Leak Prevention

Tank-nically Speaking

by Marcel Moreau

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Hmm...If Only Overfill Prevention Worked!

One of the people in the tank business I really enjoy talking with has his own business and has invented a number of UST-related devices, including vapor recovery, tank testing, and automatic line testing equipment. Over the years, he has introduced some of his children into his company, including his son. A few years ago at a trade show, I asked him where his son was.

"He's left the company," he said, "and he's really happy." His son had been in charge of marketing Stage II vapor recovery equipment for the company; he'd since switched to selling mountain bike gear and apparel. He loved being in a business where people actually wanted to buy what he was selling.

That comment stuck with me. It's true, UST regulations all too often force people to buy things they don't want. Sometimes, the regulations require things that make business sense to a forward-thinking person (e.g., corrosion-protected tanks).

Likewise, ATGs have become a very popular leak detection choice, not because buyers think they are great at finding leaks (as UST inspectors know, the leak detection function is frequently overlooked), but because the ATG provides more convenient and more accurate inventory data—a business benefit.

But sometimes rules seem to require frills that make no economic sense. "Why, when I bury a 10,000-gallon tank, can I use only 9,000 gallons of it? Why am I wasting 1,000 gallons of storage capacity?" asks the tank owner. If the buyer perceives no business benefit to the required device, chances are he or she will invest in the cheapest choice that meets the regulations.

The problem with overfill prevention is that the buyer (the tank owner) is not the user (the tank truck driver). The buyer, seeing no operational benefit to one device over another, chooses the cheapest, typically the float vent valve. If the tank truck driver were making the choice, how many drivers do you think would purchase a device that would shower them in gasoline if they had the misfortune of trying to deliver too much fuel into a tank?

Overfill prevention is not working because the hardware is not purchased by the end user, and as a result, the available hardware is not very user-friendly. Float vent valves can be a hazard to a delivery person's health, drop tube devices slow deliveries down, and alarms are a nuisance. Tank truck drivers are motivated to avoid, ignore, or otherwise defeat overfill prevention hardware that, in an ideal world, should help them do their job rather than get in the way.

So let's look at ways in which existing overfill prevention hardware can be neutralized and then describe what a tank truck driver's "dream device" for overfill prevention might look like.

Operator vigilance during delivery is critical to spill prevention.

The Light Dawns

It was some years ago in Texas. I had taken a class into the field to conduct UST compliance inspections. At one of our stops, I remember being somewhat puzzled at the sight of petroleum product within a foot or so of the top of an underground tank fill pipe. I looked over the paperwork for the facility and verified that an overfill prevention device was in place. I then checked with the facility operator, a well-intentioned gentleman who had only recently assumed responsibility for the storage system. He said that there had been a delivery into the tank the day before.

Wanting to know more about his storage system, the facility operator had spoken to the delivery person. The driver had mentioned a "pressure relief valve" adjacent to the fill pipe that was used to relieve the pressure in the tank to allow the tank to be filled completely.

Hearing this, I scratched my head for a few minutes, and then I knew...the light bulb in my mind shone brightly. Here's what was going on: The facility had a ball float valve overfill prevention device. By opening the drain valve adjacent to the fill pipe in the spill containment manhole, the tank could be vented through the drain mechanism, bypassing the float vent valve and allowing the delivery to continue. (See *LUSTLine* #21, "What Every Tank Owner Should Know About Overfill Prevention.") It was then I realized that for the float vent valve to work, the tank top had to be air-tight, and that, in fact, there might be many cases where this requirement might not be met.

The Case of the Bypassed Ball

A few weeks ago, while reviewing delivery records associated with a spill incident, I noticed some numbers that told a similar story to the one mentioned above. The delivery records included before- and after-delivery stick readings that the driver had made. The post-delivery liquid level readings included numbers like 112 inches and 98 inches; the ball float valve in the tank should have stopped the delivery at around 78 inches. Because the tank was only 92 inches in diameter, the records pointed to several instances where the ball float had been bypassed and the tank was filled right up into the fill pipe. This circumstance would almost certainly have resulted in a spill of the delivery hose contents—in this case, it also probably caused or at least contributed to a million-dollar cleanup.

The Case of the Missing Ball

I have also heard stories from installers about ball float valves that are found to be missing their ball. Examination reveals that the cage that normally holds the ball appears to have been subjected to some physical abuse. The likely scenario is this: Ball float valves are often installed directly below the Stage I vapor recovery riser. When delivery drivers clamp onto the vapor recovery fitting with their hose and adapter, they are, in effect, attaching a 10-foot-long wrench.

By kicking the hose counterclockwise, they can loosen the vapor recovery adapter sufficiently to be able to unscrew it by hand. Then they can insert their gauge stick down the Stage I riser and pound on the ball of the float vent valve until it drops out of the cage and into the tank. The Stage I vapor recovery adapter is replaced, and no one is the wiser.

Perhaps this scenario is initiated by the float vent valve sticking in the closed position so that the driver cannot even begin to make his or her delivery. In any case, the driver will no longer have the bother of a float vent valve that reduces the capacity of the tank or that causes him or her to take a hosing in product.

The Case of the Broken Stick

Drop tube devices are also a general nuisance in the eyes of most delivery personnel. At best, they slow down the product flow by restricting the working diameter of the drop tube. At worst, they malfunction so that they close even when the tank is nearly empty and product cannot be delivered into the tank at all.

In between, they interfere with taking the before- and after-delivery stick readings. As with the ball float, the frustrated driver can use the delivery hose and delivery elbow as a pipe wrench to loosen the fill adapter, remove the drop tube, and make the delivery. Other drivers merely break off the top of a gauge stick and drop it down the fill pipe, propping the valve of the drop tube device open so that it cannot close. This slows down the delivery somewhat, but at least allows the delivery to occur.

The Case of the Deaf Driver

Alarms, of course, can simply be ignored.

Why Overfill Prevention Doesn't Work

The point I'm making with all these case examples is that the overfill technologies that by now should be in universal use at all active motor fuel facilities are not user-friendly and can easily be bypassed or overridden. The long-term result is that tragedies such as the one that happened in Mississippi (see *LUSTLine* #30, "Inferno Kills Five and Critically Injures One...") or contamination cases such as the one described in my last ***Tank-nically Speaking*** article (*LUSTLine* #30, "The Holes in Our UST Systems") will continue to occur.

How Can We Make Overfill Prevention Work?

While acknowledging that we have come a long way in the implementation of effective UST technology in the last decade, we must also acknowledge that all is not perfect and that there is room for improvement. So in the spirit of Total Quality Management and continuous improvement in which the federal UST program was born, here is my vision of what a better overfill pre-

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Determining the ullage in a tank prior to delivery is critical to preventing overfill incidents.

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vention approach might look like:

- **An overfill prevention device MUST be user-friendly.** It should improve, rather than interfere with, the speed and convenience of making a delivery.
- **The overfill prevention device should be part of the truck, not the tank.** Overfill prevention that is based on the truck will allow the driver to deal with deliveries in a consistent and uniform way, avoiding any traps for the unwary driver. Right now, a driver does not necessarily know whether he or she is dealing with a float vent valve, a drop tube device, an alarm system, or some combination of these. The driver may be able to see a drop tube device, but it is not unusual for installers to put in both a float vent valve and a drop tube device. This could result in a most unpleasant surprise to the delivery driver if the float vent valve closes before the drop tube device and the driver assumes that he or she is dealing with a drop tube device rather than a float vent valve. (See *LUSTLine* #21, "What Every Tank Owner Should Know about Overfill Prevention.") Having the overfill device on the truck should also have economic advantages, because there are many fewer tank trucks in this country than there are tanks.
- **The overfill prevention system should be bypass- and override-proof.** There should be no way for the driver to continue to deliver product to a tank that is nearly full.

What I envision is something like this: Imagine a small box mounted on the tank truck, conveniently located relative to the valves where the delivery hose is connected. This box is able to control the air-operated valve that is already present in tank trucks in the bottom of each compartment. The box on the tanker is able to communicate with a small transmitter located in the underground tank spill containment manhole. The transmitter would be connected to an inexpensive level sensor located inside the tank.

The control box on the truck would receive the tank-level information from the transmitter and display the volume of fuel presently in the tank. This would save the driver the time required to stick the tank, calculate the volume in the tank and the ullage, and record this information. This feature alone would endear this device to most drivers. The remaining capacity in the tank could also be displayed so the driver would know right away whether the volume of fuel in the truck will fit in the tank.

As the fuel flows into the tank, the volume of product in the tank and the ullage remaining would be displayed in real time. Conspicuous green, yellow, and red lights could be incorporated into the control box so the driver would know when everything was OK (green), when the tank was approaching the full level (yellow), and when the valve had closed and product flow was stopped (red). This way, the driver would be alerted immediately when product flow stops and would waste no time waiting around while no product was flowing through the delivery hose. When the drop is completed, the driver would insert the paperwork into a slot in the control box on the truck where a little date/time/volume stamper would print the initial and ending volumes in the tank and the amount of fuel delivered. Again, the driver would not need to stick the tank after the delivery and record the results.

The German Approach

A similar, but not so sophisticated approach has been used for many years in Germany. The German approach requires that the driver make an electrical connection as well as a hose connection between the truck and the tank so as to make a delivery. A high-level switch in the tank then closes a valve in the tanker when the tank is nearly full. I envision updating this technology by adding some wireless communication between the tank and the truck, so the driver has no additional work, as well as providing inexpensive level sensing in addition to valve actuation.

First and Foremost: Reliability, Safety, and Environmental Protection

The system I envision has the following advantages:

- It makes the delivery operation easier for the driver, because he or she would not need to stick the tank;
- It does not slow down the delivery by restricting the diameter of the drop tube;
- It makes draining of the hose after the overfill device has operated as fast as it used to be;
- From a public safety perspective, spilled fuel or the release flammable vapors during a delivery would be dramatically reduced, because this technique does not rely on the tank top being air-tight to work;
- The threat of "blow back" of fuel onto the driver is eliminated along with the need to "relieve the pressure" by using the drain mechanism of the spill containment manhole; and
- From an environmental perspective, reliable overfill prevention that drivers want to use rather than bypass would result in better protection of the environment.

The Reality of Overfill Prevention

As I see it, a major marketing obstacle for this solution is that it rests with both the tank and the truck. In most cases, the tank and the truck belong to different people, so this solution would require an ideological and financial investment on the part of both parties. Also, this solution involves the truck owner in the underground tank overfill business, an area that regulations have placed in the domain of the tank owner. On the other hand, the technology has the potential to make delivery mistakes much less frequent, thereby, perhaps, lowering insurance rates for both UST owners and fuel delivery companies. The technology should also shave a minute or two off the time required to make a delivery, which could create a financial incentive to invest in the technology.

Of course the biggest obstacle to this technology right now is that it doesn't yet exist—at least as far as I know. ■