New England Interstate Water Pollution Control Commission
116 John Street
Lowell, Massachusetts
01852-1124
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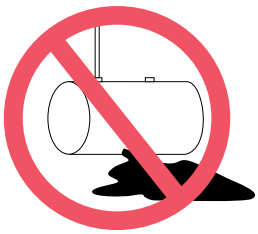

A Report On Federal & State Programs To Control Leaking Underground Storage Tanks

Will Groundwater Ever Get Some R-E-S-P-E-C-T?

Courtesy of Ground Water Protection Council. Art by Poshen Wang.

Why Underground Storage Tanks Matter

by Ellen Frye

Madison County, Alabama - In October 2006, a release was reported from a corrosion-protected 10,000-gallon steel tank. About 8,000 gallons of gasoline flowed through a corrosion hole in the tank into a nearby karst wellhead protection area. Minor concentrations of gasoline were detected in water supply wells in the area. As of summer 2008, about $700,000 had been spent on cleaning up the site, with more work to be done.

Along with water supply well concerns, a lot of people who had spent years trying to protect the Alabama Cave Shrimp, a tiny creature that is nearly transparent and less than an inch long, became very concerned. This federally listed endangered species (since 1988) lives in floodwaters and pools in underground caverns and eats small bits of organic matter. It is found in just two cave systems in Madison County, one of which is within the boundaries of the U.S. Army's Redstone Arsenal. According to the Cooperative Conservation America website, the main threats to the cave shrimp's survival are a low reproduction rate and groundwater contamination.

The Redstone Arsenal's environmental office has worked closely with other federal, state, and local authorities, scientists, local educators, homeowners, and the surrounding community to protect the cave shrimp populations on the Army installation, on private lands, and in potential habitat for populations that might yet be discovered. When the 8,000-gallon gasoline release occurred, there was a flurry of activity on the part of many people to make sure the Alabama Cave Shrimp was not impacted. It appears it wasn't…this time.

They say that water is the oil of the twenty-first century. In the words of the WorldWatch Institute: "Water scarcity may be the most underappreciated global environmental challenge of our time." And if you've checked out the gusto with which corporate giants are buying up water rights (i.e., groundwater rights) worldwide, it's clear that water has gained precious commodity status, to be bought and sold in the marketplace. Water speculators know full well that we need fresh water to live. We can't drink oil.

But, as a society, we're still several cucumbers short of "getting the religion" where water is concerned. Mind

■ *continued on page 2*

Inside

■ ■ Groundwater and USTs

from page 1

you, there are plenty of people in this world who *do* have the religion and recognize the value of clean, fresh water—and on a very personal level—because their fresh water supply is teetering, tainted, or just plain dried up. But many of us seem to need a water crisis—that frenetic time when "the fix" is often shortsighted and parochial—to call attention to something as relevant as water.

These days, it seems like there is a smorgasbord of unsettling water stories, almost on a daily basis—droughts, depleted water tables, floods, water wars, overpumped groundwater, dismantled riparian ecosystems, wetlands destruction, failing levees, desertification of some areas of the country, oil spills from river barges, pharmaceuticals, personal care products, landfill leachate, paints, household cleaners, fertilizers, pesticides, hazardous substances, stormwater, and other stuff that is washed, dumped, or percolated into our surface waters and groundwaters. And there are still those nagging gasoline leaks from UST systems, as well.

Hydrologic systems and their corresponding ecosystems are under assault. Furthermore, there are often overlooked and even more insidious cumulative aspects—incremental effects that can have a greater impact than the sum of their parts. As irony would have it, groundwater, the resource humans rely on more and more for so many, and often competing, uses, including energy and fuel production, turns out to be the poor stepchild in this water miasma—it just doesn't seem to get much R-E-S-P-E-C-T!

The Ground Water Protection Council, a group representing state environmental regulators across the country, is very concerned about this lack of respect for groundwater and has produced a highly informative, tell-it-like-it-is *Ground Water Report to the Nation: A Call to Action* in an effort to call attention to the seriousness of groundwater's plight. (*http://www.gwpc.org/calltoaction*) (See story on page 5.) Chapter 7 of this report is dedicated to USTs, which were considered a priority topic for this call to action. As the report points out, when a groundwater supply is no longer available because of overdraft or contamination, it is usually very difficult and expensive to replace. So, the question that follows is: Why wouldn't we, as a nation, want to bend over backward to maintain the health and availability of our fresh water and keep substances that can degrade the quality of the water, like gasoline, out of it?

Polls show that people care about water. But caring isn't enough, we need to be active water stewards, working to sustain the water resources that help sustain us—not to mention the critters and natural systems that co-inhabit the earth with us. Okay, I run the risk of sounding disgustingly "touchy feely," but where water abuse is concerned, I get all choked up.

Twenty Years and Counting

So what about our USTs? It's been 20 years since the federal rules for the nation's UST systems hit the streets. (40 CFR Parts 280 and 281 was published on September 23, 1988.) In December, it will be the 10-year anniversary of the 1998 deadline, requiring existing tank systems to be removed, closed, or upgraded to federal/state standards (spelled out in the federal rules). No question about it, since 1988, the federal, state, and tribal tank programs have accomplished much. Nearly 1.7 million substandard USTs have been closed. As of March 2008, 371,880 LUST cleanups—out of 478,457 confirmed releases—have been completed, with more than 100,000 still to go.

Sometimes Its Not Just One Thing

56,000 Gallons of Gasoline Escape in Alabama

It was holiday season in December 2007, when 56,000 gallons of unleaded gasoline leaked from an UST system at a gas station in Alex City, Alabama, and flowed toward the drainage area of a nearby recreational lake. The owner had taken some time off, and personnel working at the facility were not trained to recognize abnormalities—like the frequent need for fuel deliveries, for one thing. The facility had leak detection. The sump sensor had been recording normal readings, but the sump sensor was not functioning, and no one was aware of it. In fact, a frayed flex connector in the piping sump was continuously spraying product under pressure. Finally, the fuel delivery company brought the need for frequent deliveries to the owner's attention. Also, a customer had complained about strong a fuel smell from behind the facility. The Department of Environmental Management (DEM) undertook a massive and expensive emergency response effort to prevent the gasoline from entering the lake. Cleanup is ongoing.

As luck would have it, in August 2007 DEM had adopted a new regulation that would require positive shutoff in the event of detection of a leak, effective August 2008—too late for the Alex City event. Owner/operators are also now required to check sensors once a year to see if they are operational and to keep records.

L.U.S.T.Line

Ellen Frye, *Editor*
Ricki Pappo, *Layout*
Marcel Moreau, *Technical Adviser*
Patricia Ellis, PhD, *Technical Adviser*
Ronald Poltak, *NEIWPCC Executive Director*
Amanda Driggers, *USEPA Project Officer*

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NEIWPCC
116 John Street
Lowell, MA 01852-1124
Telephone: (978) 323-7929
Fax: (978) 323-7919
lustline@neiwpcc.org

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But make no mistake; the work isn't over, and it won't be over any time soon—even if the fat lady ever gets around to singing. As of March, only 65 percent of federally regulated USTs were in significant operational compliance with both release-prevention and leak-detection requirements. The Energy Policy Act of 2005 requirements for three-year inspections cycles, owner/operator training, secondary containment, and delivery prohibition for noncompliant UST systems should help improve these numbers. (High gas prices could also encourage owners and operators to pay more attention to keeping gasoline in their tanks rather than in their groundwater.) But nothing will help if our programs are hamstrung owing to staffing shortages, legislatively reappropriated cleanup funds, and an institutional lack of commitment to groundwater protection.

USTs and their contents really matter to the well-being of our groundwater, and because USTs tend to be in locations close to where people live and work, the groundwater that we use for drinking water is frequently at risk. This is a big reason that, as long as stored petroleum products threaten our groundwater environs, not to mention human health and safety, it is irresponsible of us as a society to let down our guard. Yes, Virginia, sometimes federal and state governments kind of let important programs slip to the back seat, and it would be an abdication of responsibility to let this happen to any of our nation's tank programs. The thousands of USTs scattered all over our nation are a water-quality threat and should not fall from regulatory grace, because preventing groundwater degradation really matters…doesn't it?

Tanks in Today's Roiling World

In this crazy mixed-up world, there are some things we can still depend on, and of course there are some situations that, when brought together, have the potential to create the UST version of the "perfect storm." For example, we still have plenty of UST systems that store *gasoline*; except that some of the fuel constituents have changed…and continue to change. Is there another MtBE waiting in the wings? Are these fuels going to be compatible with those systems? What chemical and fate and transport behaviors take place when they leak into the environment? And, by the way, what compounds are we dealing with...and should we be concerned?

Also, just as many of the major oil companies shed their retail operations in 1980s and 1990s, it's happening again. Many single-site owners now operate facilities that were, up until recently, owned by and under the seasoned umbrella of one oil company. We are now seeing a new generation of tank owners who may be new to the business and who may be more focused on convenience store profits than on UST system operation and maintenance or leak prevention.

State tank program managers face the task of educating a whole new generation of tank owners and operators, sometimes with a language barrier. Not only do these new owners need to know about the new requirements of the Energy Policy Act, which includes owner/operator training, they need to know the whole regulatory ball of wax that we've been carefully instilling in the regulated community for the past 20 years. The 56,000-gallon release mentioned above is a good example of how tank owner/operator education required by the Energy Policy Act of 2005 might have made the situation less catastrophic.

And just as many UST systems were buried time bombs waiting to discharge between 1988 and 1998, we have another generation of tanks that have outstayed their welcome. How about all of those single-walled 1998-deadline tanks that squeezed through with linings and cathodic protection? What's going on there? According to our rules, they all will be allowed to leak before they can be required to be replaced.

And just as we had federally exempt tanks then, we still have both USTs and aboveground storage tanks (ASTs) that store a variety of substances that aren't on any federal lists of chemicals or substances of concern. "We have many sites that would fall through the regulatory cracks if the state didn't have a statute that required a responsible party to take corrective action," says Sonja Massey, Chief of the Alabama DEM Groundwater Branch. "These are gaps between the federal programs that are only filled if a state has covered that base. It's not just a drinking water exposure, it's other exposures, like vapor intrusion into physical structures." Heating oil is one such substance that is stored on the premises of many homes and businesses, especially in the New England states. These tanks are federally exempt and regulated on a state-by-state basis. Yet heating oil tanks leak, contaminate groundwater and/or surface water, and require somebody to pay the piper.

And, of course, there are the many regulated and unregulated, rivately and publicly owned USTs that continue to lie in wait until we discover them or at least pay atten-

■ *continued on page 4*

Hello? Anyone Notice Anything Unusual?

21,000 Gallons of Gasoline Escape in Utah

During the summer of 2007, the weld seam of a single-walled steel tank installed in 1981 failed, releasing about 21,000 gallons of gasoline in Gunnison, Utah. Statistical Inventory Reconciliation (SIR) was the leak-detection method being used. The monthly data had been collected and turned over to the SIR provider, but because the release started on the first day of the month and the data was submitted after the last day of the month, the leak was detected 40 days after it began. The 12,000-gallon tank leaked throughout the month of July and was refilled several times. There were no drinking water impacts, but because the highly mobile gasoline plume followed a depression in a hardpan layer lying 10-13 feet below the ground surface, there was serious vapor intrusion in a three-city-block area, particularly at the far downgradient end of the plume. Fifteen businesses and 15 homes are undergoing continuous air monitoring. The $1 million in state fund coverage was spent in six months. The responsible party has spent about the same amount of money, and the cleanup is far from over.

■ Groundwater and USTs

from page 3

tion to them—the abandoned and out-of-service tanks that may or may not be leaking. Abandoned tanks made headlines in August, when the Associated Press (AP) reported on its investigation of underground fuel tanks that "could be leaking hazardous materials into drinking water." AP zeroed in on buried steel tanks left over from the Cold War era, saying that the Federal Emergency Management Agency (FEMA) has known about the buried tanks under its management since at least the 1990s, but has done little in the way of investigation and remediation. According to the AP, at present, FEMA knows of at least 150 LUSTs and "is trying to determine by September whether an additional 124 tanks are underground or above ground and whether they are leaking." But why pick on FEMA? There are probably lots more federally, state, and locally owned USTs awaiting their day in the sun.

Finally, just as we've had LUST sites since way back when, we still have LUST sites. Technologies for site assessment and cleanup at LUST sites have improved enormously. But cleanups still take time and lots of money, and once they have closed out sites that are essentially the low-hanging fruits, states still struggle to meet USEPA cleanup goals. It is not made any easier when state cleanup funds struggle to make good on the original reason for the funds—getting to and cleaning up sites faster.

In a world where irony rules, reduced fuel consumption (which is good) has reduced fund revenues, which in turn reduces the states' ability to clean up sites. In addition, as revenues go down, costs just seem to keep going up. It is not made easier when state legislatures see the funds as revenue sources. The State of Rhode Island, for example, lost $2 million from its fund in 2008. The fund in Oklahoma was diverted on an unparalleled scale. From 2002 to 2004, $38 million from the fund was rerouted to higher education. The fund will also lose $6 million per year for the next nine years to the Oklahoma Department of Transportation. Meanwhile, the fund's claims increased from $14 million to $24 million during FY- 2007/2008, and revenues have gone down.

Having seen the evolutions of state tank programs over the past 20 years, I am always amazed at how state program staff continue to think creatively when faced with reduced staff and funding resources. They truly do more with less, but there is a point where the strain of it all may take its toll on both agency staff members and the environment.

What Price Water?

In many ways USTs and UST/LUST programs are caught up in the shifting, and sometimes turbulent, winds of our times. Since 1988 and 1998 new realities have emerged—ethanol, a gasping economy, strained state and federal budgets, failing infrastructure, skyrocketing fuel prices, disintegrating profit margins for tank owner/operators, reduced revenues for state cleanup funds. USEPA is now beginning the process of revising the rules, an undertaking that is very much needed; but will the interests of groundwater protection be preempted because we "can't afford" to be too tough on tank owners, particularly the "mom and pops"?

As the GWPC's *A Call to Action* states: "We are at a groundwater crossroads that necessitates ingenuity and proaction in order to minimize potentially detrimental and costly consequences…It is way past time for us to recognize the significance of groundwater to our national welfare—our public health, quality of life, and economic well-being."

USTs matter very much to groundwater, and the tanks program has a key role in groundwater protection and giving this vital resource the respect it deserves. As a new generation of tank regulators enters the program, let them not forget the importance of their jobs. ■

Ellen Frye edits and produces LUSTLine. *Ellen also provided the GWPC writing and editing support for its* Ground Water Report to the Nation: A Call to Action.

Ghost Tanks Have a Way of Haunting

4,200 Gallons of Heating Oil Escape in Austin, Texas

On January 10, 2008, more than 4,000 gallons of fuel oil leaked from a 30-feet-long by 9-feet-diameter (about 15,000 gallons) former railroad tanker car buried in an alley at the rear of the Littlefield Building in Austin, Texas. The tank, buried sometime around 1910, was originally used to power a generator that provided electricity for the building. In January, the long-abandoned and forgotten tank got some notoriety when a ruptured water line forced water into the tank through both existing surface corrosion holes (square feet in size) and the fill port, displacing the stored fuel. The fuel went into the stormwater system through a sump and emerged at the nearby Waller Creek. Booms were used to contain and abate the release. In addition to the 4,200 gallons of fuel released to the creek, another 4,000 gallons of sludge were removed from the tank.

The City of Austin conducted the initial cleanup at a cost of $200,000. On May 2008, the owners of Littlefield were accepted into the Texas Commission on Environmental Quality's Voluntary Cleanup Program to close the UST and assess any remaining contamination. "The tanker car is entombed in utility lines," says Tom Ennis, Division Manager of the City's Environmental Resources Management Division, Watershed Protection," which makes investigation and cleanup tricky. It will be closed in place," he says, "but there are still many unknowns. When the field tests are completed, we will know better whether the tank had already been leaking."

Ennis explains that as a result of an industrial fire in the city in about 1909, from then until 1963, the burial of tanks needed the approval of the city council; the Littleton tank had been approved. Because of this release, Ennis' staff went through all of the city council minutes for that time period and found 800 to 900 locations where the council approved burials. "Whether or not tanks were actually buried, or how many were buried, is not known," says Ennis.

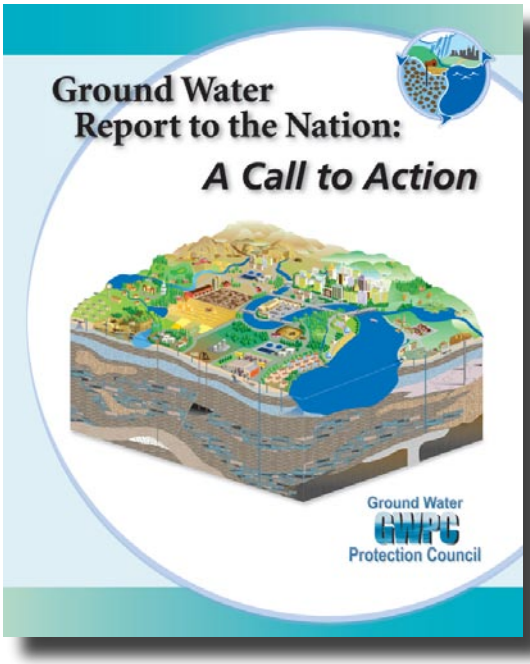
GWPC's Clarion Call for Groundwater

The Ground Water Protection Council, an Oklahoma-based group representing state environmental regulators across the country, has produced a watershed document calling attention to groundwater and stating the case for the need to take "swift and decisive action to ensure that groundwater is meaningfully integrated into federal and state water resource conservation, management, and protection agendas." The report, *Ground Water Report to the Nation: A Call to Action* (*http://www.gwpc.org/calltoaction*), seeks to reverse the negative trends regarding the use, availability, degradation, and dearth in characterization and monitoring of groundwater taking place across the nation and provides specific recommended actions with each of its 10 chapters for accomplishing this. The report is the result of a multiyear effort in which GWPC enlisted the expertise of individuals from all over the country to assess the threats to the nation's groundwater resources and hone their findings into an accessible document.

USTs were one of the chapter topics chosen for this first edition of what GWPC considers the beginning of an ongoing effort to advance the protection of our vital groundwater resources. Besides the introductory Call to Action chapter, the other chapters focus on groundwater Use and Availability, Characterization and Monitoring, Source Water Protection, Land Use Planning and Development, Stormwater, Onsite Wastewater Treatment Systems, Underground Injection Control, and Abandoned Mines. A glance through this colorful and user-friendly document is a quick but deadly lesson on the seriousness of the problem and the importance of getting on with remediative actions at all levels of government as well as in other realms, such as businesses, communities, and nonprofits.

According to GWPC, the severe strain on already overtaxed water supplies needs to be factored into energy policy decisions as the nation seeks to reduce its reliance on oil. Coal power, which currently accounts for about 52 percent of U.S. electricity, requires 25 gallons of water to generate each kWh. Ethanol production from corn also draws down the water budget. It takes about 19 pounds of corn to produce the equivalent of one gallon of gasoline. In the High Plains region, it takes about 1,000 gallons of water to grow 19 pounds of grain, and another 400 to 500 gallons to process that amount of grain into ethanol. In 2006, the U.S. consumed roughly 5 billion gallons of biofuels, mostly ethanol, which equates to about 7.5 trillion gallons of water pumped largely from underground aquifers.

It's time to start heeding the warning signs," says Mike Paque, GWPC Executive Director. "While they may present themselves as isolated incidents, the water and quality issues that are surfacing add up to a growing national problem with significant environmental and economic impacts. Our aquifers are vast and rich resources, but they are not bottomless. We need to be more aware of our dependence on groundwater and the role it plays in nearly everything we do."



Courtesy of Ground Water Protection Council. Art by Ricki Pappo and Poshen Wang.

On July 9, a small group of GWPC members met with the Congressional Water Caucus to inform them that current rates of water use are unsustainable and are already leading to critical shortages in some areas. In their presentation, they called for greater national emphasis and better funding to study and protect underground sources of water. ■

24 Defendants Settle Claims Involving over 150 USTs in NYC

Twenty-four defendants in a federal civil environmental case settled claims against them for UST violations involving over 150 USTs at 25 facilities in New York City, including six facilities on Long Island. The defendants, as owners/operators of the USTs, allegedly failed to comply with requirements for corrosion protection, leak-detection prevention, closing and/or registering USTs, and financial responsibility and failed to cooperate with USEPA. The defendants have undertaken measures valued at approximately $750,000 to come into compliance with Resource Conservation and Recovery Act and have also agreed to pay a $650,000 civil monetary penalty to the federal government. The U.S. Department of Justice Eastern District Court of New York and EPA Region 2 announced the settlement in a July 21 press release. ■

New UST Legislation Enacted in New York State

At last! On July 24, Governor Paterson signed the legislative package that updates New York's petroleum and chemical bulk storage programs to achieve consistency with federal UST regulations. Until this new legislation was passed, New York's authorities did not include the 1988 requirements for tanks to upgrade or close or other key federal requirements. The legislation also addresses all Energy Policy Act requirements, including delivery prohibition. The state expects the regulatory development process to take 2–3 years, though delivery prohibition may be fast-tracked. New York expects to seek UST program delegation after regulations are promulgated. ■

Operator Training: The Oregon Experience

by Tracy J. England

Once upon a time in Oregon, U.S.A., motor-fueling station operators were bewildered by underground storage tank regulations. Although some operators didn't care, most had some questions...Do I have the correct equipment? Have I done all of the required testing? Do I have all of the records I need? Can I trust my service providers to do the work right and keep me in compliance? How can I get answers to these questions without tempting DEQ to inspect my facility? All of this confusion led to lengthy inspections, poor compliance, time-consuming enforcement actions, heavy penalties, and, in some cases, costly modifications to UST systems. The Oregon Department of Environmental Quality (DEQ) needed to find a way to remedy these problems, improve compliance, and show operators we weren't "out to get" them. Oregon decided to try something new...Operator Training. Now, after four years, regulatory compliance has increased nearly 20 percent...but is operator training the whole story?

The Early Years

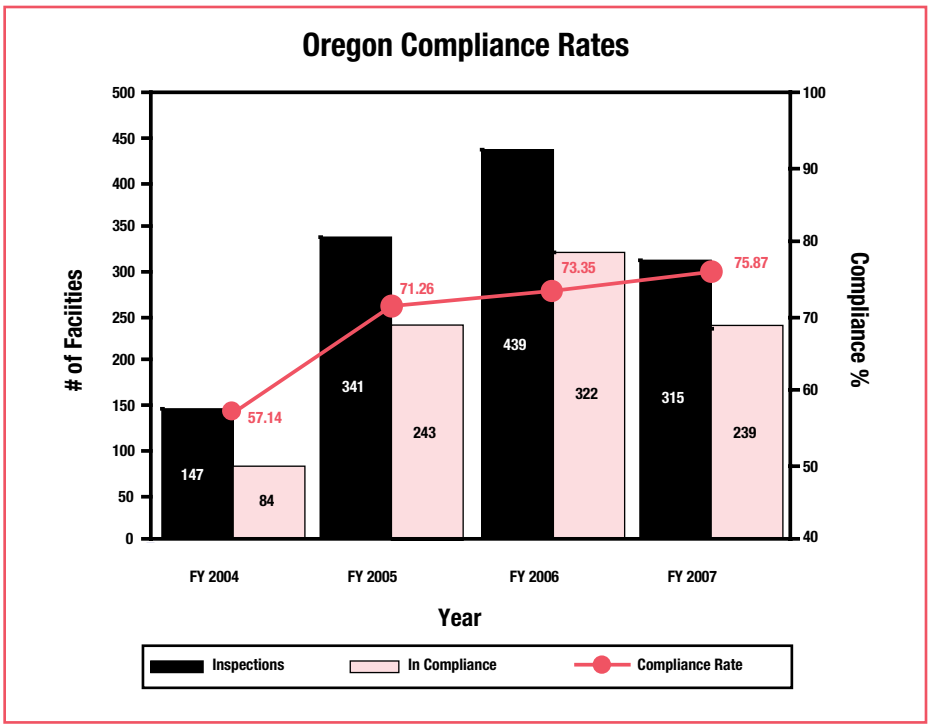
Although Oregon UST rules were in place in May 1988, most operators had little interaction with DEQ regarding operation and maintenance compliance. They only vaguely understood that they needed to do more, but DEQ had little time to help operators or inspect operating facilities (we were busy recording leaking tanks and inspecting decommissionings).

After the 1998 upgrade deadline, DEQ and USEPA began conducting operations and maintenance inspections. Compliance, for the most part, was atrocious. Most operators had violations—some had major issues. Several operators had assurances from their service providers that the equipment they had purchased would meet the UST requirements but not all of it did. The underlying problem was a lack of understanding of the rules by both service providers and operators. DEQ recognized the problem and opened a dialogue with operators, service providers, and industry representatives to find solutions. Together we developed several strategies to increase compliance that included an expedited enforcement (field citation) pilot program and a proposal for mandatory operator training.

Operator Training Takes Off

The operator-training proposal was molded into legislation, and in February 2003 Oregon became the first state to require operator training. As of February 2004, all facilities in Oregon that dispense fuel to a motor vehicle or container must have a trained UST-system operator. Training for the operator must be documented by a listed vendor and include:

- A general overview of Oregon DEQ administrative requirements, including financial responsibility
- A general overview of other related regulations (e.g., fire code, health and safety)
- An overview of spill-prevention and overfill-protection devices and UST system operation and maintenance
- An overview of release-detection methods and devices, operation, maintenance, and recordkeeping
- An overview of corrosion-protection (including internal lining) methods, operation, maintenance, and recordkeeping.



Success?

By the February 2004 deadline, about 80 percent of our UST facilities had trained operators, and since 2006 it has remained near 100 percent. After a paltry 57 percent compliance rate prior to the training requirement, these rates have dramatically improved. An increase of nearly 19 percent is hard to ignore, especially a 14 percent jump after the first year. But can this success be attributed to operator training alone? We're not convinced.

Tribulations

In looking at our training program four years later, we recognize that there are some shortcomings. For one thing, Oregon's pre–Energy Act training requires only a general overview

of topics. There are no requirements for continuing education or retraining after violations are cited to an operator who has completed the training—and one trained operator can be responsible for an unlimited number of facilities.

Fifteen vendors were listed by DEQ to conduct training; however, not all instructors are created equal. To be listed, training vendors needed only to sign an affidavit stating they would cover the required elements. They employed a variety of teaching methods, and some courses were far more detailed than others. The most basic sessions consisted of an instructor simply standing in front of the class reading the Oregon UST rules. These were often large classes, and many operators who attended felt that their training was a waste of time.

Other sessions were site-specifically tailored to the operators in attendance; overwhelmingly, these operators felt the training was beneficial. In these small- to medium-sized sessions, most operators left the training feeling that they had gained insight into the regulations and the operation of their UST systems and shared a willingness to improve their operation and maintenance.

Oregon's operator training program does not require continuing education or retraining after violations; therefore, after the initial training of operators, most vendors who had offered training courses stopped. Now, only one trainer offers courses on a regular basis, which makes it difficult for new operators to complete the required training. To help offset this problem, Oregon recognized the International Code Council's (ICC's) UST System Operator (national exam) as a partial fulfillment of the training requirements.

In our rules, the term "trained operator" was broadly defined, and the number of facilities for which one person could be the operator was not limited. The rates of compliance in situations where a single operator was trained for several facilities varied. In most cases, operators regularly monitor the operations of their facilities, and compliance issues at one facility are addressed at all of their other facilities. However, in several instances, the trained operator actually has little involvement with the daily operations of a facility. Curiously, the same violations tend to occur at several locations under these circumstances.

Oregon recently implemented a rule revision, prompted by the Energy Act. We have adopted a broad interpretation of the Energy Act model for operator training. This will allow us to tighten control, as needed, through guidance rather than rule. Oregon's revised operator training program starts in August 2009. We are still drafting our guidance, but a few of the issues we have encountered have already been addressed. For example, vendors will be subject to a more stringent approval process prior to offering courses in Oregon. Also, requirements for retraining of violators and improved constraints on the requirements for being the "designated trained operator" have been added.

Other Tweaks Toward Compliance

Before 2004, UST violations found by DEQ required a lengthy and time-consuming formal enforcement process. Enforcement was detracting from the time inspectors could spend actually conducting inspections, and it created a financial burden on businesses because of the associated penalties. DEQ recognized the need to streamline enforcement, so in 2004 we began an expedited enforcement pilot program. As a result, we significantly cut the level of formal enforcement, freeing up our inspectors to conduct inspections. Violations cited at the conclusion of an inspection result in less time out of compliance for facilities and may have significantly contributed to increased compliance. Owing to the success of the pilot program, DEQ's expedited enforcement program was expanded and permanently authorized in 2008.

In anther effort to improve compliance, we targeted UST service providers who are licensed in Oregon and for the most part play an active role in assisting their customers in making equipment and monitoring decisions. DEQ recognized the value of informed and knowledgeable service providers and provided a series of free one-day seminars tailored for this group. The seminars offer current, pertinent information and a forum for direct interaction with DEQ inspectors for rule interpretation and guidance.

These sessions have opened an avenue of information exchange between DEQ and service providers. As a result, service providers are better serving their customers, confidently assisting operators by teaching ways to improve their practices—and thereby increasing compliance. The operators are now knowledgeable about their systems and usually have the required records readily available during inspections. Service provider efforts have led to shorter inspection times and improved operational compliance.

Other factors that may have influenced compliance include an increase in the number of inspectors (from 3 to 5 FTE) and inspection frequency (from "eventually" to an approximate 3-year cycle). Also, Oregon has a good percentage of facilities operated by regional distributors. In most cases, a violation at one facility leads to corrections being made at their remaining facilities before additional inspections are scheduled—one cited violation has led to improved compliance at several facilities.

The Communication Bullet

It's challenging to quantify the success of Oregon's operator training program. One thing we know is that operator training is not the compliance silver bullet. We believe a crucial missing piece in the compliance puzzle is communication—with both the regulated community and service providers. In our experience, this has been the most important element in our compliance success.

Regardless of the reason, we are happy to say that since 2004 there has been a significant increase in the knowledge of the operators in Oregon, and they no longer dread receiving an inspection notice. Inspectors can attest that operators have an improved understanding of the requirements, and we have seen a significant reduction in the time it takes to conduct an inspection. Most importantly, compliance rates are up and continue to improve. ■

Tracy J. England is an UST Inspector with Oregon DEQ. He can be reached at tracy.england@state.or.us.

A Long View

Parting Thoughts from a Veteran Tank Regulator

by Marshall Mott-Smith

On March 31, 2008, I retired from the Florida Department of Environmental Protection, where I worked for 31 years—the last 22 of those were as administrator of the Storage Tank Regulation Section. While listening to the luncheon speakers at the recent Annual Tanks Conference in Atlanta, I got to thinking that I really ought to say a few words that reflect on what we've accomplished and what still needs doing and also to thank those people who have helped me along the way. *LUSTLine* has been there for all of us throughout the program and is the ideal forum for me to pass on some parting thoughts to my friends, fellow regulators, and the many others in the UST and AST programs around the country that I had the pleasure to work with through the years. It's not that I've become an old geezer with a compelling desire to tell everyone what it was like in the "old days," but I believe there is some value in knowing our program history so we can better appreciate and gauge the strength of our current effort.

First of all, I'm very grateful for the knowledge and experience I gained in my government job. My regulatory experience was very valuable. It started as an apprenticeship when I was a field inspector making $7,000 a year in 1977, and the more I learned, the better I became at my job. The fieldwork was particularly educational because it afforded me a true perspective on the realities that regulators, facility owners, manufacturers, and consultants face each day in their efforts to be successful in their work. I took advantage of the technical and leadership training opportunities that were available and soaked up the wisdom of experts like Maine's Marcel Moreau and England's Jamie Thompson. I urge all of you to keep learning and to be open to new ideas and technologies. In addition, I really enjoyed my work as a tanks compliance program administrator because it continually offered new challenges, was never boring, and gave me the opportunity to work with many different and interesting people and industries.

Second, if you are a new inspector and think that the United States is overly polluted and going to the depths in a handbasket, you are wrong! There is always room for improvement, but I remember when we *really* did have dirty air and water in the 1960s and 1970s, and we absolutely have made outstanding progress since then. This is particularly true with our tanks programs. Looking back to the early days of Florida's program in 1983, the one thing that really jumps out at me is how far we have come.

I remember when Florida only had six inspectors. Each had over 300 cleanup enforcement cases with leaking UST systems, and no one had any time available to perform compliance inspections. Progress with remediation at contaminated sites was at a standstill, and sites with free product, which was measured in feet instead of inches, was commonplace. If a site was owned by a major oil company, we had the lawyers, we had to delay any cleanup response, and the contamination remained in the ground.

If a "mom and pop" owned the site, there was no action either, because the owner didn't have the resources to clean up the contamination and would often just "walk away." The Florida legislature finally allocated money for a compliance program in 1986, along with a well-funded Trust Fund for cleaning up sites. From then on, everything went into high gear. Twenty-two years later, after more than 500,000 compliance inspections and thousands of enforcement cases, there truly is an amazing contrast between the past and the present.

We've also learned that there is absolutely no substitute for a pair of eyes with an on-site inspection to determine compliance. If owners know there will be a physical inspection, there is more incentive to be in compliance. In my opinion, Environmental Results programs are well intended, but ineffective. We know that the only effective system for preventing leaks is one that has secondary containment and that single-walled systems with external monitoring or internal lining are woefully ineffective. We've learned that inventory control is usually only good for finding large leaks and that most leaks today originate from the spill-bucket area.

Some difficult experiences we've encountered involve certain manufacturers that made products that seemed like great ideas on paper, but had poor performance records when they were installed in the field. Early models of flex-pipe (particularly from Total Containment, Inc.) and tank internal bladders are just a few products that come to mind. Also, the 0.2 gph leak rate may have been a good standard in 1988, but it has not kept up with advances in leak-detection technology. A good way to see the progress since these failed products and leak-detection systems is to go to the next Petroleum Equipment Institute (PEI) conference in Chicago and see the vast array of quality products that are now available. Release-detection technology is out there; however, the "weak link" in the process has now shifted to the operator.

Some other transitions in the tank arena will challenge UST inspectors. For one thing, there has been a dramatic change in the demographics of ownership in the past several years, and this trend is going to continue. As major oil companies divest their ownership in retail sales, new owners are buying the facilities. While these new owners may be good merchants, they are often inexperienced as tank owners and do not always have environmental protection or facility main-

tenance as a high priority. Family financing for these facilities also makes agency enforcement actions difficult. Another transition underway involves facilities that chose lower-cost upgrade technologies for meeting the 1998 deadline. Instead of purchasing compliance, these facilities essentially rented their compliance for a short time…and with a short fuse. Inspectors should ensure that both of these transitional situations receive adequate attention and resources, or they could face a return to the days of the early 1980s.

I would like to recognize the early pioneers and the prominent leaders of the program. For example, Ron Brand, who started the USEPA program and had the vision to give the states an active role in program development and management. I served on a committee in 1986 with Marcel Moreau and many other state regulators to help USEPA develop its technical UST rules that eventually became 40CFR 280. There were notable USEPA Office of Underground Storage Tanks (OUST) Administrators in between like David Ziegele and Lisa Lund, who kept the program on task toward meeting the 1998 UST upgrade, replace, or remove deadline. We are currently well served by Cliff Rothenstein and his fine staff, who helped get the Energy Act of 2005 through Congress, and who have initiated the recent work to revise the federal UST rules—especially Mark Barolo.

As leaders of state programs today, we need to make sure that compliance inspectors have the tools and knowledge they need to be effective regulators, yet at the same time make sure they have the "people skills" needed to be fair and unbiased interpreters of the rules as they are written. We can't forget that tank owners are people just like us who are trying to make a living and that their taxes help fund our programs. They also have a multitude of other regulations to comply with in addition to the UST regulations. And remember, only countries with viable economies can afford to have and enforce environmental regulations (visit Mexico, Russia, and a few third-world countries if you disagree). Tempering your regulatory decisions with a real-world outlook and commonsense judgment goes a long way.

Marshall Mott-Smith (left) and European tanks expert Jamie Thompson, Association for Petroleum and Explosives Administration (APEA), meet up in England.

I also have one word of caution. We cannot be satisfied with our success and become complacent. We must continue to look for more efficient and effective methods of regulation that are practical and achievable, yet provide adequate protection for groundwater. For example, Florida gets 92 percent of its drinking water from groundwater sources. While in some places it's plentiful and clean, in other areas there is excessive demand and not enough suitable sources that meet drinking water standards.

Groundwater protection must be our prevailing purpose, and we must remain focused on this mission without getting sidetracked with procedures, bean counting, or other things that divert our attention. This will not be easy, as many state resources are strained with lower tax revenues, and state legislators are faced with difficult funding decisions. Travel, training, and expense budgets have been slashed, and managers must prioritize their efforts on inspecting those facilities that pose the greatest risk to groundwater.

I have known numerous state tanks program regulators and managers through the years who have made significant contributions for the good of the national program and/or who have been influential in helping Florida's Program. I have a list of about 100 names of people that I would like to recognize, and I know if I mention any names, I risk leaving someone out. I would, however, like to mention a few special friends who have been very helpful to me. Bill Truman (ex-Florida, currently with USEPA Region IV, and the worthy successor of another friend, John Mason); Mississippi's Kevin Henderson, for his excellent work with flex-pipe and UST-system equipment performance; Ben Thomas, for all his training efforts; Steve Crimaudo, for his supportive work with AST-SWMO; Stuart Gray, for his moral support; and Florida's Ernest Roggelin, for all that he has done as Florida's lead trainer.

We've gone from bare-steel tanks and piping to single-walled, corrosion-resistant storage tank systems, and from a handful of inspectors to a large successful nationwide program that probably has provided more real protection and remediation for our ground and surface waters than any other federal program. Together we have brought thousands of facilities into compliance and cleaned up hundreds of thousands of contaminated sites. The future outlook is also good as we are well on our way with the transition of single-walled corrosion-resistant storage tank systems to systems with secondary containment. So, whenever you think you are spinning your wheels, mired in the tedious and routine process of completing your grant application, or wondering if what you are doing is really worth the effort, step back for a moment and take in the long view. You were part of the collective success, and we truly have much to be proud of. ■

Marshall Mott-Smith is currently president of Mott-Smith Consulting Group LLC. He can be reached at marshall@motts-smithconsulting.com.

A MESSAGE FROM CLIFF ROTHENSTEIN

Director, U.S. EPA Office of Underground Storage Tanks

Changes Coming to the Federal UST Regulations

With the Olympic games recently over and the baseball playoffs just around the corner, it dawned on me that those of us in the UST program have a lot more in common with professional athletes than we might think. We're both at the top of our professions. We both occasionally make some unforced errors. And like professional athletes, we too need to keep up with the latest equipment and technology. Any sports fan knows that Rafael Nadal didn't win Wimbledon using a wooden tennis racquet, nor did Tiger Woods win the U.S. Open using a persimmon driver. And 41-year-old Olympic swimmer Dara Torres didn't win a silver medal in the 50 meter freestyle wearing a cotton bathing suit. She wore the new hydro-dynamically advanced Speedo LZR Racer swimsuit. Tiger used his Nike SasQuatch Tour 460cc driver, and Rafael used a Babolat Aero Pro Drive Cortex racquet.

Like these great athletes, we too must replace our old, worn-out tools of the trade with new equipment. For those of us who are tank aficionados, it means we must update our UST regulatory wardrobe so we can continue to perform at the top of our game.

I think we all agree that for more than 20 years the UST regulations have served our program and our country well. We've seen a steady decline in reported releases and an expanded use of better tank systems. But there is still room for improvement. It's been almost two decades since we promulgated our regulations—and like golf clubs, tennis racquets, and swimsuits—UST systems have also changed quite a bit. We have seen wooden dipsticks replaced with automatic tank gauging, and bare-steel tanks replaced with double-walled tank systems. And now we are even seeing "green" gas stations being built with energy-efficient and environmentally friendly equipment.

But one thing that has not changed is the UST regulations. While technology has moved into the 21st century, our regulations are still stuck in the 1980s. And some of the requirements are now woefully out-of-date. Fortunately, with the enactment of the 2005 Energy Policy Act, we now have a great opportunity to take a close and critical look at our UST regulations—we will update them so that we can fully implement the UST provisions of the Energy Policy Act and take full advantage of today's new technology.

Implement Energy Policy Act to Ensure Equity of UST Requirements

In 2005, about 20 years after creating the UST program, Congress again saw a need to update the law so we would have more tools to prevent, detect, and clean up releases from underground tanks. So when Congress passed the 2005 Energy Policy Act, it included several new provisions that, once fully implemented, will help all of us do our jobs better. As drafted, however, some key provisions of the Act, including secondary containment, operator training, and fuel-delivery prohibition, apply only to UST facilities in states that receive federal LUST funding. These provisions, however, do not apply to tank facilities located in Indian Country, nor do they apply in states that do not receive such federal funding.

In order to achieve more consistent program results in preventing releases, we need to revise the tank regulations and require that these provisions apply throughout the country. What this means is that after the new regulations are promulgated, tank owners in Indian Country and in states that haven't received USEPA UST-program approval will also need to meet the new secondary-containment requirements, train their UST facility operators, and be subject to fuel-delivery prohibition enforcement authority. By doing this, USEPA will ensure federal enforceability of these release-prevention requirements nationwide.

Targeted Changes to Existing UST Regulations

But to take full advantage of today's better technology, we must look beyond these new Energy Policy Act requirements. In much the same way that Congress recently amended, updated, and improved the statute governing underground tank regulations, we must also take a close look at our existing 40 CFR, Part 280 regulations to see where they are out of date and where they can be improved.

Our goal is to quickly, but methodically, identify targeted regulatory changes that will continue to advance and improve UST technology and that are needed to move the program forward in a cost-effective manner. Our regulations, wherever possible, should encourage UST owners to use the best and latest equipment (like professional athletes) to prevent and detect releases.

While we haven't yet completed our assessment of what changes are needed, we have identified a few areas where targeted regulatory changes may be worthwhile. For example, we know that some standards referenced in our

regulations are outdated or no longer exist and need to be updated or eliminated. We also know that for about 20 years, field-constructed tanks and other types of UST systems have been deferred from regulation, and we may want to regulate or exempt some or all of these systems. We know there also may be opportunities to reduce unnecessary recordkeeping and other regulatory burdens. And on the flip side, there may be a need to close significant regulatory gaps, such as testing requirements for spill buckets and sumps.

The Real Work Is Just Beginning

On June 30, we officially kicked off our new rulemaking process. It's a process with many steps, but we're already making progress. We've begun some of the initial administrative work that USEPA requires for a rulemaking change such as this. And we've also started talking with state and tribal officials, as well as many UST stakeholders (e.g., industry, environmental organizations, and federal agencies) and are actively eliciting their thoughts on our plans.

Over the next several months we expect to continue working our way through the initial steps of the regulatory process. But unlike the Olympic games, which lasted only two weeks, developing, proposing, and promulgating our new regulations is more like the years of training all top athletes must endure to even get to the Olympics. Our regulatory process will be a long haul, but worth the effort. As we all know, despite our best efforts, USTs are still the nation's leading source of groundwater contamination. But with your active involvement and input into our regulatory process, I am confident we can amend our rules and lead the way in protecting our nation's groundwater and drinking water from UST systems. And at the end of the day, when we get to stand on our podium and receive our gold medal, we will be as proud as any world-class athlete that we can more effectively run our programs. ■

A Tribute

Arlene Luther's Legacy

by Ellen Frye

The Navajo Nation, other tribes, USEPA, family, and the environment will miss Arlene Luther, a longtime advocate for Navajo environmental justice and a pioneer of what is now the Navajo Environmental Protection Agency. Arlene died in January 2008 after a long illness complicated with pneumonia. According to her friend and coworker Henry Haven Jr., Arlene dedicated most of her life to the protection of land and precious water resources on the Navajo Nation.

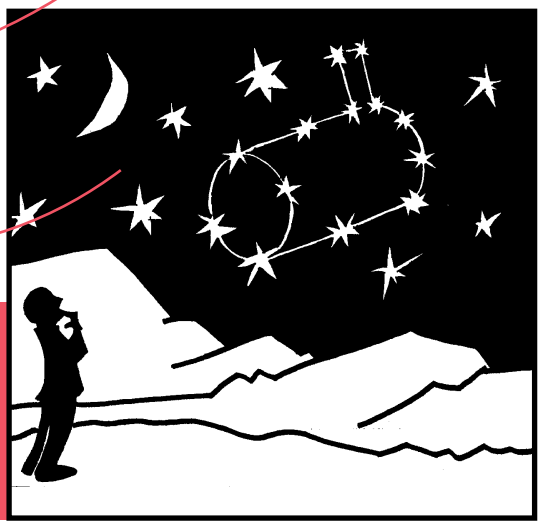
"She lectured in matters of environmental justice across Indian reservations and captured the audience of both the U.S. EPA and prominent members of Congress," says Haven. "She provided great guidance and wisdom to the Navajo UST and LUST program, as well as to other tribes. She will be missed and will be remembered for her solitary struggle to bring environmental justice to all Indian Nations."

Luther was program director for USTs, Superfund, Hazardous Waste, and Waste Management and had been with Navajo EPA for nearly 30 years. She was a federally credentialed hazardous waste inspector for USEPA and a tribal UST compliance-monitoring inspector. She participated in many criminal investigations with USEPA. "She was involved in almost everything—uranium, oil and gas, groundwater contamination," says Haven. " She brought a lot of stuff up to the congressional level, especially with uranium and groundwater contamination. She was always bringing everybody together—BIA, the state, U.S. EPA, local people, and other tribes—getting them to realize there were problems that needed attention."

"She was standing on the value of the sacredness of land, water, and air. That was her whole position," explains Haven. When Henry Haven phoned me in January to say that Arlene had died, I sensed the enormity of our loss, but it was also clear that she had left behind a powerful legacy for the Navajo nation and all others whose lives she had touched. ■

Cliff Rothenstein (left), Director of the USEPA Office of Underground Storage Tanks, Arlene Luther, and friend and coworker Henry Haven Jr. at the 2007 Tanks Conference in San Antonio, Texas.

Wander LUST

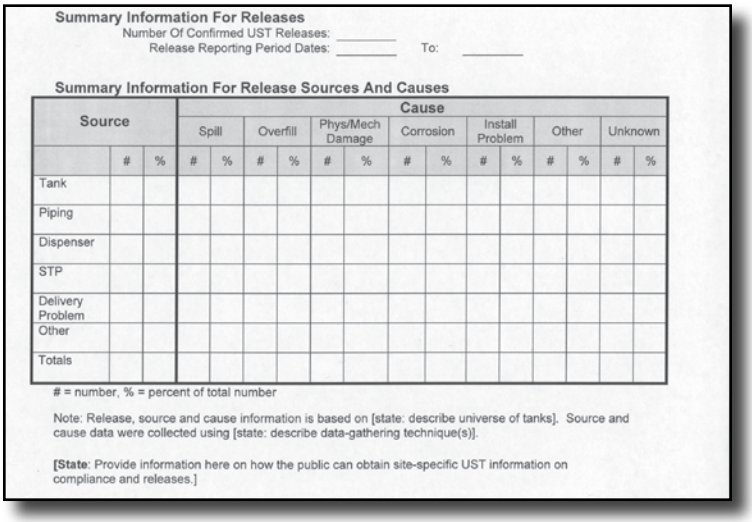


A roving column by reporter Patricia Ellis, a hydrologist with the Delaware Department of Natural Resources and Environmental Control, Tank Management Branch. Pat served as a member of U.S. EPA's Blue Ribbon Panel on MtBE. She welcomes your comments and suggestions and can be reached at *Patricia.Ellis@state.de.us*.

As Rudy Used to Say..."I Dunno"

For those of you who aren't *Survivor* fans from way back (series 1, no less), Rudy Bosch, a seventy-something, seemingly clueless, ex-Marine who somehow made it to the final three on the show, frequently uttered the words "I dunno." I consider myself a little less clueless than Rudy (at least in certain areas), but I find myself saying, "I dunno" much of the time when filling out the new Source/Cause reports, developed as a result of the Energy Policy Act of 2005 (EPACT).

Part of the new public record reporting required by EPACT includes an accounting of the number, sources, and causes of UST releases in each state. Two measures were added to the reporting, in addition to the number of confirmed releases that have been required for years. The first measure is the number and percent of releases by source, where the source of the release is known. The second is the number and percent of causes by source.



Summary Information For Releases

Number Of Confirmed UST Releases: _____

Release Reporting Period Dates: _____ To: _____

Summary Information For Release Sources And Causes

Source	Cause															
	Spill		Overfill		Phys/Mech Damage		Corrosion		Install Problem		Other		Unknown			
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Tank																
Piping																
Dispenser																
STP																
Delivery Problem																
Other																
Totals																

= number, % = percent of total number

Note: Release, source and cause information is based on [state: describe universe of tanks]. Source and cause data were collected using [state: describe data-gathering technique(s)].

[State: Provide information here on how the public can obtain site-specific UST information on compliance and releases.]

While trying to identify the source and cause of releases from UST systems is an admirable and useful goal, in practice, it is an easier-said-than-done task. We are spared some of the agony of this reporting because EPA's "Grant Guidelines to States For Implementing the Public Record Provision of the Energy Policy Act of 2005" does not require states to report this information for releases where the source is not known.

Okay, maybe I can just invoke Rudy's "I dunno," but I doubt that the public would be very happy with 100 confirmed releases, and source/cause information for only 5 of them (that's 95 "I dunno's" for source and cause). Figure 1 shows USEPA's suggested reporting format. I'm sure that the agency doesn't expect the total number under "Source" to equal the "Number of Confirmed Releases," but how much of a difference is acceptable?

Tracking Source/Cause Information?

What is involved in tracking the Source/Cause information? USEPA has provided the states with lists of sources and causes. Logic would have it that we should at least be able to figure out the general area of the release, because, after all, parts of a tank system are usually (but not always) spread out spatially on a site. Later, I will discuss why this is not always the case, depending on how the release might have been identified.

The following is the minimum list of these **sources**, with USEPA's short description of each:

- **Tank** – Stores the product and is a part of the UST system.
- **Piping** – Includes the piping and connectors running from the tank or submersible turbine pump to the dispenser or other end-use equipment. It does not include vent, vapor-recovery, or fill lines.
- **Dispenser** – Includes the dispenser and equipment used to connect the dispenser to the piping. For example, a release from a suction pump or components located above a shear valve would be considered a release from the dispenser.
- **Submersible turbine pump (STP) area** – Includes the submersible turbine pump head (typically located in the tank sump), the line-leak detector, and the piping that connects the submersible turbine pump to the tank.

- **Delivery problem** – Identifies releases that occurred during product delivery to the tank. Typical causes associated with this source are spills and overfills.
- **Other** – Default option when the release source does not fit into one of the above categories. For example, releases from vent lines, vapor-recovery lines, and fill lines would be included in this category.

I can usually identify a dispenser leak and a piping leak, but tank, STP, and delivery problems are all located in the tank area.

The following is a minimum list of **causes**, with USEPA's short description of each:

- **Spill** – Use when a spill occurs. For example, spills may occur when the delivery hose is disconnected from the fill pipe of the tank or when the nozzle is removed from the vehicle at the dispenser.
- **Overfill** – Use when an overfill occurs. For example, overfills may occur from the fill pipe at the tank or when the nozzle fails to shut off at the dispenser.
- **Physical or mechanical damage** – Use for all types of physical or mechanical damage, except corrosion as described below. Some examples of physical or mechanical damage include: a puncture of the tank or piping, loose fittings, broken components, and components that have changes in dimension (e.g., elongation or swelling).
- **Corrosion** – Use when a metal tank, piping, or other component has a release due to corrosion (for steel, corrosion takes the form of rust). This is a specific type of physical or mechanical damage.
- **Installation problem** – Use this cause when the problem is determined to have occurred specifically because the underground storage tank system was not installed properly. Note that these problems may be difficult to determine.
- **Other** – Use when the cause is known but does not fall into one of the above categories. For example, accidentally or intentionally putting a regulated substance into a monitoring well would be included in this category.
- **Unknown** – Use only when the cause is not known.

Spills and overfills may be difficult to distinguish from each other, unless they were witnessed and reported at the time. Contractors don't always work with the care and precision of a surgeon, so unless you're there when they are working on a tank system, you might not know that pipes or fittings were damaged before they started digging.

Identification of Release

At the same time that we added the Source/Cause fields to our Delaware database, I also added a field called "Identification of Release." This was an attempt to start tracking how sites were identified as release sites and came to be added to the "LUST List." At least it gave us the satisfaction of being able to check something off with a reasonable degree of certainty. Maybe I can get rid of a few "dunnos." I know USEPA says we don't have to provide source and cause information to the public if we can't figure out the source, but given that option, we would be tempted to always check the "I dunno" box. I need to know why we so frequently "dunno." I think that part of the answer lies in the way in which releases are identified and come into our system!

Release identification options include:

- Tank system removal or abandonment observations and samples
- Site investigation
- Equipment failure
- Offsite impact
- Referral from Emergency Response
- Referral from Public Health (usually because of a contaminated well)
- Retrofit sampling
- Tank gauge or line-leak detector triggered
- Tank or line testing
- Stage II vapor-recovery testing
- Inventory control discrepancies
- Water in tank.

Of the first 70 sites or so that have been entered into our database, approximately half were identified as "leakers" because of tank removals or abandonments. Approximately 25 percent of the new sites were identified because site investigation reports were submitted, usually owing to a property transfer or potential transfer. (It's a good thing we've had a lot of property transfers, or I might run out of things to do.) Around 15 percent of the sites were identified because of retrofit sampling. The other 10 percent of sites were identified due to referrals from our State Emergency Response Team, the Office of Drinking Water, or observations such as staining during facility inspections. Maybe it's because of the small sample size, so far, but what is conspicuously absent is any of the methods of leak detection giving us an indication of a release.

For *tank removals*, we collect one composite soil sample from the soils excavated from the top and sides of the tank, and one soil sample from two feet below the bottom of the tank. A sample is also collected from five feet below a dispenser. These samples might allow me to check "Dispenser" as an option, but the composite and grab tank samples don't always allow me to know whether the tank leaked, there was an STP problem, or there was a delivery problem.

When our inspectors attend a removal, they try to time their arrival to when the tank is ready to come out of the ground. Chances are, the concrete pad was removed the day before, the dispensers are already gone, and all the tank-top piping and sumps are gone. Many of these pieces may already be in the dumpster. Chances are, when the inspector arrives on site, the soil is already in a big heap staged out of the way. That makes it a little hard to guess where the problem was when the samples come back hot.

I went to one tank removal a few years ago where the product piping had been repaired by something that looked like segments of radiator hose, held together by hose clamps. Oh, to have had a camera that day! And since we seldom see any bare-steel tanks any more, we seldom see tanks that look like they've been hit by a load of buckshot.

To have a better chance of answering the "source" questions, our inspectors might have to hang around a site for two or three days, starting with the minute that concrete is broken, which would not be very popular with either our inspectors

■ *continued on page 14*

■ **WanderLust** *from page 13*

or (possibly) the contractors. With our current way of doing removal inspections, we can probably say that the release was from the area of the tanks (top or bottom), or the area of the dispensers.

When we get a *site investigation report*, usually done for a property transfer, we often get both soil and groundwater samples, because many of these investigations are done using direct-push techniques. Samples are collected from around the site, with most investigators attempting to sample near tanks and dispensers while also trying to avoid hitting tanks, lines, vapor-recovery lines, concrete pads, water lines, electric lines, and all the while dealing with property boundaries. We may or may not get groundwater flow directions, and the investigator may or may not have managed to collect samples from locations that are downgradient of potential release areas.

I received two property transfer investigations recently, both of which were previous LUST sites, so flow direction was known. Even knowing flow direction in advance, the investigators managed to collect all of their samples upgradient and crossgradient of any potential source areas. Attempts to collect additional samples downgradient were stymied in both cases because of access refusal. If these investigations, done by the buyer, were to serve as a baseline for existing contamination...well, based on what was submitted, they looked nearly clean to me! Even a well-done site assessment might let you know that the problem appeared to come from the tanks, or appeared to come from the dispenser, but examination of station records and testing results will usually fail to identify a definitive source.

Retrofit sampling, because it is done in a localized area, is more definitive in identifying a source. If you remove a dispenser to install a sump, you can see the staining. If you add or replace a tank-top sump, you can usually see or smell the problem, although you might be sampling pea gravel instead of soil. Replacement of flex connectors with swing joints also allows you to get up-close and personal with potential source areas. At least one release area might be identified with reasonable certainty during a retrofit.

Cause of Release

If we can get past determining the source-of-release problem, identifying the cause might be somewhat easier, but much of the time, your ability to determine source and cause will depend on how the site was identified as having had a release. A contractor who is hired to remove a tank will not be operating with the care of a coroner conducting an autopsy to determine cause of death. He's out there to get the tank out of the ground as quickly and cheaply as possible, so he can get on to another job. If a line-leak detector triggers, someone has to track down the problem so that it can be fixed.

Now, when a tank or line fails a test, the contractor has to tell us what he had to fix to get the tank or line to pass the re-test. When we identify a release by way of things like a Phase II site investigation, later examination of station records often fails to give any indication of a past or ongoing release. Depending on where samples are collected, you might have a pretty good general idea where the release occurred, but not the cause. Repairs may have been done years before, and we're just identifying the release now.

LUST Autopsy Reports

Sometime around 2001 or 2002, we were required to fill out a LUST Site Release Report for every release where the tanks met the 1998 standards for submission to EPA Region III. These reports were three pages long and included tank and piping system information (material and type of tanks, product stored, age, presence of absence of sumps, pump types, leak-detection methods including brands and model numbers, date of last testing, etc.). Then the reports continued on to date release discovered, estimated date of initial release, source, cause, how identified, estimated extent in soil and groundwater, and media affected. There was also plenty of space for a long detailed description of any additional information. What I remember most about the forms, other than the sheer joy I got in filling them out, was having most of them rejected by USEPA because of

Florida Leak Autopsy Study The Florida Department of Environmental Protection (FLDEP) has probably collected more autopsy data than any other state. An article by Marshall Mott-Smith appeared in *LUSTLine* Bulletin 56 detailing some of the findings of the study. The Florida report form requires extensive information on the tank system and equipment at the facility, method of discovery of the release, whether the method of leak detection in use at the facility detected the release, as well as source/cause information (*http://www.dep.state.fl.us/waste/quick_topics/publications/pss/tanks/62-761Workshop/LeakstudyformDraft.doc*).

Some of the results of the Florida leak-detection project were presented at a public rule workshop in October 2007. The study showed that leak detection detected releases 37 percent of the time, failed to detect releases 38 percent of the time, and was unable to detect releases (or unknown) 25 percent of the time *(http://www.dep.state.fl.us/waste/quick_topics/publications/pss/tanks/rulemaking/62-761_RuleWorkshop18Oct07.pdf)*.

ERM, Inc. analyzed data collected by FLDEP with the leak autopsy reports. A large number of their autopsy reports were considered invalid because either the source or cause was unknown, but 357 reports had enough information for analysis. The main source of releases was spill-containment buckets, and the main cause was material failure (*http://www.ermi.net/Media.nsf/Main/9870B0314DE33D8C8525729E005F2429/$file/NISTMUST2005PresentationB.pps?open*). Where tanks were the source of the release, the main causes were listed as unknown and overfill. Where pipes were the source, material failure and physical damage or punctures were the main causes (*LUSTLine* 56).

The Florida study also included a summary of discovery methods similar in idea to information that I have been tracking with my "Identification of Release" field. Their "discovery" includes: visual, analytical tests or samples, removal, leak detection, other tank tightness methods, installation or upgrade, inventory reconciliation, annual tank tightness, and olfactory. Seventy percent of the releases were identified by visual detection, analytical tests or samples, and removal. Again, "leak detection" methods accounted for much smaller percentages.

too many "I dunno"s. Eventually, we were told that we didn't have to fill them out anymore.

And How About the Stupid Leaks?

Of the approximately 600 LUST sites for which I've been the project officer in the last 18 years, I can give an absolutely certain source and reasonably certain cause for about 20 of them. A number of the releases were caused by sheer stupidity—why would you dispense product into a clearly labeled, double-locked tank field well when the fill pipe is a few feet away and clearly labeled?

It takes a socket wrench to get this lid off, and then it's got a locking well cap inside. It's also labeled Monitoring Well. It's not a fill pipe! STOP. THINK!

Why wouldn't you take a better look at your facility if one tank's daily inventory record showed four straight months of daily losses, even if the inventory passed the 1 percent of throughput plus 130 gallons threshold? That release was finally reported when a previously absolutely clean monitoring well that existed owing to an earlier release from another tank field all of a sudden had three feet of free product. Product was squirting every time someone dispensed product, but the problem evidently wasn't where either the line-leak detector or the automatic tank gauge (ATG) would trigger. I don't know how much longer it would have taken to be discovered if a consultant hadn't been doing quarterly monitoring for an earlier release, and if that monitoring well didn't happen to be right next to the tank field. It was really obvious when we went to the site and popped the manhole cover for this tank.

Note the bottomless plywood sump within the manway—it's 25 feet straight down through the pea gravel to groundwater. Product squirted every time the pump kicked on. Our new regulations not only require sumps, we require double-walled sumps. Operators are also required to perform a release investigation if in any month there is an "unexplainable consistent negative trend" in inventory.

Why would someone drill a monitoring well within the area of a long linear patch in the asphalt, directly in line between the tank top and the vent lines. Yup, drilled through the vent lines and even logged the fiberglass in the drillers' log. Not reported at the time of the accident. I spotted it when I saw a spike of MtBE in groundwater during the next several quarters of groundwater monitoring and found the fiberglass logged in the drillers log. Evidently the geologist logging the well was not aware that product piping and vapor-recovery lines could be made of brown fiberglass.

2-4' Pea gravel and ground fiberglass fragments

4 – 6' Orange medium Sand with fiberglass chips

6-8' Layered orange pea gravel & sand with fiberglass
8-8.2' Orange C-M SAND (FILL)
Wet and slight petro odor at 9'
8.2-15.2 Gray clayey SILT

Part of the drilling log from installation of a monitoring well. Fiberglass is not normally part of our local lithology.

One of my newer sites has one of my favorites. The station owner was installing a concrete pad on which to place a car vacuum. Several rebars were driven into the ground before the concrete form was poured. The line-leak detector tripped (amazing!) and they started looking for the problem at the dispensers, working toward the tanks. The lines didn't follow the path that I would have guessed. They doglegged right alongside the building instead of coming out the end of the dispensers and right-angling to the tanks. I guess they should have used Soft-Dig. Did anyone ever hear of keeping the station As-Builts? They pulled off the fronts of the dispensers and observed product, so they started digging at that end to expose the lines. The breaks in the pipes were most of the way toward the tank field. I'm not sure why they didn't start looking in the area where there was obviously some construction taking place.

They couldn't have nailed the fiberglass product pipe any better if they'd tried. Two rebars scored direct hits on one pipe, and the third rebar nailed a second pipe.

What's the Answer?

During the Blue Ribbon Panel hearings on MtBE, one of the panelists (from a major MtBE producer) repeatedly stated that when all tanks came into compliance with the 1998 tank standards, there wouldn't be any more releases, so the tank programs should make sure that all tanks were in compliance, and we wouldn't have to eliminate MtBE from gasoline. This was in early 1999, and we hadn't achieved 100 percent compliance by then, so we needed to work harder to remove/retrofit all of the tanks that were still out of compliance. Get all those old bare steel tanks out of the ground! Install that spill and overfill protection! After all, a 1998-compliant tank couldn't leak! Fast-forward 10 years, and we're much closer to compliance but—miracle of miracles—even tanks that are equipped to comply and being operated in compliance with the regulations are still leaking without being detected.

■ *continued on page 21*

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**

Making Sense of Sensors

Sensors are old hat to regulators in states where secondary containment has been required for a while, but implementation of the secondary-containment provisions of the 2005 Energy Act will introduce sensors in greater numbers to many more regulators, tank owners, and operators. So this seems like a good time to provide a primer on how the most common kinds of sensors used in UST systems today work. Along the way, I'll also touch on some the reasons why they may not work as well as they should.

In the late 1980s and early 1990s, there were many different types of UST sensors—dissolving strings, proximity switches, wires with dissolving insulation, vapor-sensing adsistors, and metal-oxide semiconductors. Most of these have gone the way of the dodo, although some still survive in isolated pockets of the country. In the interests of brevity and relevance, I'm going to limit this discussion to the technologies that I believe are most commonly used today.

What Is a Sensor?

In the UST world, sensors are devices that act as remote eyes to alert us to conditions of interest in the interstitial spaces of UST systems. These interstitial spaces include those between the walls of double-walled tanks and the insides of tank-top and under-dispenser sumps. Sensors are basically switches that are designed to automatically complete, interrupt, or modify an electrical circuit when certain conditions are present. In the UST world, these conditions most often boil down to the presence of product or water in the interstitial space where the sensor is located. Other conditions, such as the loss of vacuum in a sealed interstitial space, can also be monitored.

The change in the circuit produced by the sensor triggers an audible and visual alarm that is typically in a separate location such as an adjacent building. These days, the alarm may also be transmitted to a remote location that could be the company's head office, a dedicated 24/7 monitoring center, or even a distant land anywhere else on the planet. Most often, the alarm is a component of an automatic tank gauge (ATG).

Sensors are intended to provide constant, unobtrusive vigilance. Like obedient bird dogs, their job is to hunt quietly and point clearly when the prey is present. In the UST realm, the prey is most often liquid—rainwater, groundwater, gasoline, diesel, or some related petroleum product. There are also a handful of vapor sensors and vacuum sensors out there, but they are not included in this article.

A Word About Compatibility

In these days where ethanol in fuel has become almost as pervasive as ethanol in taverns, compatibility of sensors with ethanol fuels is a factor that must be considered. A brief and unscientific survey I conducted of manufacturers' literature indicates that most sensors are compatible with E10 fuels, but only a few are rated for use with higher levels of ethanol. For any new facility or for a facility where a conversion to ethanol-blended fuels is planned, owners should verify the compatibility of any sensors with the product to be stored.

Types of Sensors

Discriminating Versus Non-discriminating

The two main categories of liquid sensors are discriminating and non-discriminating. Discriminating sensors are able to tell the difference between product and water and typically issue different messages on an ATG display, depending on the liquid that is detected. Non-discriminating sensors merely indicate the presence of a liquid, without indicating whether the liquid is product or water. Most discriminating sensors combine two separate sensor technologies, one that indicates that a liquid is present and a second technology that either responds only to product or can tell the difference between product and water.

It is important that facility operators know whether the sensors present at their facility are discriminating or nondiscriminating, because the alarm messages associated with non-discriminating sensors often err on the side of caution and indicate a "fuel alarm" even when only water is present. The all-too-frequent intrusion of water into tank-top sumps thus produces "fuel alarms" that turn out to be "only" water.

Alas, the frequent reoccurrence of these "nuisance" alarms often results in a rather nonchalant attitude toward ALL alarms on the part of facility personnel. Facility operators with nondiscriminating sensors must understand that "fuel alarms" responding to water intrusion are not happening because of some defect in the sensor. They must understand that each "fuel alarm" requires immediate investigation to determine the real nature of the liquid that is present. Operators who are not willing to do this should invest in discriminating sensors.

Discriminating sensors produce alarm messages that differentiate between product and water, allowing for a two-tiered response to an alarm—immediate and urgent response for product alarms and a more measured response for water alarms. While this seems like a very valuable distinction to me, the great majority of tank owners have chosen the cheaper nondiscriminating sensors over the more expensive discriminating ones. The exception to this is California, where regulations have encouraged the use of discriminating sensors.

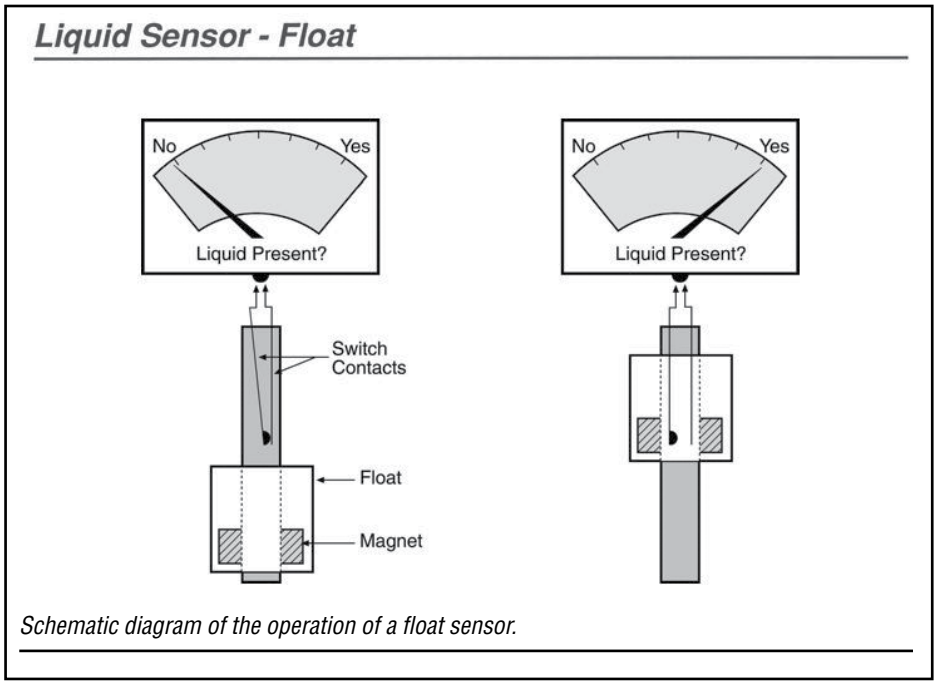
Float Sensors

By far the most common sensor technology used in UST systems is the float sensor, which does not discriminate between product and water. This technology is very simple. Two parallel, flexible strips of metal that act as switch contacts are encased in a small, liquid-tight tube. When the two strips of metal touch, an electrical circuit is completed. When the two strips do not touch, an electrical circuit is open or incomplete.

Outside the tube, there is a donut-shaped float that contains a magnet. The tube containing the switch contacts fits loosely inside the hole of the float/magnet. When liquid is not present, the magnet is positioned away from the switch contacts. The switch contacts are normally closed (touching) so that when liquid is not present, the electrical circuit is complete. When liquid is present, the float/magnet rises up on the tube and the magnetic field of the magnet in the float separates the two switch contacts, opening the switch. The opening of the switch is the signal that liquid is present.

Float sensors can be packaged in many different ways. One very common way is in a gray cylinder about 12 to 22 inches long and about 2 inches in diameter. The float switch is actually located near the bottom of this cylinder, and the rest of the cylinder is empty.

There are a couple of variations on this theme. While the normally closed sensor described above is common today, some of the earlier sensors were normally open, which means that the switch contacts were separated when liquid was not present and came together (completed the circuit) when the float/magnet moved upward to indicate the presence of liquid. The disadvantage of this type of circuit is that if a wire is broken or disconnected, the sensor is not able to sound an alarm, but there is no indication at the ATG that anything is wrong.



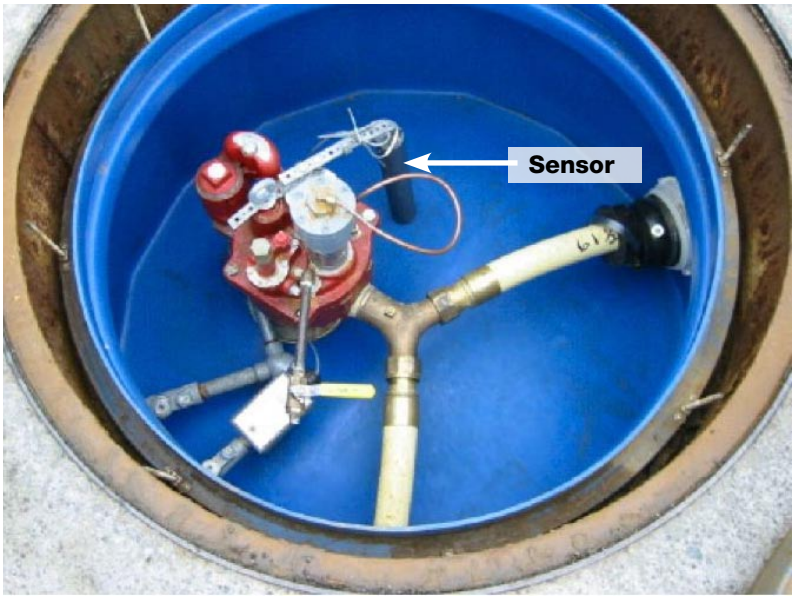
Schematic diagram of the operation of a float sensor.

The normally closed sensor solves this problem by having the "normal" condition be that the circuit is complete. So if a wire is broken or disconnected, the alarm sounds to indicate that there is a problem.

Some sensors go a step further and include a resistor (an electrical component that has a fixed amount of electrical resistance to electrical current) in the circuit near the switch contacts. Thus, the "normal" condition is to have very little electrical resistance in the circuit because the switch contacts are closed or touching.

If the float moves and separates the switch contacts, the circuit will have a resistance equal to that of the resistor. This reading is the alarm condition that indicates to the ATG that liquid is present. If a wire to the sensor is disconnected or broken, the resistance of the circuit will be infinite, and the ATG will interpret this as a trouble condition rather than a detection of liquid. This type of sen-

■ *continued on page 18*



A properly installed float sensor.

■ Tank-nically Speaking

from page 17

sor is sometimes referred to as a "tri-state" sensor because it can indicate three conditions: normal (very low resistance), liquid present (when the resistance of the circuit is equal to the resistor value), and trouble (open circuit).

Float Sensor Issues

Float sensors have three big issues:

- They must be properly located (an issue with all sensors)
- They must be positioned vertically so that the float can move with minimum friction
- The float must be free of dirt and debris or anything else that can prevent the float from moving freely.

While the ATG can effectively monitor the integrity of the float-sensor wiring, this is not sufficient to verify that the sensor is operational. Because the sensor has moving parts, the ability of these parts to move must be verified to ensure that the sensor is operating properly. There is no way that the ATG can know whether the sensor is properly located, vertically oriented, or whether the float is moving freely. Float sensors must be physically inspected and tested to verify that they are operating properly.

Testing the operation of float sensors is typically just a matter of submerging the lower part of the sensor in a container of water to ensure that the alarm is triggered at the ATG. There may be a delay of several minutes between the time the sensor is immersed in water and the time when the ATG alarm sounds.

Electrical-Resistance Sensors

These sensors consist of a rubberlike strip of material that has carbon particles imbedded within it (the technical term for this rubberlike strip is "conductive elastomer"). These carbon particles conduct electricity, and there are enough particles imbedded in the strip that the electrical conductivity of the strip is relatively low.

The sensor works because the material swells when it comes in contact with petroleum products. As the material swells, the carbon particles move farther apart so they do not touch one another, and the electrical resistance of the strip increases substantially. This increase in electrical resistance is the signal that petroleum is present. The strip only swells in the presence of petroleum, *not* water.

This type of sensor is often packaged in a gray plastic cylinder, very much like the float sensor. Careful inspection is often required to distinguish this type of sensor from a simple float sensor.

Electrical-resistance technology is almost always used in conjunction with float switches so that the sensor is a discriminating sensor. In a typical configuration, the petroleum-sensing strip is oriented vertically inside a gray plastic cylinder with a float switch located at the bottom of the cylinder and another float switch at the top.

The function of the float switch near the bottom of the sensor is to indicate that water is present. Even if water is present, the sensor will still be able to respond to petroleum because the strip of elastomer extends a foot or so vertically (assuming the sensor is properly oriented) and will respond to the presence of petroleum anywhere along its length.

Once the fuel-sensing strip is completely submerged in water, however, it cannot be directly exposed to petroleum and will not swell. To alert the facility operator of this condition, the second float switch located at the top of the sensor sounds an alarm when the water level is so high that the presence of petroleum can no longer be detected.

This combination of float-switch and electrical-resistance technologies makes this discriminating sensor capable of multiple alarms and warnings—water present (but not so much that the sensor will not detect fuel), fuel present (anywhere along the length of the sensor), water too high (water above the sensor so fuel will not be detected), and open circuit (broken wire).

Electrical-Resistance Sensor Issues

The float-switch portions of this type of sensor share the same issues as the plain float switches noted above. The product-sensing portion of the sensor has no moving parts, so it has few maintenance issues other than proper location and orientation.

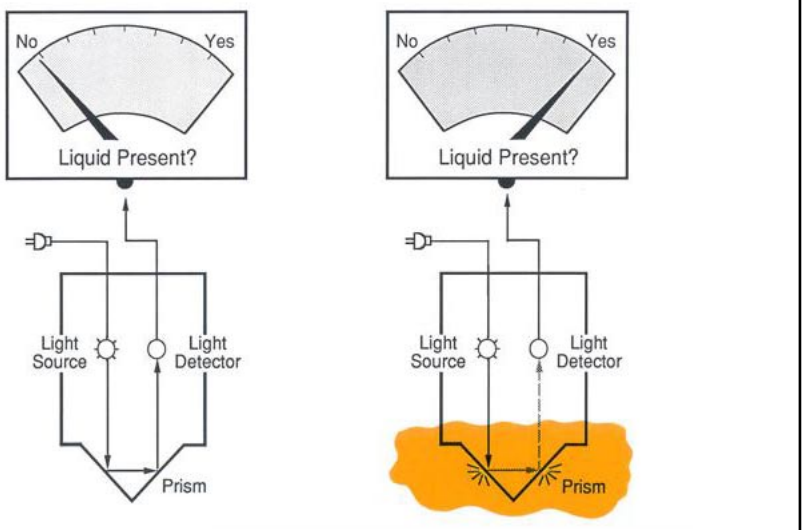
Testing the operation of the fuel-sensing portion of the sensor requires exposing the sensing strip to a petroleum-based liquid that will cause it to swell. A common complaint is that it then takes a while for the test liquid to evaporate and the sensing strip to return to its normal state. Testing the float switch components of these sensors is merely a matter of submerging the sensor in a bucket of water.

Optical Sensors

Optical sensors work by having a small electric eye that changes electrical resistance, depending on the amount of light it is receiving. The sensor also includes a small light-emitting diode (LED) that provides a source of light. These two components are separated so that the light must travel inside a clear plastic prism and reflect off the sides of the prism to reach the electric eye. Most of the light is reflected at the edge of the prism because of the large difference in density between the plastic and the air (remember your high school physics?).

The normal condition is for the LED to be on and the light to reach the electric eye. When liquid is present, the difference in density of the plastic and the liquid at the surface of the prism is much less, and a substantial portion of the light is refracted outward into the liquid. The amount of light now reaching the electric eye is reduced, and this causes a change in the electrical resistance of the electric eye. This change in resistance is detected and interpreted as the presence of liquid. This type of sensor technology will respond to any liquid and so is nondiscriminating. Failure of the LED or any broken wires will also be detected because the light signal will be lost.

Optical sensors are sometimes combined with a simple electrical-resistance sensor to turn them into discriminating sensors. Note that this is *not* the same type of electrical-resistance sensor that is described above. This resistance sensor works by measuring the electrical resistance across two electrical contacts that protrude slightly from the sensor into whatever liquid is present. Keep in mind that water is a pretty decent conductor of electricity but petroleum products are not. Once the optical



Schematic diagram of the operation of an optical sensor.

part of the sensor indicates that liquid is present, the device checks the resistance across the two electrical contacts. High resistance indicates petroleum, and low resistance indicates water.

Optical Sensor Issues

The advantage of this type of sensor is that there are no moving parts to become stuck, and the orientation of the sensor is not critical to its function. A potential issue in humid climates is that condensation or frost on the surface of the prism can cause an alarm. Testing the sensor is simply a matter of submerging it in water. This may require the use of a dark-colored container to minimize the amount of ordinary daylight that reaches the light sensor. If too much daylight is reaching the sensor, it may not go into alarm.

Discriminating versions of this type of sensor can be tested for operation by submerging the sensor in both water and product.

General Sensor Issues

In many ways secondary containment with continuous interstitial monitoring is the simplest form of leak detection. It is very much a black and white method – liquid is either present in the interstitial space or it is not. There are no grays as there are with volumetric methods, where small volume changes due to temperature, evaporation, or tank deflection must be distinguished from actual leaks. While simple in concept, however, there are several factors that confound secondary containment as well.

While sensors are based on sound mechanical and electrical principles, there is no lifetime guarantee provided by any manufacturer stating that their sensor will work forever. The sump environment is not pristine. Sumps are most often dirty, subject to wide swings in temperature, high levels of moisture, and sometimes high levels of fuel vapors. As a result, moving parts tend to get stuck, moisture and dirt can cloud surfaces that should be clean, and components tend to degrade over time.

The "bury it and forget it" mentality that is pervasive in the tank world does not apply to sensors any more than it does to any other storage-system component. Unless sensors are inspected and tested on a periodic basis, their reliability will deteriorate over time.

The other issue that vexes secondary containment is the nuisance infiltration of water, especially into tank-top sumps. Many sensors fall prey to the "crying wolf" syndrome and end up being ineffective because they are repositioned, disconnected, or simply ignored when they sound an alarm. While keeping water out of sumps is a challenge, it is a challenge well worth taking on, otherwise the effectiveness of sensors and secondary containment is severely compromised.

Discriminating sensors that tolerate a limited amount of water without compromising the ability to detect product have some advantages here, as long as facility personnel know how to distinguish a fuel alarm from a water alarm and respond appropriately to each kind of alarm.

Sumps that are not liquid-tight pose a somewhat opposite problem. I personally know of several substantial releases where the product escaped into the environment from a leak in the containment sump before it could reach a sensor and be detected. Leaky sump piping penetrations, electrical conduit penetrations, and the connection point between the containment sump and the tank seem to be the prime locations for these types of leaks. The solution here is in careful installation of quality components to begin with, and periodic evaluation of the integrity of the secondary containment over time.

Perhaps the most pervasive sensor issue is the personnel who ignore alarms. There are many excuses for this—ignorance of the significance of the alarm, being too busy to pay attention, having previously responded to too many "false" alarms. Operator training requirements may help with this issue somewhat, but my gut feeling is that this will only be a small improvement.

As big oil leaves the retail arena and the number of small owners proliferates, each one of these issues is only likely to grow in magnitude. We have made great strides in the last 20 years in improving the integrity of storage systems. We have picked the low-hanging fruit of bare-steel tanks and galvanized pipe. As we move into the era of secondary containment and sensors, we must keep in mind that better technology is only part of the answer. Proper operation of UST systems and appropriate response to UST alarms requires the active participation of tank owners, operators, and regulators. ■

Field Notes

from Robert N. Renkes, Executive Vice President, Petroleum Equipment Institute (PEI)

Just What the Doctor Ordered—an RP for Inspection and Maintenance of UST Systems

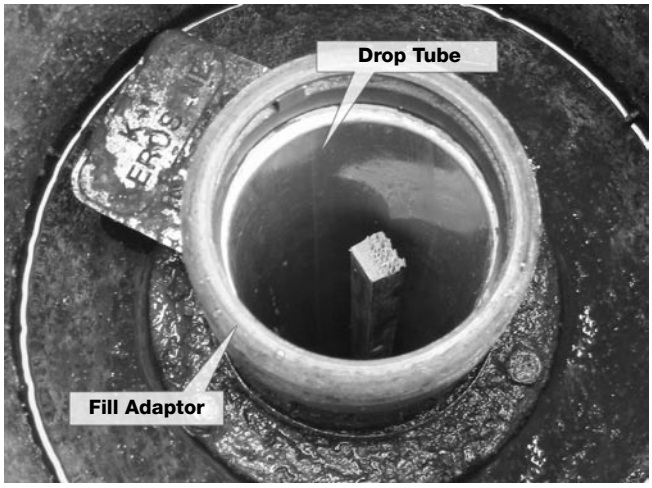
The Petroleum Equipment Institute has published a new document entitled *Recommended Practices for the Inspection and Maintenance of UST Systems* (PEI/RP900).

The UST industry has learned that properly installed and maintained UST system equipment is durable and reliable. However, daily wear and tear can degrade or damage storage-system components, resulting in equipment failure and/or product releases. So can exposure to the corrosive effects of soil, water, and stored product, as well as seasonal extremes of heat and cold. Constant vigilance with regard to detecting leaks and anticipating operational problems is required of all tank owners to ensure that environmental contamination will not occur.

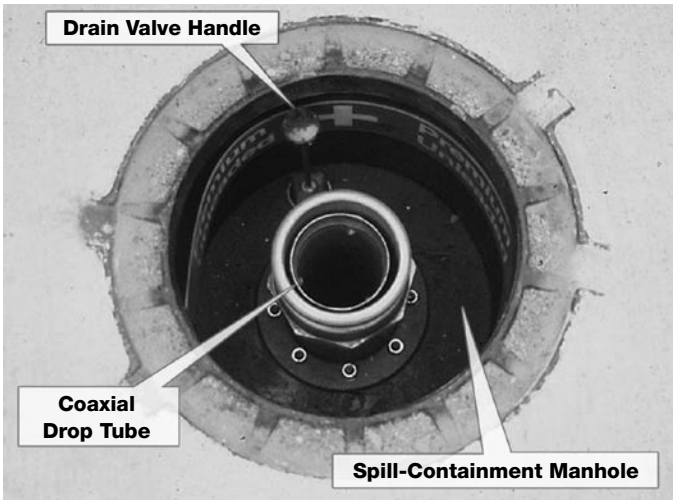
This new publication recommends very specific periodic inspections to help protect the public, fueling-facility employees, and the environment from the hazards posed by the release of flammable or combustible liquids and exposure to toxic motor fuels. RP900 is the only document currently available on a nationwide basis that covers those inspection procedures with such a high degree of specificity.

RP900 provides the UST facility owner with recommended practices that enhance the longevity and trouble-free performance of UST equipment. It also promotes fire prevention and storage system safety; encourages the protection of human health and the environment; promotes regulatory compliance; reduces liability associated with the operation of UST systems; and promotes early identification of potential equipment problems.

This recommended practice describes procedures used to verify the function or condition of easily accessible components of UST systems located in the vicinity of the storage tank and at fuel dispensers located at vehicle-fueling facilities. The equipment covered includes all below-grade liquid- and vapor-handling components accessible from grade over or near the top of the storage tank and below the emergency shutoff valve at the fuel dispensers.



Spill-containment manholes should be clean and dry. Drain mechanisms should be in good condition. The rim of coaxial drop tubes should be smooth and round.



Drop tubes inside fill pipes accelerate the rate of fuel delivery and minimize vapor generation.

While aspects of the recommended practice can be applied to marinas, aviation-fueling facilities, isolated construction sites, farms, lube-oil or heating-oil storage systems, and emergency generators, this document is not specifically intended for those types of operations.

RP900 tells the reader what to inspect, suggests when the inspection of different components should occur, provides guidelines on who should perform the inspections, and instructs the user of the document on how to inspect the equipment. Inspection checklists are included in the document and are also available free of charge on PEI's website *www.pei.org*.

This document should be useful to state regulators. If the state already has an inspection program, it can serve as a means to compare the state program with the recommended inspection and maintenance program developed by industry. If the state is in the process of developing an inspection program, the recommended practice could serve as a guide from which to base a program. In any case, the recommended practice has been well received and tank owners are already using it.

The single-copy price for RP900-08 is $40 for PEI members; $95 for nonmembers. Member pricing is extended to all regulatory officials. For more information of this special pricing for regulators, contact Keith Wilson at PEI: 918-494-9696 or kwilson@pei.org. ■

UST Insurance Matters.....

Confirmed Release Policies Versus Suspected Release Policies

by Chris Montgomery

While all UST pollution policies must provide coverage for cleanup of covered storage tank system releases, many do not cover the costs of investigating potential releases (e.g., tank testing, soil sampling) to confirm if an insured tank is leaking. The expenses necessary to confirm a release can add up to tens of thousands of dollars and are expressly excluded in many tank insurance policies. These "confirmed release policies" typically contain exclusionary language such as: "Any costs, charges, or expenses incurred by the 'insured' to confirm the existence of a 'release' shall not be considered 'cleanup costs'".

For instance, under a confirmed release policy, suppose a tank owner is named as a "potentially responsible party" for contamination found in a nearby creek and must pay to have soil/groundwater sample analysis to confirm if the leak is coming from his site. After spending $15,000 for such testing, if he learns he has, in fact, had a release from his tank system, he must also then pay the deductible. If the deductible is $25,000, his out-of-pocket cost is $40,000. This is enough to put many small tank owners out of business.

If a policy-insuring agreement has language such as "This insurance applies to pay for corrective action due to confirmed releases," or if the definition of "cleanup cost" has language such as "This insurance does not apply to claims for any costs, charges, or expenses incurred to investigate or verify that a confirmed release has taken place," then the policy is a confirmed release policy. The simplest way to tell if the policy is a confirmed release policy is to check the policy definitions to see if "confirmed release" is defined or if the definition of "cleanup cost" includes any of the aforementioned language.

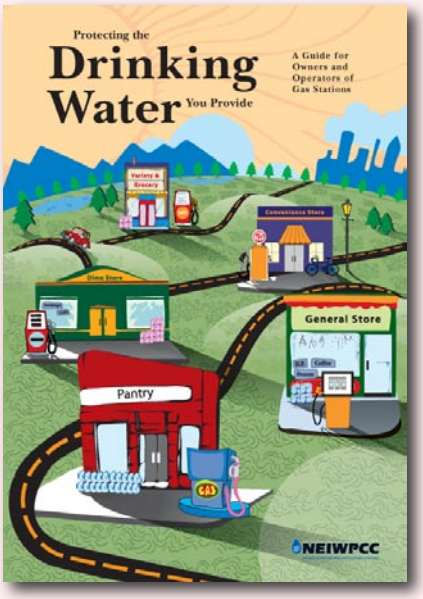
"Suspected release" policies, on the other hand, do not have any definition or language that excludes such costs and will cover the costs to investigate whether there has been a covered release. This can significantly reduce the owner/operator's out-of-pocket expense.

Individual features of these policies can dramatically affect the owner/operator's costs. Other coverage areas of concern may include claims reporting limitations, exclusion of natural resources damages, and noncompliance exclusions. Look for more information on these issues in future Insurance Matters articles. ■

Chris Montgomery is a principal with Custom Environmental Insurance. He can be reached at 877-TANKCOV (826-5268) or Chris@tankcov.com .

Check Out NEIWPCC's New Booklet on Protecting Drinking Water at UST Facilities

The New England Interstate Water Pollution Control Commission (NEIWPCC) has produced a booklet titled *Protecting the Drinking Water You Provide—A Guide for Owners and Operators of Gas Stations* (*http://www.neiwpcc.org/tncguide.asp*). The purpose of the booklet is to educate tank owner/operators who have an onsite drinking water well about their responsibilities in meeting drinking water regulations and protecting the health of those who drink the water or otherwise come into contact with it. The booklet is colorful and educational and can be distributed electronically or as printed copies. For those who want to train others through a presentation, PowerPoint slides highlighting the major themes of the piece are available. These can be incorporated into a larger existing PowerPoint for UST operator training or used as a general education tool. For more information, contact Rebecca Weidman at rweidman@neiwpcc.org. ■



■ **WanderLust** *from page 13*

What do we need to do to detect and identify sources and causes of leaks, since leak detection doesn't seem to be doing the job? Do we need to change the way that we do inspections? We're looking at station records, testing results, equipment in use, and so on, but these methods don't seem to be identifying releases. If alarms are going off, are we being notified, or are operators just turning off those annoying alarms? Are repairs being made and we're not being notified? Do we need to camp out at a site during the entire tank removal process? Or are all of our releases miracle releases, coming from systems that are apparently tight, are equipped to comply with the regulations, and are being operated in compliance with the regulations. In the words of Rudy, I dunno. ■

FAQs from the NWGLDE

…All you ever wanted to know about leak detection, but were afraid to ask.

ATG Probe Performance with Ethanol Fuels

In this issue's FAQs from the National Work Group on Leak Detection Evaluations (NWGLDE), the Work Group discusses the ability of ATG probes to perform leak detection in tanks containing ethanol fuels. (Please Note: the views expressed in this column represent those of the work group and not necessarily those of any implementing agency.)

Q. Are there any automatic-tank-gauge (ATG) probes listed by NWGLDE that are suitable for leak-detection monitoring of USTs containing alternative gasoline-ethanol blended fuels?

A. The short answers are "no" for ethanol or ethanol-gasoline blends with high percentages of ethanol, such as E85, and "maybe" for ethanol-gasoline blends with low percentages of ethanol, such as E10. There is just not enough information and data available on the use of ATG probes in ethanol-gasoline blends with low percentages of ethanol such as E10 to make a call at this time. Stay tuned.

When discussing the performance of ATG probes in ethanol or in ethanol-gasoline blends with a high percentage of ethanol, two main issues have to be addressed—material compatibility and leak-detection functionality. Unfortunately, the third-party leak-detection evaluations that NWGLDE members review do not address the *material compatibility* of any type of leak-detection equipment. Therefore, NWGLDE is unable to make any representation as to the compatibility of leak-detection equipment with the product stored (see the last "specific" NWGLDE disclaimer statement under "Disclaimer" at *nwglde.org/disclaimer.html*). However, literature distributed by certain ATG leak-detection equipment manufacturers indicates that there are probes available that have been designed to address material compatibility issues with regard to fuels containing a high percentage of ethanol. For information concerning material compatibility with alternative fuels containing ethanol, please refer to LUSTLine #52 (May 2006). Also see the Petroleum Equipment Institute's website, which lists ethanol-compatible equipment based on manufacturers' claims (*http://resource.pei.org/altfuels/guide.asp*).

The *leak-detection functionality* of ATG probes used in USTs containing ethanol or ethanol-gasoline blends with a high percentage of ethanol is something that could be addressed in third-party evaluations. NWGLDE has not learned of any such evaluations conducted, to date. This is probably because USEPA ATG testing protocol only requires ATG evaluations to be performed with either gasoline or diesel, although it allows ATG manufacturers to specify other fuel types in which they believe their equipment will perform equally as well as the fuel type used during their evaluation.

Currently, NWGLDE lists the fuel that was used during the evaluation and other fuels that the manufacturer has indicated in the evaluation report (none of which currently include ethanol or gasoline-ethanol blends with a high percentage of ethanol). The listing also states: "Other liquids with known coefficients of expansion and density may be tested after consultation with the manufacturer." This means that a manufacturer can specify other liquids that can be used with the ATG without having to perform another evaluation.

Based on the limited information that NWGLDE has been able to gather to date concerning the physical properties of ethanol-water mixtures, NWGLDE believes that gasoline-ethanol blends with a high percentage of ethanol that come in contact with water produce a gasoline-ethanol-water blend that is *not* a liquid with a *known* coefficient of expansion and density. The reason NWGLDE believes this is because it is well documented that a significant percentage of water is absorbed into 100 percent ethanol before an increase in volume of the water-ethanol mixture takes place. This would affect density as well as thermal characteristics of the entire gasoline-ethanol-water blends.

Though NWGLDE has not been able to find any literature that provides information on the exact amount of water that will be absorbed by different gasoline-ethanol blends without a volume increase of the blends, NWGLDE is concerned that the amount of volume and density change will be significant enough to affect an ATG water-detection and/or the gasoline float's ability to detect a water ingress under high-water-table conditions.

USEPA ATG testing protocol requires that all ATG water-detection floats be evaluated to prove that they can detect water ingress into the tank. Why do regulators care about water ingress (a product-quality issue) when our goal is protecting the environment from product leaking out? Because as product and water-table levels change over time, water ingress could become product egress. Detecting water ingress is also very helpful for the UST operator who wants to keep water out of customers' vehicles.

To date, NWGLDE is not aware of any water-detection float that has been evaluated in tanks containing any percentage of gasoline-ethanol blends. Since a blend of water, ethanol, and gasoline has a lower density and less surface tension than water

alone, the water-detection float may not reliably detect water in the tank until the blend phase contains enough water to separate from the gasoline, settle to the bottom of the tank, and accumulate a high percentage of water versus ethanol.

It appears that some manufacturers have realized the potential problems associated with water detection in ethanol-gasoline blends because their literature indicates that they are marketing ATGs that do not include water-detection floats for use with ethanol-gasoline blends. However, the use of an ATG without a method to detect water ingress does not meet the requirements of USEPA ATG testing protocol. Whether an ATG that does not meet the USEPA ATG testing protocol is acceptable for leak detection or not is an issue for individual implementing agencies to resolve.

USEPA ATG testing protocol does allow for an alternative method of water detection. In this case, the ATG would be evaluated for its ability to detect a 0.2 gph water ingress rate by measuring the rise in product level with the product float in the same manner as if the ATG was measuring a 0.2 gph leak rate (in this case only the probe would detect a rise of product instead of fall of product). As discussed previously, a certain amount of water is absorbed by the ethanol in the gasoline-ethanol blends without an increase in volume of the ethanol. Therefore, this method may also be problematic in detecting water ingress because the increase in the product volume may not accurately reflect the volume of water that has entered the tank

The NWGLDE New Addendum:

In an effort to ensure that all methods of water-ingress detection are available for evaluation, NWGLDE has developed an addendum to the current USEPA ATG and NWGLDE CITLDS testing protocols that will allow an ATG to be evaluated to determine its ability to detect water ingress into an ethanol-gasoline blends by using only the ATG's top liquid-level measurements capability. This addendum can be found on the NWGLDE website at *nwglde.org/protocols.html*.

Again, the NWGLDE is not aware of any ATG manufacturer that has performed an evaluation of their equipment in accordance with the USEPA ATG testing protocol, or the NWGLDE addendum, to address the *leak-detection functionality* related to the adequate detection of water ingress into an UST containing a gasoline-ethanol blend with a high percentage of ethanol. If such an evaluation is performed, the ATG listing will be found under "new/revised evaluations" on the NWGLDE website at *nwglde.org/news_and_events.html*. The NWGLDE invites any manufacturers who are contemplating such an evaluation or studying this issue to share their findings with us.

Until an ATG manufacturer performs an evaluation on its equipment to determine whether or not an ATG will adequately detect water ingress into an UST or until there is more research into the interaction of water in ethanol-gasoline blends with a high percentage of ethanol, a conclusion cannot be made on whether an ATG probe is suitable for use in these ethanol-gasoline blends with a high percentage of ethanol.

About the NWGLDE

The NWGLDE is an independent work group comprising 10 members, including 9 state and 1 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 NWGLDE 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 USEPA 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 USEPA standard test procedures.
- Make the results of such reviews available to interested parties.

OUST UPDATE

Delivery Prohibition Website

Find out what other states are up to and more regarding delivery prohibition at OUST's website (*http://www.epa.gov/oust/dp/index.htm*). This site provides links to state and territory delivery prohibition programs. Users will find detailed information on the topic, including applicable laws, regulations, and policies. Information accessible through this site can also help fuel-delivery drivers know how to determine if an UST is not eligible to receive fuel. Section 1527 of the Energy Policy Act of 2005 states that, by August 2007, states and territories receiving funds under Subtitle I of the Solid Waste Disposal Act are required to meet delivery prohibition requirements described in USEPA grant guidelines. EPA consulted with states and representatives from the UST and fuel-delivery industries to develop the guidelines.

Biofuels Compendium

USEPA has developed a web-based compendium that provides UST stakeholders with information regarding biofuels. The compendium is available at *http://www.epa.gov/oust/altfuels/bfcompend.htm*. It presents information USEPA collected from federal and state agencies, trade associations, and industry on biofuels topics such as equipment compatibility and installation, fate and transport, handling, health and safety, remediation, UST system conversion, and state policies.

OUST's FY 2007 Annual Report Documents UST Program Progress

The USEPA Office of Underground Storage Tanks' (OUST's) 7-page *FY 2007 Annual Report on the Underground Storage Tank Program*, EPA-510-R-08-001, provides a snapshot of the activities and progress of the UST program during fiscal year 2007, including: UST program highlights for the year; advances in preventing releases; progress in cleaning up leaks; efforts to enhance communication and information sharing; and a look ahead for next year and beyond. The report documents the significant progress USEPA and its tank partners made in advancing UST leak-prevention and cleanup efforts during FY 2007. The report can be accessed at: *http://www.epa.gov/oust/pubs/2007annrpt.htm.*

Guidance from the UK on Ethanol Fuels Available Online

If you are interested in the United Kingdom's (UK's) perspective on ethanol fuels at UST facilities, the Association for Petroleum and Explosives Administration (APEA), a UK-based organization, has produced *APEA Guidance on Storage and Dispensing of High Blend Ethanol Fuels Including* E85 at Filling Stations. The guidance is available at the APEA website at *www.apea.org.uk*. Once on the home page click on "publications", then click on "Guidance for HBEF" and this will provide a free download of the guidance.

March 30 - April 1, 2009

The 21st Annual National Tanks Conference & Exposition will be held on March 30 – April 1, 2009 in Sacramento, California, at the Sacramento Convention Center Complex.

This conference provides learning and networking opportunities for federal, state, and tribal UST/LUST regulators. The focus is on building on our progress, setting priorities, and developing plans for reaching our common goal—to find new and better ways to work together to protect human health and the environment.

For the first time, this National Tanks Conference will integrate the State Fund Administrators Meeting. This change should result in an agenda that comprehensively addresses issues related to managing your state's underground storage tank program.

Conference registration opens on November 7, 2008. Check out the conference website,

www.neiwpcc.org/tanksconference

at that time. Be sure to view preconference workshop information as well as details on submitting a poster presentation idea or reserving exhibit booth space!

Send any questions to:
NTCInfo@neiwpcc.org

L.U.S.T.LINE
New England Interstate Water Pollution Control Commission
116 John Street
Lowell, MA 01852-1124

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