



Western Berks Fire Department Training Bulletin

Tanker Operations

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Purpose Statement

This training bulletin has been developed to provide information on operating a tanker in a safe manner.

Scope Statement

This training bulletin applies to all members and employees of the Western Berks Fire Department.

Background

This training bulletin is a reprint of an article that appeared in the March 2014 edition of "Fire Apparatus & Emergency Equipment" magazine.

Tankers/Tenders: Keep Them on Their Wheels

If you are on the East Coast, you know them as tankers. If you're on the West Coast, you know them as tenders.

And, if you're in the fire service, you know them as being the smallest percentage of fire apparatus out on the road with the highest chance of getting killed if you are involved in an accident with one.

Additionally, tankers/tenders have not been immune to the current trend of building apparatus that can perform more than one function. Multipurpose designs have also impacted the tanker/tender market where today we have pumper-tankers and tanker-pumpers. The combination apparatus are sometimes longer, carry more equipment, and can carry more personnel than their two-door, straight water hauler brethren. What is common among whatever type of tanker/tender your department might own is that it will carry at least 1,000 gallons of water. According to National Fire Protection Association (NFPA) 1901, Standard for Automotive Fire Apparatus (2009 ed.), "The mobile water supply apparatus shall be equipped with a water tank(s) that meets the requirements of Chapter 18 and that has a minimum certified capacity (combined, if applicable) of 1,000 gallons (4,000 L)." Although the minimum tank capacity is 1,000 gallons, departments often have larger tanks, and it is the amount of water carried that is a major difference in how a tanker/tender operates vs. a custom pumper.

As with many things, awareness is key. Fire apparatus today is extremely easy to drive. Gone are the days of double clutching and stalling if you don't find the next gear in time. The pool of drivers is far wider and deeper than ever before. But, drivers and operators must be aware of how different a tanker/tender is and why to operate it safely.

Water Weight and Motion

The main difference between a custom pumper and a tanker/tender is the amount of water it carries. Some tanker/tenders are straight water haulers with small pumps on them, while others are designed more as first-out pieces, carrying enough equipment to function as Class A pumpers. Regardless of the type, the handling of a vehicle carrying 1,000 gallons of water or more is going to be different than a truck carrying a 750-gallon water tank. Water in motion directly impacts how the vehicle handles.

One gallon of water weighs slightly more than eight pounds. So, tankers/tenders compliant with NFPA 1901 will carry approximately 8,340 pounds of water. With that much extra water weight-weight that is in motion-operating the apparatus is impacted. "It doesn't matter if you're in a commercial two-door with 3,000 gallons of water or a big four-door custom eight-person cab with 2,500 gallons of water," says Mike

Wilbur, president, Emergency Vehicle Response. "The laws of physics dictate that if you don't drive them conservatively at a slower speed and pay attention, you will flip them over. The laws of physics are very unforgiving."

Firefighter Jim Moore, Miami-Dade (FL) Fire Rescue Department, agrees and says the difference between operating a tanker/tender and a custom pumper is the dynamic load of the water itself. "It's a high center of gravity, and when you brake and turn, the longer you are braking and turning, the more apt the vehicle is to roll over and react in a way you're not expecting," he says. "The tanks are baffled. But as you are turning, such as on a full 360-degree cloverleaf, enough water will go through the baffles and climb up the side of the tank that you will have to reduce your speed."

An important point regarding water in motion is driving a tanker/tender when it is half full—a practice that is not recommended. "You see the most drastic change in characteristics while driving if [the tank] is half full," says Moore, "because there is space for the water to disperse to one side and give you a severe load change, making it really heavy on one side, which taxes the suspension on one side, which makes it dip, which makes it worse, and can cause a rollover. But when it's full, there's really no place for the water to go, so it can't cause as much of a difference in weight distribution."

Moore cites one unit in his department as an example of how a tanker handles vs. a custom pumper. "We have one 4,000-gallon tanker," he says. "It's a two-person vehicle that is more a water tender. It doesn't have a complement of hose. It has no ladders, just a tank and a pump. It's the hardest one to drive. It's not going to get anywhere fast even if you want it to. Even at 500 horsepower, there are 37,000 pounds of water on the truck when it's full. So it takes a long time to get up speed, and therefore it takes a long time to stop it."

Another example cited by Moore is the speed at which drivers will take highway off ramps. "I know that when you're in your personal car or even sometimes a fire truck and you go on an off ramp that says it has a 40-mph speed limit, we have guys taking it at 45 or 50 all the time. If you do that in a tanker, you're not going to be at the other end of the road when you come out of that turn. You're going to be on your side someplace because you need to go almost half of what the posted speed is for an off ramp."

Combination Apparatus

Technology has allowed apparatus manufacturers to build trucks that wouldn't be considered even 30 years ago. "The apparatus industry has done such a good job providing components—larger tires, larger axles, and larger brakes," says Wilbur. "A truck that we just recently opened the bids on has a 24,000-pound front and a 60,000-pound rear. That's 84,000 pounds of gross vehicle weight. If you get a true tanker built for fire department use to the NFPA 1901 standard, they are far safer than they've ever been."

This technology has allowed departments to build tankers/tenders that are essentially first-out pumpers. They carry the equipment required to be pumpers, larger pumps, and space for sometimes up to eight personnel. These trucks are larger, longer, and sometimes a little wider than many are accustomed to operating. These pose different challenges, with the advantage of 80 percent of their weight not being water. "They're usually a little taller and a little wider at the top," says Moore. "But basically they look like a hazmat unit or some other specialty unit because they're not quite as tapered at the top because they've got a bigger tank. But, they carry the same amount of hose as a fire truck. They have the same size pump, at least our department does, and they have four personnel in them."

In Miami-Dade, the department considers tankers firefighting rigs with bigger tanks, whereas its 4,000-gallon hauler is a tender. "The fire truck has all the amenities: the compartments with all the gear in them and the pump, which is bigger than our water tender." Another difference is how the load is distributed. "The pump on a fire truck weighs thousands of pounds, so the load is more evenly distributed when it's a full complement, four-person firefighting rig that just happens to have a bigger tank and therefore is called a tanker," Moore adds. "The tanks are square, and I think they're a little lower than what would be considered just a water tender or tanker. But, the tanker that has all the compartments and the gear and the hose and four personnel has equally as much weight on its framework and nonliquid content as it does liquid content. So, it doesn't get affected as drastically as a vehicle that has 80 percent of its weight as water."

He continues, "Our regular fire engines have 750-gallon tanks in them. Our tankers have 2,000-gallon tanks. They're slower. They just feel cumbersome when you're driving them. They don't react as quickly. The same characteristics apply if you have a dynamic load and more than half your truck weight is water."

Reducing Tanker Crash LODDs

To both Moore and Wilbur, the key to reducing tanker crashes and the LODDs that often come with them, like so many other aspects of this business, comes down to training. However, they approach the training issue from different perspectives. Moore espouses more stringent driver training and more continuing training. Wilbur cites the changing talent pool coming into today's fire service and the time constraints placed on it from every direction as real challenges to overcome when qualifying operators on these rigs. Additionally, technology has made it easier than ever to drive these trucks, and Wilbur says technology advancement may now be outpacing the fire service's ability to keep up.

"They have, in my opinion, outpaced the fire service's ability to take 20-something-year-olds who have only driven vehicles the size of their compact car and have enough time to train them to properly operate such big heavy equipment. I think we're at a precipice now."

Because the trucks are so easy to drive, the fire service has lost one way to vet drivers it had in the past. "When I broke in, the first truck that I learned on was a 1947 Mack," says Wilbur. "It was a double-clutching son of a gun. Standard transmissions in that era acted as eliminators. If you couldn't shift it, you couldn't move it. Chances were good that you shouldn't be behind the wheel. Now we have automatic transmissions. Everybody can drive it. You put it in 'D' for drive, you push a pedal, and you're going down the road."

The pool of potential firefighters is changing as well. "When I joined the fire service in 1974, there were 19 people on the drivers list," Wilbur asserts. "Seventeen of them had commercial driver's licenses (CDLs), and 13 of them drove trucks for a living." He contends that because the fire service doesn't have that group of commercial truck drivers anymore, we now have newer members who are 20 years old, or even younger, driving fire apparatus who up to that point had driven nothing larger than a compact automobile in many cases. "The largest thing they've ever driven is a car that weighs 2,000 pounds, and now they are behind the wheel of a 2,500- or 3,000-gallon tanker."

Wilbur theorizes that on the volunteer side of the business, the need to work, go to school, and have a family life has eroded the time that a volunteer firefighter has to train. "Now we have something that requires far more training because the personnel trying to do it don't have any heavy truck experience. At the same time, we have these people who need to work two jobs to support their families. Or, they commute long distances and just don't have the amount of training hours available. The volunteer fire service today vs. 20 years ago is vastly different. So that plays a role."

For Moore, safer operation comes right back to training. "I think we all need more stringent driver training than we have and more ongoing driver training than we have," he says. "I think there should almost be CDL-type training for all drivers. I think it should be a CEU-based certification like everything else we do."

Lights and Sirens

Wilbur and Moore have different thoughts on lights and sirens for tankers/tenders. In many ways, equipping these apparatus with lights and sirens boils down to how they will be used. It's not so easy to just say that tankers/tenders should not have red lights and sirens and should only operate at 40 mph. Their combination counterparts that are first-out rigs make that a hard argument. "What's a pumper-tanker and what's a tanker-pumper?" asks Wilbur. "A pumper-tanker is a Class A pumper with a lot of water. A tanker-pumper is a mobile water supply apparatus that happens to be equipped with a rated fire pump." Wilbur agrees with the idea that there should be speed restrictions and lights and siren limitations for these apparatus but admits that the combination apparatus muddy the issue. "I don't want anyone rolling a truck and getting killed," he says.

"But who's going to make that call as to what this truck really is? How can you tell someone driving a two-door tender with 2,000 gallons of water and a 500-gpm pump that he can only use yellow lights and go 40 mph and then you have another truck that has a 1,500-gpm pump and hose and maybe 2,500 gallons of

water? Physically, what's the weight difference? There isn't any. So, how can you tell this group, Well, you only have a tanker, so you're going to get yellow lights. But, you have a pumper, so we're going to give you red lights and a siren when both vehicles are constructed the same, represent the same driving challenges, and represent the same weight? How do you tell one no and the other one yes?"

Moore adds, "The lights and sirens thing-that's kind of a judgment call. You can usually get through an intersection quicker with the lights and sirens. But by the time you get to the other side of the intersection, the light turns green and all those cars that you passed pass you because now you're doing 20 mph and it takes you a mile to a mile and a half to get it back up to 60."

Keep Them Upright

Ultimately, however, it comes down to keeping these vehicles on all ten wheels. Everything else discussed here funnels into keeping these trucks upright. Because if they do roll, it's no surprise to Moore that we lose firefighters. "It's real simple," he says. "It makes sense that we would have more LODDs involving tankers because here again, it's mass and movement. When you get that much mass moving, it tends to do more damage when it does come to an abrupt stop. It's just when you have that much weight moving 60 mph, it's going to take a long time to stop, even if it's not on its wheels. We need the water. We need the apparatus. It has its place. It just needs a little more respect."

CHRIS Mc LOONE, associate editor of *Fire Apparatus & Emergency Equipment*, is a 20-year veteran of the fire service and an assistant chief with Weldon Fire Company (Glenside, PA). He is a member of apparatus and equipment purchasing committees. He has also held engineering officer positions, where he was responsible for apparatus maintenance and inspection. He has been a writer and editor for more than 19 years.

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