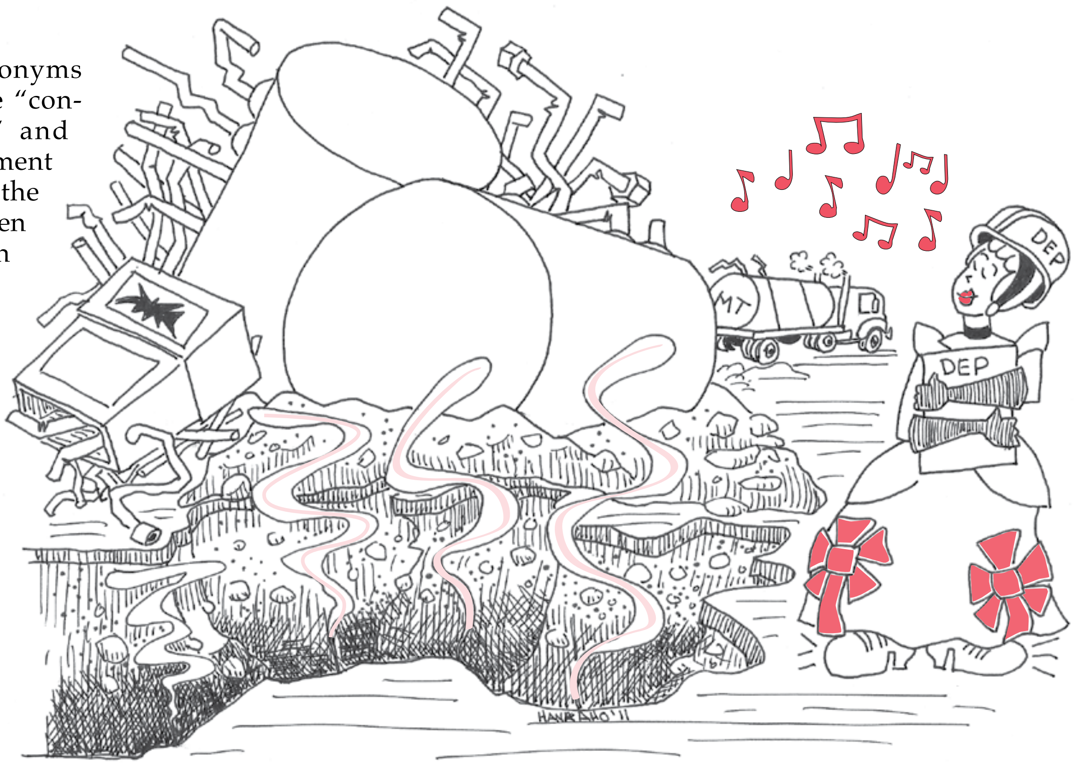
# Tank-nically Speaking

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.**

# Someday My Facts Will Come…Part 1

## TQM & USTs—A Marriage Made in Heaven




If you can remember acronyms like "TQM," phrases like "continuous improvement," and terms like "Deming management method" and "franchise" in the context of USTs and LUSTs, then you qualify as an old-timer in the world of tank regulation. For all of you more youthful *LUSTLine* readers, these were all catchwords of Ron Brand, the first director of USEPA's Office of Underground Storage Tanks (OUST) and visionary founder of the UST regulatory program.

"TQM" stands for Total Quality Management, an approach taught by W. Edwards Deming for improving manufacturing processes through repetition of a series of steps:

- Measurement of the status quo
- Implementation of small changes
- Comparing measurements from before and after the change to determine what has been achieved

For example, if I were making widgets, I would carefully measure a sampling of my finished widgets to see how closely they matched the "perfect" widget I had set out to make. I would measure dimensions and weights, and do tests to see how long my widgets would last. I would also measure how long it took to make my widgets, how much raw material went into them, and how many widgets I had to reject because they didn't do whatever they were supposed to do. Once I had my baseline measurements, I would then make changes. Ideally these changes would come from ideas generated by the workers who made the widgets, because they were the ones who knew best where the mistakes were being made and how to improve the process.

After implementing a change, I would compare my pre-change measurements to the post-change measurements to see how much the quality of the widgets had been improved, or the time required to make them had been reduced, or how many fewer widgets were rejected because of quality problems. This is a process of endless measurement of the entire widget-making process, continually tweaking the process in order to make improvements, and tracking the resulting effect on the finished widgets and/or the widget-making process—always with a goal of making better widgets and making them faster and cheaper.

Nearly a quarter century has passed since the tank rules were finalized, and there is no question that our UST systems are of a higher quality (less prone to leak) than they have ever been. That said, if I were to try to quantify this "quality" of our UST system population I would be hard-pressed to come up with many meaningful numbers. I can say with some level of certainty that there were 597,333 tanks in active service last year and that 1,748,204 tanks have been closed since the USEPA regulatory program began. I can look up how many confirmed releases have occurred each year over the last 22 years. I can count how many ongoing cleanup operations we have (93,123) and how many have been completed (401,874). These numbers certainly tell a story that tank owners and tank regulators alike can be proud of. (Figures from USEPA's *Semiannual Report of UST Performance Measures End of Fiscal Year 2010; www.epa.gov/oust/cat/ca_10_12.pdf.)*

But there is another statistic that has a crimping effect on this happy news: Last year, 6,328 new releases were reported. And keep in mind, this is only the number of releases *reported*—we don't know about the unreported releases. In the interest of continuous improvement, the ultimate goal of the tank program should be to whittle down the number of new releases to zero. While I can imagine a lot of heads nodding affirmatively as they read this, there is one big problem—**we haven't got a clue how to do this!**

## Doctor Doctor!

As Tom Schruben pointed out in his *LUSTLine* #66 article "Investigating Petroleum UST-Equipment Problems...," and Carol Eighmey has been preaching from her soapbox for quite a while now (see her article on page 6), we don't know what's wrong with our UST systems, and if we don't know what's wrong, how are we ever going to fix them?

The fundamental tenet of TQM is that you measure your product or your process continually so you can see where you are and plot a course to where you want to be. It seems to me that to establish where we are in the UST-release world, we should have a firm grip on statistics like:

- **How many new releases did we actually have last year?** As Eighmey points out in her article, we don't know whether the "new" releases reported last year are in fact releases from new storage systems or whether they are newly discovered releases from old storage systems.
- **How many leaks did each method of leak detection actually detect last year?** For example, how many tank leaks were discovered by ATG monthly tests? How many piping leaks were discovered by line-leak detectors? How many leaks were discovered using secondary containment? And just as important, how many leaks were missed by each of these methods of leak detection?
- **How many delivery spills happened last year, and how many spill buckets are leaking?** Are our methods of preventing and containing delivery spills actually working?
- **What UST components are failing, how often do they fail, and why do they fail?** Although the generally accepted wisdom today is that most leaks are associated with the piping, that is not what the current national statistics say (see Eighmey's article). So where does the truth lie?

While I'd wager that any group of UST owners or installers or regulators could sit around a table with a pitcher or two of beer and have a very lively discussion on any of these issues, none of us could pull out a chart or a table with hard numbers to answer any of these questions. In an era of limited resources, how do you know which problem to tackle when you don't know which problem causes the most frequent and/or most severe leaks? And how do you know whether whatever it is you change is working if you don't continuously measure the effect of the change?

## We've Been Here Before

Back in the 1980s, when Ron Brand and a team of OUST folks and state regulators were structuring the regulatory program we have today, they faced a similar problem. They knew there were lots of things wrong with UST systems, but they wanted to know what the *biggest* problems were and how best to tackle them. Back then, there were very few UST regulators, so the idea of gathering national statistics using regulatory personnel was not feasible.

But the OUST program did have a budget, so they commissioned various studies. They sent consultants out to review state leak files. They interviewed Petroleum Equipment Institute (PEI) contractors. They got statistics from testing companies that had conducted thousands of tightness tests. Eventually, all of these data were consolidated into a "Cause of Release" study. Though nearly a quarter century old, the findings of this study are still worth reviewing. Among the major points made:

- While the historical problem had largely been caused by corrosion of bare steel tanks, the study recognized that this particular problem (except for internal corrosion of steel tanks) had largely been solved.
- The big remaining problem was the piping, because although piping materials had been improved (fiberglass had largely replaced galvanized steel) there was still an issue of quality control (good workmanship) in installing the piping under field conditions.
- Pressurized pumping systems were particularly prone to large releases.
- Delivery releases were very common.
- "Nonoperational" leaks (e.g., loose tank-top bungs, loosely screwed-together vent lines) were very common. (In later years these would come to be known as "vapor leaks," and they came to have great significance while MtBE was present in our gasoline.

In short, back in the 1980s we got a pretty good qualitative (and sometimes quantitative) handle on the problems by consulting with the people out in the field actually doing the work!

## Who Is in Touch with the Cold, Hard Facts?

It is my belief that in trying to get regulators to gather UST system failure statistics, we are trying to pound square pegs into round holes. As a group, regulators lack the funding, the time, the motivation, and the knowledge to conduct tank autopsies. I would note that it can be done, as shown by the statistics gathered in Florida during Marshall Mott-Smith's tenure as administrator of the Florida UST program, but this effort required a substantial commitment of resources and a regulatory structure and discipline that is lacking in most states.

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■ **TQM and USTs** *from page 9*

If we really want to understand what's going wrong with our UST systems, we should look at history. We need to look back to the late 1970s, when, under the auspices of the American Petroleum Institute (API), storage system failure data were gathered (primarily by PEI members). While the data were not perfect, they did show conclusively that corrosion was the biggest issue with steel tanks. Likewise USEPA's Cause of Release study gave us information that helped put the national UST program on sound footing. In short, we should look to the people doing the work in the field—the installers, testers, and maintenance folks who are out there every day, responding to alarms, discovering, and repairing leaks—for the answers.

We can get some tantalizing clues about what is going on in the UST world because, in this computer age, we have huge databases that can be mined for information. These include those of large-scale tightness-testing companies like Crompco that maintain databases of their test results, and remote monitoring services like Gilbarco's Fuel Management Service that record tens of thousands of alarms.

Just to see if this approach is worthwhile, I've been working with Ed Kubinsky of Crompco to get a peek at what their testing statistics can tell us. Just looking at some of the "big picture" numbers that Ed was able to generate quite rapidly gives us some interesting information. For example, a ranking of what types of equipment fail the most frequently (Figure 1) tells us that our secondary containment systems are in trouble because they have, by far, the highest failure rates of any storage system component that Crompco tests.

This is somewhat disconcerting because as a result of the 2005 Energy Act, we as a nation are headed in the direction of adopting secondary containment. The clear message is that if we do not address the liquid-tightness of secondary containment, our chosen method of leak detection will turn out to be less than satisfactory in detecting and preventing releases. The bottom line is that periodic testing of the integrity of secondary containment is going to be key to the success of secondary containment. What this graph does not show is exactly *how* these containment systems are failing. That would require a more labor-intensive review of the tester's notes for each failed test, but such a review might be a crucial step in figuring out how to design more reliable containment systems for the future.

**FIGURE 1. FAILURE RANKING OF UST COMPONENTS**

*(Based on 2004 through 2010 Crompco data)*

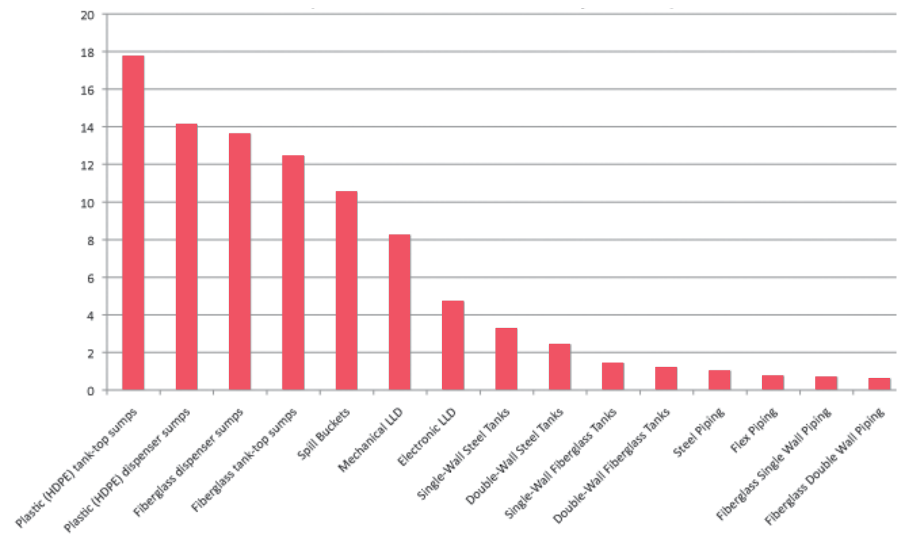


**FIGURE 2. SPILL BUCKET FAILURE RATE**

*(Based on 2004 through 2010 Crompco data)*


Looking at trends over time, we can see that spill buckets, for example, are showing marked improvement (Figure 2). Keep in mind, however, that this improvement is being seen only in spill buckets that are being tested periodically. States where periodic spill-bucket testing is not the rule should be looking at the early years of the data in this graph and realizing that they have a substantial problem with leaky spill buckets that will only grow worse over time.

As with any data set, the limitations of the data have to be understood. For example, Figure 1 tells us that steel tanks have a higher failure rate than fiberglass tanks but that fiberglass tanks, even double-walled tanks, fail tightness tests as well. We have to keep in mind that these data

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## FAQs... *continued from page 22*

Manufacturers of leak-detection equipment are encouraged to contact the appropriate members of the NWGLDE to request the addition of ASTM standard biodiesel blends to their current listings. Contact information can be found under *"Group Members"* and *"Team Members"* at *www.nwglde.org.*

A copy of the Biodiesel Industrial Advisory Panel (BIAP) report *Effects of Biodiesel Blends on Leak Detection for Underground Storage Tanks and Lines* can be found at *www.nwglde.org* under "Downloads." ■

**About the NWGLDE**

The NWGLDE is an independent work group comprising ten members, including nine state and one USEPA member. This column provides answers to frequently asked questions (FAQs) the NWGLDE receives from regulators and people in the industry on leak detection. If you have questions for the group, please contact them at questions@nwglde.org.

**NWGLDE's Mission**

- Review leak detection system evaluations to determine if each evaluation was performed in accordance with an acceptable leak detection test method protocol and ensure that the leak detection system meets EPA and/or other applicable regulatory performance standards.
- Review only draft and final leak detection test method protocols submitted to the work group by a peer review committee to ensure they meet equivalency standards stated in the U.S. EPA standard test procedures.
- Make the results of such reviews available to interested parties.

## ■ TQM and USTs *from page 10*

represent strictly pass/fail statistics. The data at this point do not indicate whether the leaks are liquid leaks at the tank bottom or vapor leaks from the tank top. Nor do the statistics indicate whether the failed tests for double-walled tanks merely resulted in a release to the interstitial space or to the environment. Ed tells me that many of these issues could be resolved by reviewing the tester's notes on the test, but that review would need to be done by a person familiar with the test protocols and the often-cryptic language that testers use to document their findings.

### So What's the Point of this Soapbox?

Simple. a) We need some hard data on what is wrong with our UST systems today, if we're ever going to learn how to make them better (i.e., more leakproof) in the future. b) If we really want the data, we need to enlist the help of those out there doing the work—the installers, testers, and third-party monitors who are seeing the warts in our UST systems in real time on a daily basis. I believe that many of these people would be happy to help, especially if there were funds available to pay for the time it will take to pore through their data bases and get the information that we really need to move our UST system population to the next level of integrity.

P.S. I'm planning on spending some more time with Ed's data to see what's there and describing my findings in the next issue of *LUSTLine*. ■

## ■ Fuel and Tank Disconnect *from page 13*

system every quarter. Keeping tanks water free, incorporating a desiccant dryer on the vent alarm, and managing the water content by immediately removing it to avoid that "perfect storm" when water and temperature combine to manifest microbial contamination. This is in fact the one place where tank owners can lend a helping hand to their fuel supplier and make a big difference in both fuel performance and storage tank longevity.

### What Next?

My goal in writing this article was to help the reader look beyond the tank system to the entire fuel-supply chain and understand that no matter what happens in that fuel tank, whether good or bad, it is still a direct result of its entire life cycle. A short summary would suggest that all parties involved in the fuel-distribution business work collegially to establish an easy-to-follow road map for quality fuel preservation from upstream to downstream. Open communication will be required if we are to minimize fuel-quality issues that have compromised performance both under the hood and inside the tank system. ■

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