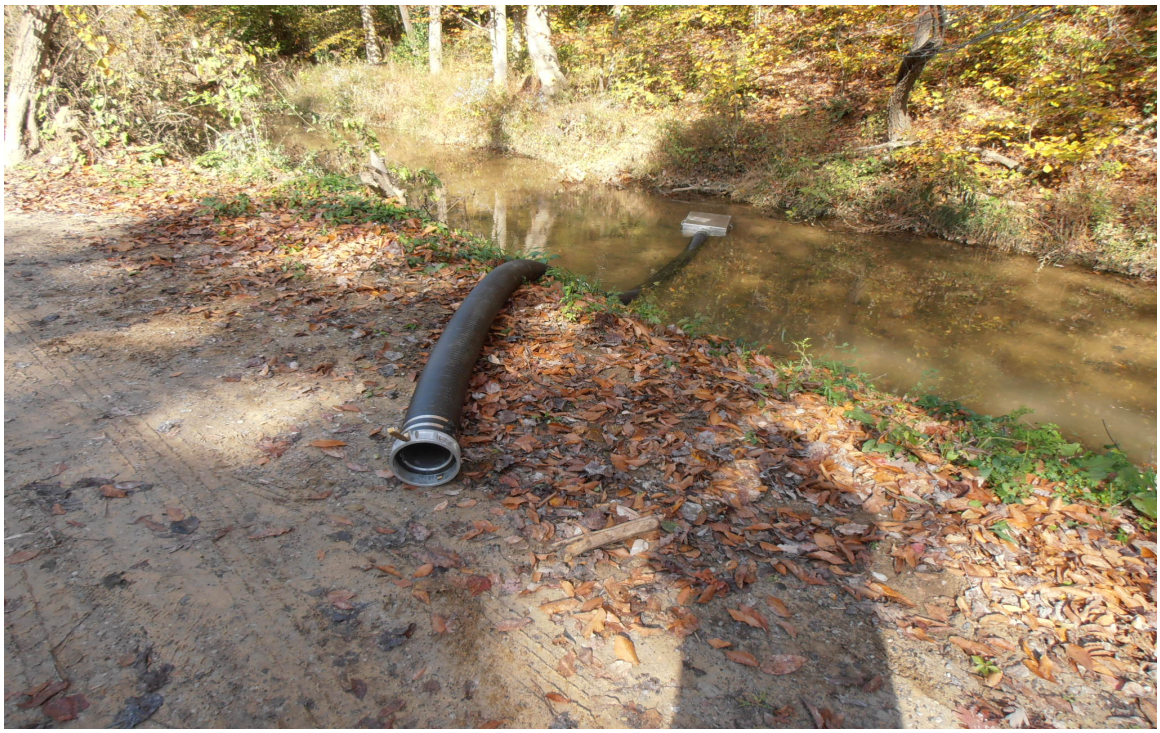
First vacuum tanker could bring the next load of water in (all set up is done): ..... **<u>12 minutes</u>**

What if that truck could find a hole of water under a bridge near the fire scene:.... **<u>8 minutes</u>**

(Now I understand the claim that a vacuum tanker can deliver 3 loads of water before the conventional can deliver its second load!)

(I also learned at this drill what they mean when they say, "….Park the conventional trucks and let the vacuums do their thing!…")

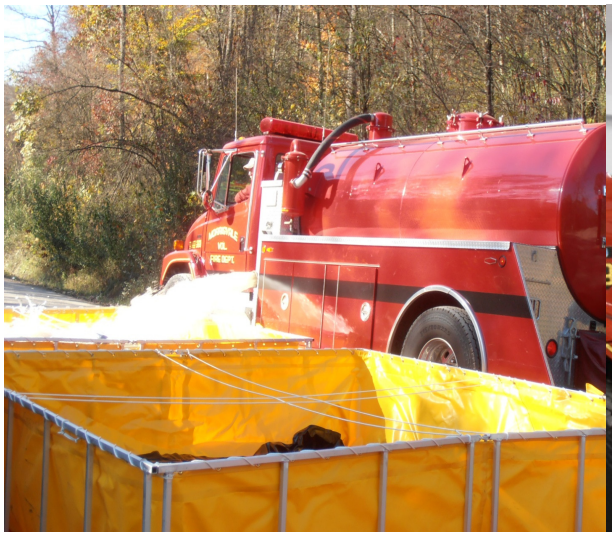
Accessing water near the fire scene and refilling quickly with low manpower- these are some of the major advantages of vacuum tankers.

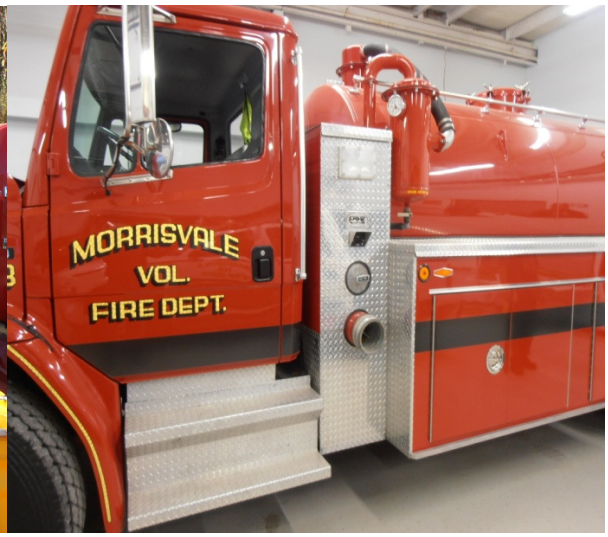


<u>Above</u>: One of four vacuum tanker suction points; Vacuum tankers can self fill at approx. 1,000 GPM through 6 inch suction hose. The stream above was 5-6 inches deep. The tanker driver can fill at this site by himself.

-<u>No waiting to fill</u>. There were two fill sites during the Morrisvale drill (approx. 1.1 miles in each direction from the dump site). There were literally 5 fill points at those two sites. Since there was one conventional tanker in the drill there needed to be one pumper set up to fill that tanker. The drill was on a dirt road which ran along Mud River. At each of the two fill site locations there were two points for vacuum tankers to fill. There were 5 vacuum tankers and there were four suction tubes available. Two tankers often ran right behind each other**. They could both fill at the same fill site at the same time @ over 2,000 GPM.** That was impressive!

- <u>Efficiency of Side Dump Tankers</u>. All six tankers at the Morrisvale drill could dump on either side and out the rear. With such dumping flexibility the tankers could dump into any and all of the four dump tanks at one pass. You can imagine the back log there would be if rear dump only tankers were limited to dumping into only one of four dump tanks. If you have a rear dump only tanker it can be inexpensively modified (90 degree dump chute elbow for about $300) to be able to dump to the side. This would greatly enhance your water delivery efficiency –especially when you attempt to deliver upwards of 1,000 GPM.





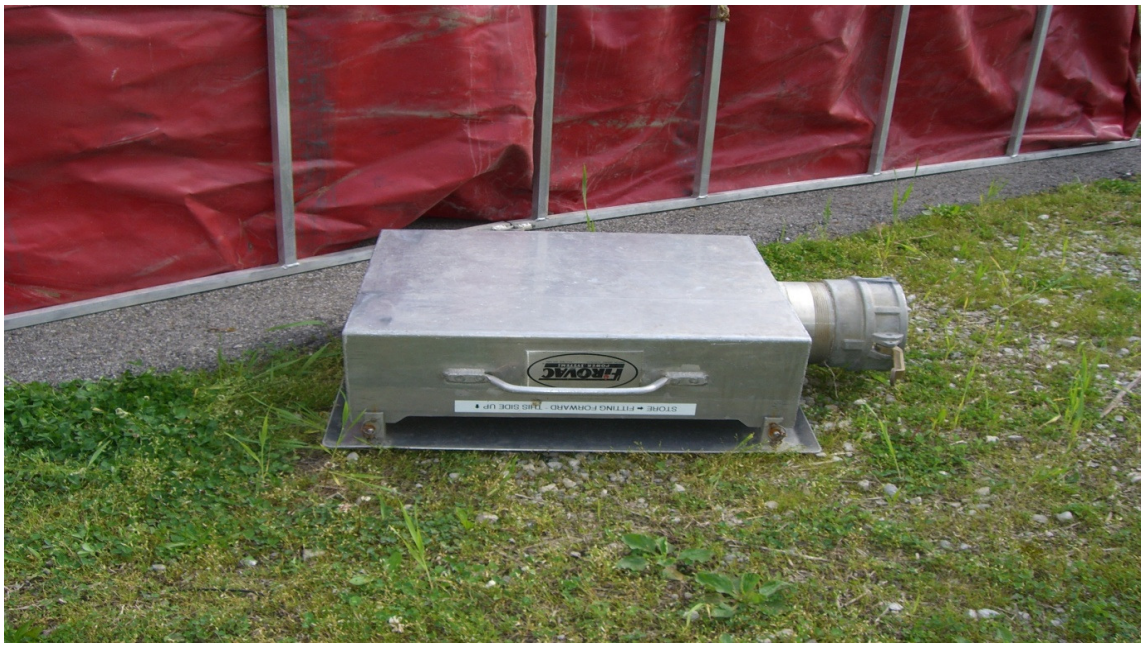
-<u>Side dumps on vacuum tankers are right up behind the driver's cab</u>. It appeared that there was no need for a spotter to help the tanker drivers line up with a dump tank. The dump valves were remotely controlled by the driver who never left the cab at the dump site. There was no need for someone to dart among the big trucks to operate dump valves –this would greatly enhance safety and **<u>reduce the needed manpower</u> at the dump site by at least 2 people.** There were very nice scene lights right above each of the three pressure dump outlets. This would surely work very well for night time operations. **The vacuum tankers were totally self contained –the driver needed no assistance either filling or dumping. I can see <u>just two people</u> operating the dump site: the pump operator and a person to keep the jet siphons and floating pumps going.**

-<u>Tankers turned empty</u>. A loaded tanker is harder to maneuver and tankers with dual rear axles turning on pavement really dig into the pavement. Due to their extensive experience the Morrisvale tanker drivers instinctively drove on down the road to an intersection to turn the empty tankers before coming back to the fill site to suck up a load of water. Whether you use conventional or vacuum tankers this is a good practice that comes with experience.

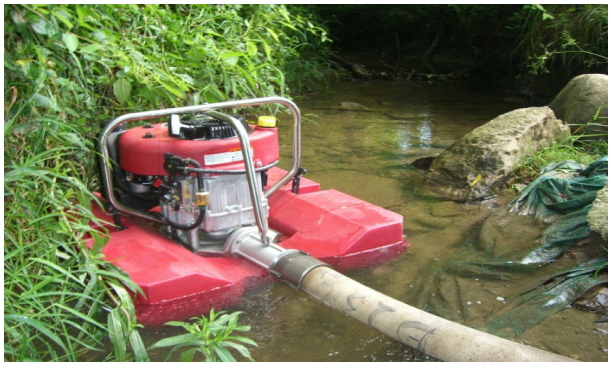
***No waiting to dump and no waiting to fill –that's the key to moving big water*!**

A tanker sitting still is not moving water!

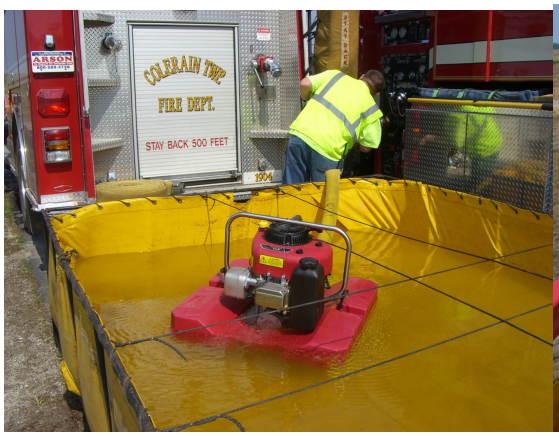
Think of pit stops in NASCAR: There are <u>two</u> pit stops per lap during tanker shuttles! The race can be won or lost in the pits.



-**<u>At the fill sites the vacuum tankers used the patented Firovac low level/floating strainers</u>**. It was worth the drive down from Ohio to see how well this strainer works. The fill site I visited had 5-6 inches of water available in the stream along the road. Morrisvale FD has documented using this strainer in as little as 4 inches of water. The stream bed had no visible rocks. The stream bed was just mud and muck. The water was so shallow that the low level/floating strainer settled right down on the bottom of the stream bed. When I looked in the dump tanks after the drill there was no debris in the bottom. **The water was pulled into the strainer from the sides. This is in contrast to barrel strainers or floating dock strainers which suck up from the bottom. What depth of water is needed for those types of strainers? I believe that the suction strainer is a major factor in determining what water source is accessible to a vacuum tanker**.



Our floating pump can access water 3-4 inches deep which is nice but it also sucks up from the bottom, picking up debris. I've often thought about building a tray for underneath the pump to simulate how the Firovac strainer works.

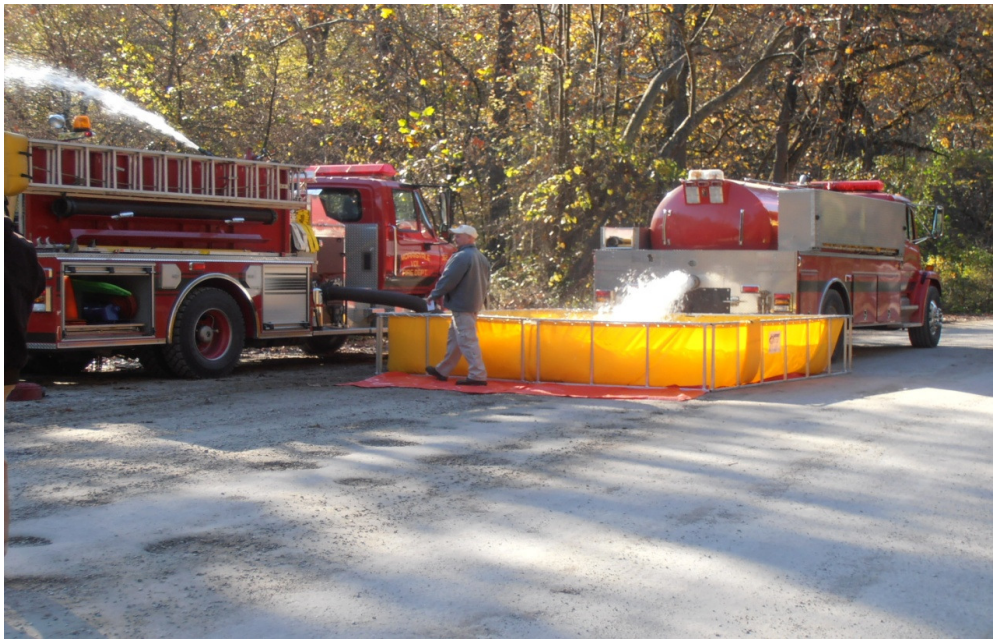


Above: Floating pumps can be used to move water from rectangular dump tanks behind a pumper to the drafting dump tank in front of the pumper as part of the single lane water supply set up. Tankers can travel in the other lane. Side dumps make it possible for a tanker to dump in any of four dump tanks in one pass.

-**Floating pumps can play many vital roles.** During our I.S.O. certification test in 2001 we used a floating pump the same way as the Morrisvale dump site. The floating pump (although it is high maintenance) reduces the need to place a 2nd pumper at the dump site to move water between dump tanks. It causes congestion when another pumper is added to the dump site –especially if you are trying to operate in a single traffic lane.

-Self filling vacuum tankers can free up pumpers. We only have two pumpers (1,250 GPM & 1,000 GPM). We have several long lanes in our rural community which require laying LDH back the lane. One of our pumpers is needed to relay pump back the lane from out on the road. When we relay pump back a lane we have no pumper available to fill tankers (remember the delay involved in waiting for mutual aid pumpers to fill tankers). **During our 2001 I.S.O. certification test we only got credit for one pumper for fire scene pumping capacity.** The other pumper didn't count because it was not attacking fire-it was filling tankers! If we don't need pumpers to fill vacuum tankers we can park that pumper at the I.S.O. mock fire site and get credit for its pumping capacity or during an actual fire that pumper can be on hand at the scene as a back up to the attack pumper. **Besides getting 100% I.S.O. credit for water tank capacity vacuum tankers can also help you get maximum credit for all of your pumpers.**

-Vacuum tankers can very efficiently remove residual water from Large Diameter Hose: Fire fighters really hate to think about picking up 1,000 ft. of LDH after they have spent several hours fighting a fire. It is a ton of work breaking the lines and walking water out of the hose. Then you have to bend over and reconnect the lines. **A vacuum tanker can be used to blow the water out of the hose line. This eliminates 3 out of the four steps involved in putting LDH back into service after a fire.** Now putting 1,000 ft. of LDH back into service is a relatively simple 15-20 minute job of reloading the empty hose on the truck as you drive back down the hose line.



Above: Morrisvale's 2,000 gallon vacuum tankers deliver the full 2,000 gallons of water every trip. They self fill completely; don't lose water as they travel from fill site to dump site; and dump completely. -

Vacuum tankers are 100% Efficient. Just because you have a tanker with the capacity to hold 3,000 gallons of water doesn't mean that you can deliver 3,000 gallons per trip to a fire scene. We have done dump tests on our conventional tankers. It was very disappointing what percentage of the water tank capacity of the truck actually makes it into the dump tanks.

You can do a simple dump test to get some idea of how your tanker is performing. You can use a yard stick to measure the depth of water when you dump your tanker into a dump tank. If your dump tank holds 3,000 gallons and is 30 inches tall then 1 inch of water is approx. 100 gallons. You can measure the amount dumped in the first minute and then at 30 second intervals after that. Weighing the tanker on commercial scales would be more precise but the simple yard stick method is economical, quick, convenient, and effective.

How much water does your tanker lose going up and down hills while traveling to the fire? I've seen a tanker lose almost 50% of its water traveling to a fire scene.

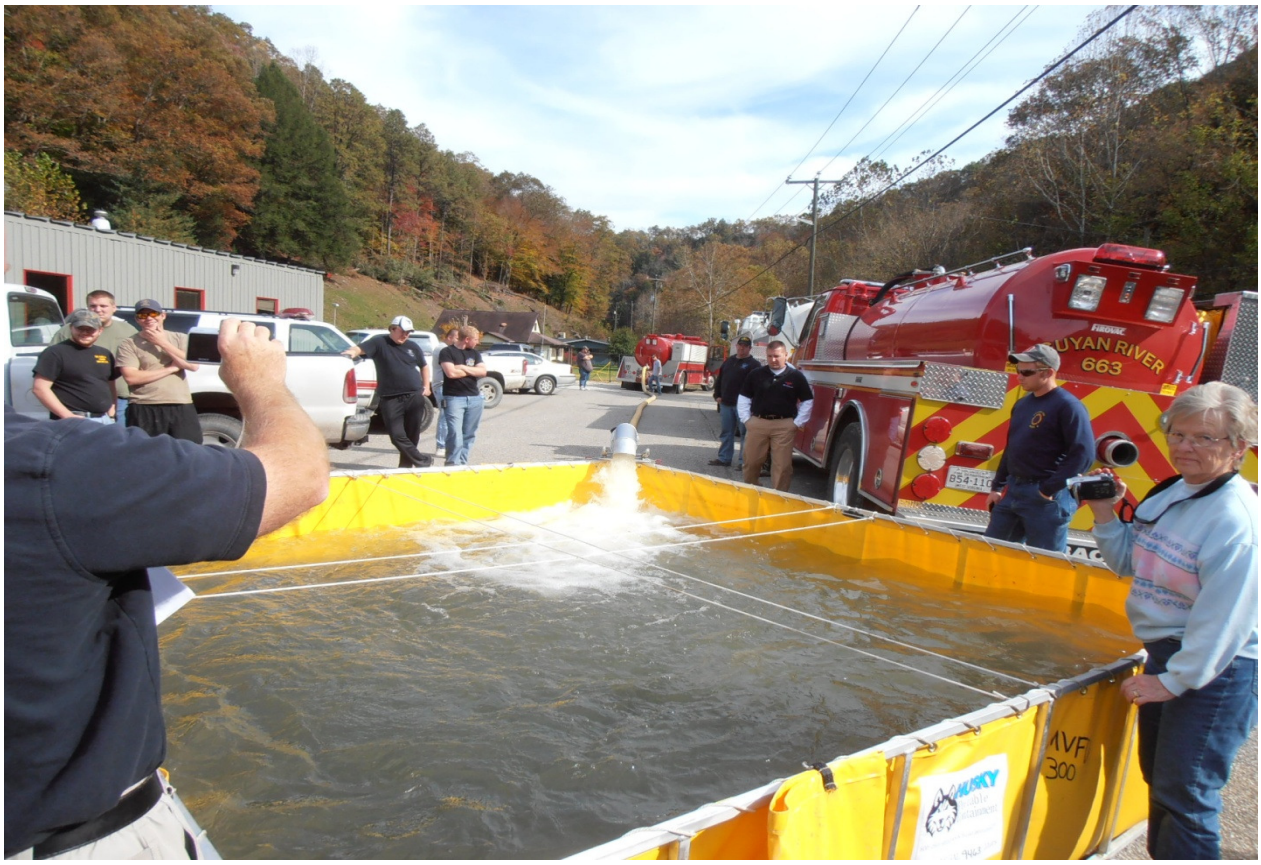
When I.S.O. gives you credit for 90% of the conventional water tank capacity as deliverable water they are being very generous. I've seen some 3,000 gal. conventional tankers delivering no more water (below 70% of rated capacity) than an efficient 2,000 gal. conventional tanker. The 2,000 gal. efficient tanker was designed to dump 99% of its water capacity in 90 seconds. **Should water delivery performance be included in tanker specifications? Would you accept a 1250 GPM pumper that will only pump 863 GPM?** We test our pumpers every year. Do we ever test our tankers? You can't pump water on a fire that never arrives on scene.

I.S.O. gives vacuum tankers 100% credit because they deliver 100% of their tank capacity to the fire scene every trip with no spillage of water on the road way.

-Vacuum Tankers can reach many water sources previously written off as "too hard to reach." One of the mutual aid tankers crews at the Morrisvale drill reported that they once had an incident where the pumper set up to fight a large fire. There was a stream down over a high bank just out of reach of the pumper. The vacuum tanker had no problem drafting from the stream. After filling its onboard tank the vacuum tanker pushed the water out of its tank into a dump tank for the pumper to draft. If I remember correctly **one vacuum tanker used this set up to supply over 500 GPM to a pumper for the duration of the fire (several hours).**

Morrisvale FD had water sources so scarce that they had to create their own! They have developed a system of underground water storage tanks. They have dry hydrants installed in those tanks. Morrisvale FD was the first department in the United States to earn a Class 6 I.S.O. rating using the underground tanks and no hydrants.

We have drainage ditches along the roads and seasonal holes of water under bridges not reliable enough to invest in dry hydrants and very difficult to draft with a pumper (even portable pumps would be hard to use) -here a vacuum tanker would excel**. Four inches of water is not enough for a traditional dry hydrant (8 inch pipe and strainer) but is enough for a vacuum tanker using the Firovac patented low level/floating strainer!** I believe we can think of vacuum tankers as "portable dry hydrants."



Above: After the tanker shuttle drill at Morrisvale West Virginia a test was conducted to determine the water movement capabilities of vacuum tankers. A 2,000 gal. vacuum tanker used only vacuum tank pressure of 15 lb. to push water at 922 GPM through 100 ft. of 5 inch LDH to a dump tank. There will likely be many more such tests to demonstrate the many capabilities of vacuum tankers.

-<u>Fireovac Demo Results</u>. We had Larry Reber from Firovac Power Systems demonstrate a 3,000 gal. Firovac Vacuum Tanker at our fire station this past spring. He pulled up to our 3,000 gal. dump tank and off loaded the full 3,000 gal. at nearly 2,000 GPM (1:32). He sucked the water back up at 1,333 GPM (2:15). (**Note:** These figures are my calculations based on just one time trial- these are not certified performance standards quoted by the manufacturer.)

<u>Above</u>: Vacuum tankers have no problem sucking water through long lengths of suction hose. They can also push large volumes of water through this hose under low pressure. The more you study vacuum tankers the more versatility you discover. **How much more water in your protection area is available to you with the above setup?**

Mr. Reber then proceeded to lay out all four sections of his suction hose and 3 sections of our 6 inch suction hose (he had an adaptor to connect cam lock to NST -if he didn't have an adaptor "duct tape would have worked"). He was now moving water through 78 ft. of 6 inch suction hose. With the hose attached to his floating/low level strainer in the dump tank Mr. Reber sucked 900 GPM back into the tanker from 78 ft. away on level ground. When he reversed the pressure pump he pushed the water back into the dump tank <u>through the strainer</u> at a rate I calculated to be 1428 GPM. This is more than GBW found when they flowed from a vacuum tanker through 100 ft. of 5 inch LDH into a dump tank. Of course we had less friction loss from 6 inch suction hose vs 5 inch LDH and 22 ft. less in hose length.

It appears if operating on level ground you are basically limited by how much suction hose you have available. Many departments who own vacuum tankers now wish they had set them up to haul more suction hose. Does anyone else have sections of 6 inch PVC pipe left lying around after a dry hydrant installation (most departments now use 8 inch pipe for the horizontal runs)? Could these sections, connected with duct tape, extend the reach of your portable dry hydrant…oops…I mean vacuum tanker. (Another possible test of vacuum tankers: compare how vacuum tankers pull water from dry hydrants vs. conventional pumpers.)

-<u>Vacuum tankers protect pumpers in cold weather</u>. During cold weather it would be nice if every pumper in a 20 mile radius is not used up pumping water into tankers. If you have a fire in cold weather it is prime time for multiple fires in your area. **Vacuum tankers pump air not water. I think they can excel in cold weather.** As of this writing Firovac in Applecreek Ohio is building a vacuum tanker to serve in Alaska. I am anxious to see this truck when it is finished. What if you could keep some of the back-up pumpers in warm fire houses ready for the next fire. The fewer fire fighters out in the cold the fewer chances of getting someone hurt on ice.

-<u>Why can vacuum tankers get started drafting water far more quickly and efficiently than conventional pumpers</u>? During tanker shuttles pumpers often need to draft using 30 ft. or longer suction hoses. It is often a challenge to get these suction lines primed. After watching vacuum tankers instantly sucking up water I've become more aware that getting started drafting water doesn't need to be such a difficult, time consuming, unreliable, and stressful task to complete during an emergency situation. I began to think that there needs to be a quicker more reliable way to establish draft. Our pumpers still have the old electric motors and oil primers (which rarely last two years!). They pull about 300 amps to run. That whining of the primer is a haunting sound.

Experienced pump operators have developed many techniques to help establish prime: back filling the suction hose with tank water and using the old jet siphon/turbo draft tactic-using the venturi effect from a 1 ¾ inch line hooked to the low level strainer. These methods combined with the whining of the electric primer usually work. But if you have used up your tank water on initial attack you don't have any water supply for these two methods unless another truck shows up to supply more water or can help prime your pump.

Today at very little if any additional costs air primers are being installed on new pumpers in place of the old electric motor primers. The air primer works off your air brake system (this air system is not needed while sitting still at a fire).

Air primers have the following advantages:

-quicker priming (12-15 seconds vs. 20 seconds to prime);

-no electric needed (vs. 300 amps for electric primer)(this makes more electric available for 12 volt LED scene lights)(can you do without the difficult to start lighting generator and the cabinet space it consumes?);

-no moving parts;

-less noise;

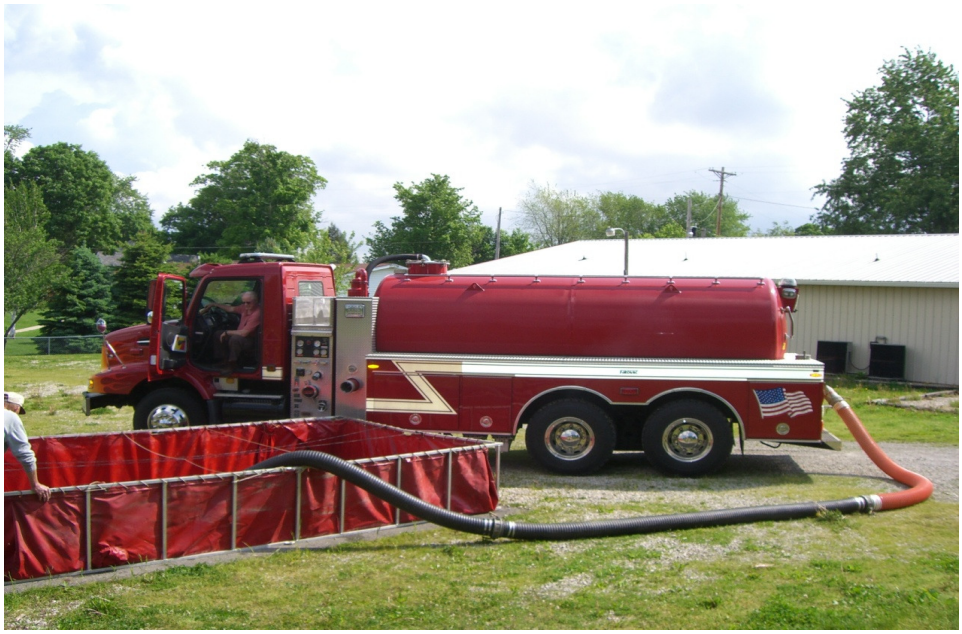
-lower annual cost of ownership.

I checked with a fire truck service center. They were willing to retrofit our 1250 GPM pumper with an air primer system for $1,972.00 (at their facility).

Note: If you can cut your dump site pumper priming time during your I.S.O. drill could this help you set up within 5 minutes and avoid needing a nurse tanker being tied up while you are setting up your dump site? What impact would this have on your overall water delivery? What if **<u>one</u>** fire fighter could quickly get that tanker refilled and back on the scene in less than 20 minutes? (This is easy with a vacuum tanker!)(Also possible with a conventional tanker if you have hydrants available.)

-<u>Can vacuum tankers provide any advantage if you have a hydrant within 1 mile of any fire exposure</u>? The short answer is **yes**. Just because we have hydrants in our coverage area it doesn't mean that the hydrants will flow 1,000 GPM in filling tankers. In our rural area we have 6 inch water lines. Like many rural water systems the lines were not sized for fire flows. They were intended for domestic consumption only. In fact our hydrants are called "flushing devices" by the rural water company-they are used to flush the lines. The average maximum flow from these flushing devices is 450 GPM.

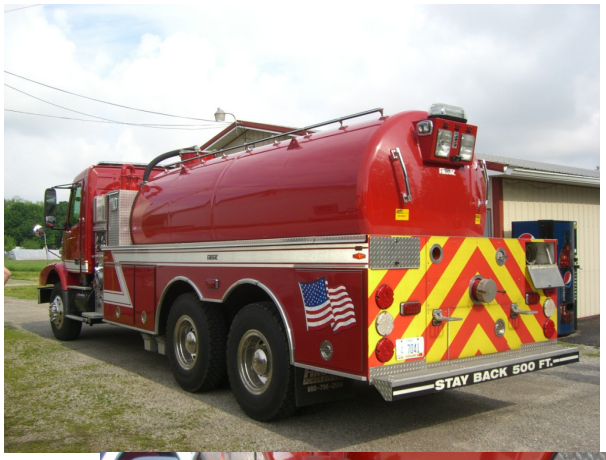
A recommended practice with hydrants of this size is to set a dump tank next to the hydrant and let the water free flow from the hydrant into the dump tank. A pumper drafts from the dump tank to fill conventional tankers at the optimal fill rate of 1,000 GPM. The dump tank refills between tankers. This set up is even used if a hydrant will flow 750 GPM-you still get that gain in net flow from the hydrant plus you provide for a steady even flow from the hydrant with limited water hammer on the water lines from rapid opening and closing of hydrants.

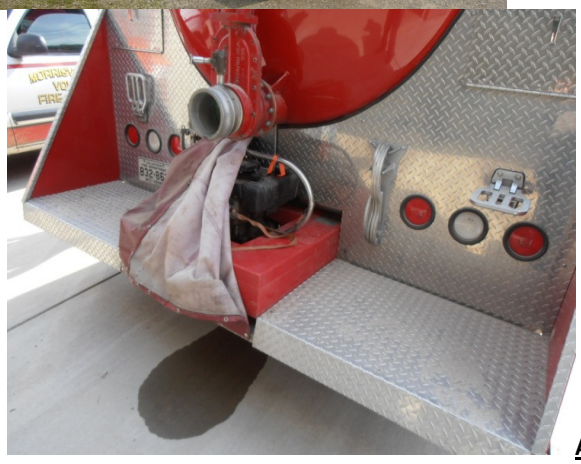


Having a dump tank set at a hydrant is one of the many ways to take advantage of the self fill capability of vacuum tankers. If only vacuum tankers are operating at this site there would be no need for a pumper to be consumed at this location. As noted before it is beneficial for many reasons to conserve pumpers and man power. I've seen some vacuum tankers with two dump tanks (one for the dump site and one for the fill site). What if one of the second or third responding tankers, while enroute to the fire, sets up a dump tank at a hydrant so it could be filling and be ready for the first arriving tanker? Of course this would cause a delay of 4-5 minutes for the truck stopping at the hydrant. It would depend on how urgently that second or third vacuum tanker is needed at the fire scene.

A Note of Caution: We need to respect and preserve our small water lines. If you have ever watched a water line being installed you would be surprised to see how the sections of pipe are "connected." One end of the water pipe has a bell housing with a gasket. The sections of pipe literally lay end to end against each other with no clamps. Any water hammer will cause them to blow apart at this junction point. In cities the water system was designed for fire flows. Other (rural) water systems are not designed for fire flows. Fire fighters drive the water companies with small lines crazy! Please, please open the "flushing devices" slowly and close them slowly. Creating water hammer is in effect vandalism. Sure by law we have the right access the water but we don't have the right to knowingly contaminate someone's drinking water**. Setting a dump tank next to a hydrant allows for a steady gentle flow of water with no continuous water hammer plus you can actually get more net flow.**

Never hook a vacuum tanker directly to a hydrant with suction hose. If you are able to pull a vacuum on water lines the damage which can be done in just a few seconds could be extensive. Would your local water company be worried about fire fighters running around with a vacuum truck? Yes! Education of all concerned would be critical**. The water company needs to be taught that a vacuum tanker can be a tool for preserving water lines instead of destroying them.**





Above: (Left) Easy access to suction hose is one of the convenient features of vacuum tankers. (Right) Easy access to "difficult to handle" floating pump. The ease and convenience of reaching heavy equipment is important.

The vacuum tankers I've seen have the suction hose carried in rear slide-in cabinets at shoulder height –only **one person** needed to handle a section of suction hose. It takes 2

"acrobats" and two helpers to put suction hose back on high side pumpers – not good. There needs to be more attention paid to ergonomics when designing fire trucks. Easy and quick access to equipment is important. Check out the small but mighty ergonomic fire trucks at *www.blanchatmfg.com*. After seeing the Minuteman truck you will reexamine how things are stored on your larger trucks. Mr. Blanchat says,"…There's always a better way to build a fire truck." You can also say **there's always a better way to move water to a fire scene.** What about the next time you order a pumper consider rear suction (a $4,000 option-superior to front suction in price and performance); If you preconnect the suction hose and strainer one person can be drafting from a dump tank in just a few seconds! It may not look pretty but "functional" beats "pretty" any day when you are concerned about efficient operations.

Conclusions: -I've been doing a lot of figuring since having this eye opening experience in West Virginia**. I think it is possible to have 1,000 GPM available at future fires and only need one person and one 3,000 gal. vacuum truck from our department involved in water supply!** We would only need 4 people and 4 3,000 gal. vacuum trucks from neighboring departments (one from each department) to achieve this exceptional water supply. We could have this huge water supply without exhausting the manpower and resources of a 370+ sq. mile area. Large vacuum pumper/tankers cost no more than very modestly priced pumpers.

Can you imagine: 5 tanker drivers + 2 dump site people = 1,000+ GPM OR **143 GPM per person!**
(5 X 225 GPM = 1,125 GPM)

During our most recent tanker shuttle drill we determined
that it would take 23 people;
9-10 of our current tankers;
and 4-5 pumpers to deliver 1,000 GPM. ……. That's **43 GPM per person.**

Vacuum vs. Conventional Tankers:

6 trucks vs. 15 trucks to move 1,000 GPM

7 people vs. 23 people to move 1,000 GPM

Besides being a fire fighter I'm also the Township Fiscal Officer (The guy that pays the bills). I'm constantly calculating what we can afford:

- **I can't help but wonder how much fuel would be saved over the course of a long fire incident if you were running 6 vs. 15 trucks.**

-During these tough economic times governments are asked to do more with less. Vacuum tankers are the perfect example of getting more bang for your buck.

Investing in vacuum tankers is like investing in a foam system for a pumper. A 10%-25% increase in vehicle cost is worth the 100%-1,000% increase in vehicle performance. (An example: $9,000 for simple around the pump foam system gives 100% increase in fire suppression to your water; cut water tank to 750 gal. from 1,000 gal.; more storage; pumper can now be rescue pumper; only one truck needed at car wreck; can get rid of rescue truck-sell pumper and rescue get newer pumper with less maintenance costs.

Like fire fighting foam vacuum tankers are a revolutionary concept that will require education of fire fighters on its potential. I've often thought that a good demonstration of vacuum tankers would be to hold a conventional tanker drill in the morning, eat lunch, and watch a small number of vacuum tankers move the same amount of water in the afternoon at the same dump site. Once you see 4-5 vacuum tankers work as a group with limited man power you'll be convinced. You must read the article "Vacuum vs. Conventional: A Factual Comparison" by Jason Estep (a member of Morrisvale FD of course!) This article is available on the GWB website). In this article Mr. Estep describes a demonstration of two vacuum tankers operating right next to a conventional tanker fill site. This is probably the best comparison available. It would be great if Morrisvale FD could recreate that demonstration! I think this would be an excellent test to document on the GBW website.

About the author: Charles Clark is retired school teacher/farmer/township fiscal officer who has been bitten by the water movement bug since 1983. He is a member of the Colerain Township Volunteer Fire Department in southern Ohio which was founded in 1983. By the fall of 1985 the department used two old pumpers and three military surplus tankers from the Ohio State Department of Forestry (total investment of only $17,000 in vehicles!) to become the third department in the state of Ohio to get a Class "7" I.S.O. rating without the use of fire hydrants. They did a tanker shuttle drill from a small stream. At that time a water supply system capable of the same fire flow (500+ GPM) would have cost over $2.8 million. The typical home owner was saving at least $100 per year in home insurance premiums. The tax levy cost about $42 per home per year. The average homeowner was making a profit from the fire department!

In 2001 the Colerain Twp. FD recertified with I.S.O. with a tanker shuttle drill which peaked at 1,080 GPM. The unique feature of this drill was the use of rectangular dump tanks in a single traffic lane water supply set up.

Like Morrisvale FD in West Virginia and numerous departments throughout the United States, Colerain Township FD had to invent or discover on their own many of the concepts now used in moving water to fire scenes. When we got access to Larry Davis' book on rural water supply many of us read it with joy and said "Yep, been there done that." What a thrill it was to discover the *www.GotBigWater.com* website. This very professionally produced website is a great place to share ideas on how to transport water to a fire scene. Be prepared to become addicted to the many informational presentations on this website.