Leak Prevention

Tank-nically Speaking

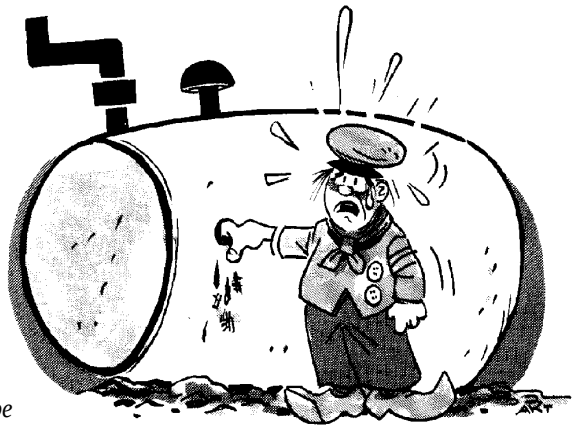
by Marcel Moreau

Marcel Moreau is a nationally recognized petroleum storage specialist whose column, ***Tank-nically Speaking****, is a regular feature of* LUSTLine**.** *As always, we welcome your comments and questions. If there are technical issues that you would like to have Marcel discuss, let him know at* **marcel.moreau@juno.com**.

PLUGGING THE HOLES IN OUR UST SYSTEMS

I've just returned from an exhausting week spent representing the interests of a city whose water wells are threatened by a release of MTBE from a service station. The situation is similar to one I described a few years ago. (See "The Holes in Our UST Systems," LUSTLine *#30.). A "state-of-the-art" storage system was the source of significant MTBE contamination. The storage system owner claimed that there could not have been a release from the double-walled system, that some wayward customer must have caused the problem by spilling a few gallons of gasoline.*

My analysis of the situation included the possibility of customer spillage as a contributing factor but also pointed out the likelihood of vapor releases, overfills, and failure of the secondary containment to capture every drop of product.



One of the questions addressed to me by the city was, "What could be done to prevent any future contamination from this facility?" While it is clear to me that the only guaranteed way to prevent future discharges is to remove the facility, this seems to be an unacceptable alternative. Given that the facility is to continue operations, what requirements could the city impose to provide maximum protection to its water supply?

As I pondered the answer to this question, it occurred to me that over the next few years quite a number of communities may be seeking answers to this same question. What follows is a preliminary list of measures that I believe could be effective in minimizing contamination from UST facilities. These measures are intended to supplement double-walled systems. The first and most important measure to take if you have a single-walled system is to upgrade to secondary containment.

Clearly, not all measures would need to be implemented at all sites. A site-specific evaluation would be needed to determine which measures would be most effective for a given location. I present this list here to stimulate thought and promote discussion.

Some Leak Minimizing Measures

[NOTE: This list assumes that the UST facility is in full compliance with all existing regulatory requirements concerning corrosion protection, leak detection, spill containment, and overfill protection. The issue I am addressing is that regulatory compliance does not provide assurance that releases of gasoline will not occur from operating UST systems.]

■ **Ensure that secondary containment is tight.** We learned long ago that primary containment systems do not remain tight forever, yet we blithely assume that this will be true for secondary containment systems. The integrity of secondary containment systems must be verified periodically. This includes the outer wall of tanks and piping as well as piping sumps and dispenser sumps. Florida and California have headed down this road and it is something that is well worth doing.

■ **Ensure that secondary containment catches everything.** A facility I inspected recently showed evidence of a liquid release (staining) from vapor recovery piping in the dispenser cabinet. Following the trail of the stain, it became apparent that the liquid release flowed down into a crack between the dispenser containment and the concrete of the pump island into the soil. Secondary containment systems must be designed so that they reliably capture releases from both liquid and vapor handling components of the storage system.

■ **Replace pressurized pumps with suction.** Though my evidence is admittedly anecdotal, I believe that pressurized pumping systems are responsible for better than 90 percent of the liquid releases that occur from newly installed, corrosion-protected storage systems. A simple change of technology could virtually eliminate this source of product releases. Arguments that suction pumps will not work in America are specious. Suction pumping systems are still dominant in Europe. If they can work in Europe they can be made to work here.

■ **Replace permeable pipe with impermeable pipe.** An industry estimate of the likely releases due to permeation from flexible piping systems states that 8 grams per day (about a gallon per year) of liquid can escape from

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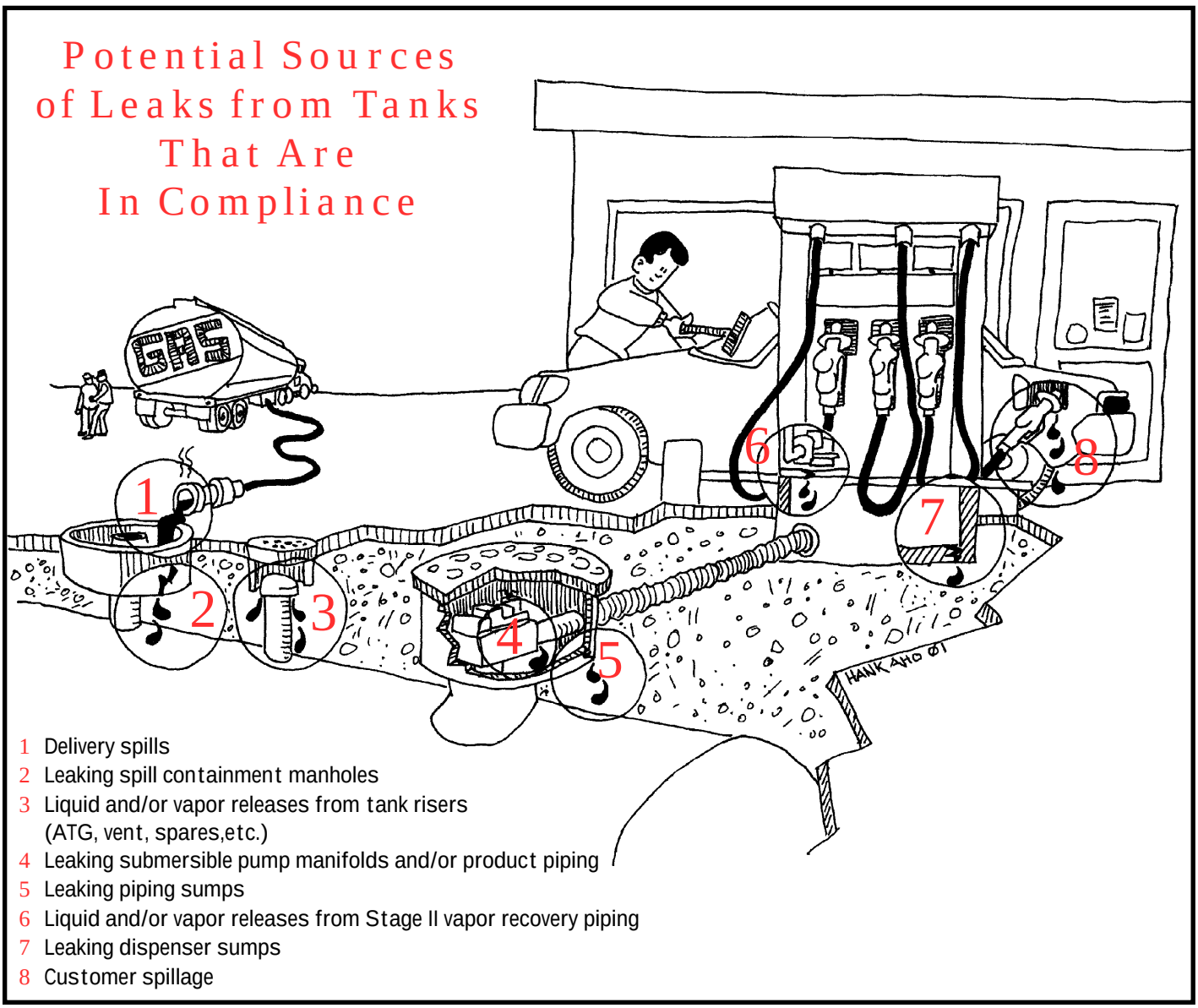
these double-walled systems ("Compatibility and Permeability of Oxygenated Fuels to Materials in Underground Storage and Dispensing Equipment," Paul A. Westbrook, Ph.D., Shell Oil Company, January 1999). While this is a small quantity, it is sufficient to cause contamination when MTBE is present in the gasoline. Piping systems susceptible to permeation should not be allowed in sensitive areas.

■ **Provide secondary containment for vapor piping.** While Stage II vapor return piping handles vapors primarily, there is no question that it also carries small quantities of liquid product. Pressure decay tests that are conducted to meet air quality requirements are not sufficient to detect small defects in vapor piping. Secondary containment of this piping seems like the best way to assure that liquid and vapor releases do not occur.

■ **Do not allow pressurization of the tank vapor space.** Vapor releases into the environment are exacerbated by vacuum-assist vapor recovery systems that pressurize the tank ullage and force product vapors out of the storage system. The California Air Resources Board (CARB) has recognized this weakness and will require that future vapor recovery systems maintain the pressure inside the storage tank at or slightly below atmospheric pressure. Until such technology is commercially available in this country, vacuum-assist Stage II vapor recovery systems should be replaced with the traditional balance Stage II systems.

■ **Isolate tank backfill from ATG and Stage I vapor recovery risers.** Vapor releases and possible liquid releases resulting from overfill incidents that occur at automatic tank gauge (ATG) risers and Stage I vapor recovery risers typically pass directly into the tank backfill. The installation of spill containment manholes around these openings would provide a barrier to vapor and liquid penetration into the soil.

■ **Video tape deliveries.** We desperately need to rethink our overfill prevention strategy (see *LUSTLine* #31, "Hmmm...If Only Overfill Prevention Worked!"), but this is not on the horizon as far as I can tell. As a stop-



gap measure, install video surveillance cameras to monitor the delivery process. Delivery drivers would need to be notified that their activities are being watched and that their jobs depend on spill-free deliveries.

■ **Do not allow any exposed backfill around fill pipes.** The backfill around the perimeter of some below-grade spill-containment manways is exposed, providing an all too convenient avenue for drips of fuel from the hose (or even an entire hose full of fuel) to enter the environment. Though these types of spill containment manways are effective in keeping precipitation out of spill buckets, as a contamination pathway they pose too much of a risk.

■ **Require 15- to 25-gallon capacity spill containment manways.** Until such time as effective overfill prevention hardware is in place, install spill containment equipment that can hold the entire contents of the delivery hose in case of a tank overfill.

■ **Seal the pavement around the dispensers.** To deal with customer spillage, seal the surface around the dispensers with petroleum-proof sealant, and grade the pavement so that all liquid runoff runs to an oil-water separator that discharges to a holding tank. The holding tank contents would need to be periodically and properly disposed of. The sealant would need to be maintained to ensure its effectiveness.

■ **Seal tank-top manway covers.** If tank-top manways are in an area where surface spillage could occur, they should be slightly above grade or have liquid-tight covers to prevent surface runoff from infiltrating the tank backfill.

■ **Do not allow self-serve gasoline dispensing.** Though messages on most dispensing nozzles warn against it, topping off when refueling automobiles is still a common occurrence that leads to spillage. By allowing only trained attendants to dispense gasoline, this problem could be reduced.

■ **Install automatic subsurface monitoring.** Though it never proved popular for UST leak detection, a device was developed in the mid-80s that had the ability to sample soil vapors at numerous points on a daily basis and monitor for the presence of gasoline vapors. With today's communication technology, such a system could easily be monitored remotely. Such a system could provide early warning of releases from any portion of the storage system or even surface spillage and overfills. In conjunction with a preinstalled remediation system (see next item), subsurface monitoring could be very effective in detecting and intercepting contamination before it can migrate off site.

■ **Preinstall a soil-vapor extraction system.** A preinstalled network of slotted pipe in a permeable backfill underlaying the dispensing area and overlaying the tank pit would make it possible for remediation efforts to begin within a very short time of the discovery of a release (via the automatic subsurface monitoring). Truck-mounted, self-contained vapor extraction and treatment units could simply drive up, plug in to the preinstalled piping, and deal with small releases in a few days or weeks time if releases are promptly identified and addressed.

■ **Implement periodic groundwater monitoring.** Conduct monthly or quarterly groundwater monitoring in areas adjacent to storage system components to provide early warning of contamination. Monitoring well location and construction would have to be carefully considered so that the wells would provide effective early detection without posing the undue risk of becoming a conduit for contamination into the subsurface.

So...

Are all these measures necessary? Would any of these measures really be effective? Could a regulatory agency or municipality ever realistically impose any of these measures as requirements, either across the board or at specific facilities? Do you have better ideas? If you could implement any three of these measures, which would you pick?? Why? Send your two cents to: **marcel.moreau@juno.com**. ■