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L.U.S.T.LINE

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

EXTREMES

USTs versus Mother Nature, Joplin, MO

A "before" picture of a Kum & Go station in Joplin (left). (St. John's Hospital, discussed under the Postmortem section of this article, is shown in the background.) The same Kum & Go station after the F5 tornado (right). The store was destroyed and a concrete dispenser island was blown away, damaging the piping beneath.

by Heather Peters

On May 22, 2011, Joplin, Missouri was hit with an F5 tornado, the most extreme tornado category. In the aftermath, a host of emergency response agencies were on the scene, including the Missouri Department of Natural Resources (MDNR) Environmental Emergency Response team. The responders immediately visited many different kinds of facilities to provide assistance on uncontrolled emergencies and offer additional help with any disaster-related environmental concerns. These visits included each of the underground storage tank (UST) facilities in the path of the tornado. In addition, staff from the Missouri Department of Agriculture's Weights and Measures checked these UST sites for leaks and tripped any shear valves that were not already closed.

■ *continued on page 2*

Inside

■ Joplin, MO *from page 1*

With the initial concerns of massive gasoline or diesel releases abated, environmental emergency responders turned their attention to other pressing concerns. Meanwhile, the department's tank inspectors began getting questions from tank owner/operators: What now? What do I need to worry about at my gas station? What does the department want me to do before reopening my station? The problem, though, was our answer—"We have no idea."

We started with a visit to every registered UST site in Joplin. Of the approximately fifty UST sites, eight had serious damage that immediately raised concerns about potential releases. Fortunately, the power was knocked out before the tornado actually hit, so the pumps were all off by the time any damage would have occurred. Ironically, the power failure helped to prevent releases. With most of the UST equipment below ground, or at least below the shear valve, we hoped for the best, and maybe we were even naïve enough to expect no problems at all. But you live and learn.

L.U.S.T.Line

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The Postmortem

The key to the damage at three of the UST sites was the shear valve. At a few of the sites, we found nothing standing but a few vent pipes. After seeing the tornado's devastation firsthand, we were surprised to see these vent pipes. But when we looked at what was left of the dispenser islands, we found closed shear valves that had accomplished exactly what they were designed to do—the shear valve closed; the piping sheared; the underground portion was protected. Success! We hoped to issue the following such report at every site: "No indications of a leak or damage to the underground storage tank system." As it turns out, we were only able to issue that report for three of the eight UST sites.

For the remaining five sites, Mother Nature beat out human engineering. A shear valve's strength lies in its anchoring. At one site, The Store (see photo below), anchored with only bolts, the shear valve broke when the dispenser was blown off. The piping, unfortunately, went with the dispenser. The fiberglass line was broken approximately one foot below the flexible connector. *One station down.*

Shear valves and their anchoring were designed for a side impact. Unfortunately, at the next facility, the evidence of the straight upward force of the tornado was obvious. What was left of the dispenser, anchor, shear valve, and piping, was pulled up approximately one foot. Fiberglass lines do not stretch. *Two stations down.*

At the Kum & Go facility (see photos on page 1), the shear valve may have remained securely anchored in the concrete foundation of the dispenser island. Unfortunately, after the storm, the whereabouts of that entire concrete foundation was unknown. The piping broke off just below the ground surface. *Three stations down.*

Then there was that lovely new, double-walled system installation at a spanking new Macadoodles facility that the department staff had inspected in 2008 (see photos on page 3). During our post-tornado visit to that site, we found an unimaginable amount of debris, even in the dispenser containment sumps. The dispensers were long gone. The store, the canopy, the steel beams were all gone or bent like spaghetti. We found debris blown up into the interstice of the double-walled piping. We also found product in the sumps—never a good sign. While we do not believe there was a

"The Store" sustained only minor tornado damage, but the fiberglass piping was broken when the dispensers were blown over.

Macadoodles in Joplin as it looked shortly after opening less than three years ago (left). Note the store standing in the background. This same facility as it looked shortly after the F5 tornado (below). Note the steel canopy beams folded on the ground.

significant release, as of the deadline for this article, the manufacturer, the department, the owner, and the contractor are still trying to determine if there is a good way to evaluate the integrity of this piping. *Four stations down.*

Last, but by no means least, was St. John's Hospital, which lost all power, including the backup generators. Why? The emergency generators were located outside of the building in a concrete block building near their associated underground fuel storage tanks. The protective brick building was blown away like cardboard.

Large debris (an air handler from the hospital rooftop) crashed down on top of an exposed emergency generator. Even if the generator itself had not been destroyed, its use would have been short-lived. The piping connecting the UST to the generator went through the wall of the concrete building, the same wall that was blown away by the violent winds. The piping, once an inner steel pipe run through an outer, noncorrosive pipe, was nothing more than mangled steel rising out of the ground, marking the former location of the protective wall. *Four stations and one hospital down!*

Never Underestimate the Power of Mother Nature

Human engineering on USTs has certainly come a long way. The landscape was leveled—not a tree or building in sight. But, the UST systems were protected, most of the time, by their subsurface location and the undervalued (at least by this inspector) shear valve. No serious leaks occurred because the power went down, the pumps were off, and unfortunately for most sites, there was nothing left to "re-power" later.

At the five sites, Mother Nature demonstrated the astonishing power of an F5 tornado. She can pull piping right up out of the ground. She can blow debris into an interstice in ways that seem to defy physics. She can level everything in sight. In this battle between human engineering and Mother Nature, Mom may have won. But as the stations are coming back to life, brighter and better than before, the most valuable lesson learned for this inspector is that with all the unimaginable chaos, the spirit of the people of Joplin was truly a profound source of inspiration to us all. ■

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Note: If you are interested in providing support for the victims of this tornado, please visit the Missouri state website at *www.mo.gov/05222011joplintornadoes/*.

EXTREMES

Can Tank Systems and Tank Owners Weather High-Octane Disasters?

Commentary by Ellen Frye, LUSTLine *editor*

This November, the Nobel Prize-winning Intergovernmental Panel on Climate Change (IPCC) issued a special report, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (www.ipcc.ch/), on global warming and extreme weather. The panel warned that the world needs to get ready for more dangerous and "unprecedented extreme weather" caused by global warming. The report confirms what climate scientists have long been telling us: that the occurrence of climate-related extremes such as increasing heat waves, heavier rainfall, more floods, stronger cyclones, landslides, and intense droughts are highly likely across the globe this century.

Think of it: This summer, Arizona, New Mexico, and Texas had record-breaking wild fires fueled by extreme drought situations. In recent years, severe floods have submerged thousands of acres of farmlands, ranchlands, and urban areas in the Ohio River, Mississippi River, and Missouri River valleys. This summer, hurricane Irene clobbered the Eastern seaboard, dumping up to 11 inches of rain in some areas of Vermont, the most destructive event to hit that state in almost a century. On June 1, 2011, sections of the city of Springfield, Massachusetts, and its surrounding region were devastated by tornadoes, rare events in that region of the country. The National Weather Service reports that the dozen billion-dollar disasters in the U.S. in 2011 alone add up to $52 billion…and counting.

So what does this have to do with USTs (and ASTs, for that matter)? This issue of *LUSTLine* considers just this question by means of disaster reports from UST regulators on extreme events involving USTs in their states, beginning with Heather Peter's cover article on the F5 tornado in Joplin, Missouri.

Of course extreme events may not necessarily be the result of some climate-related phenomenon (e.g., the six large outbreaks of tornadoes this year cannot be attributed to global warming). But whatever the cause, the real question is, should UST programs be thinking in terms of emergency preparedness for tank systems? Are UST programs prepared to advise a panicked tank owner/operator on proactive steps to take in the event of an approaching wildfire or hurricane? Are they prepared to assist tank owners in the face of disaster-related environmental threats?

As Peters says in her Joplin tornado article (page 1): After the tornado had passed, "the department's tank inspectors began getting questions from tank owner/operators: What now? What do I need to worry about at my gas station? What does the department want me to do before reopening my station? The problem, though, was our answer—'We have no idea.'"

As Matt Garcia notes in his article on Arizona wildfires, the ADEQ UST Section was in a similar predicament when tank owners called for advice as fires advanced closer to their UST facilities: "Since the magnitude of these fires was something the state hadn't encountered, we needed to get up to speed. It was kind of like having a family member asking you for help, and you don't have an immediate answer."

Admittedly, some climate events are so extreme and disruptive that concerns about leaking USTs are moot in light of the surrounding chaos. In New Orleans, for example, the affected areas were awash in a chemical soup, some tank systems were submerged in water for months—it was beyond the beyond. In Joplin, everything in the tornado's path was torn and tattered. But, as Heather Peters reports, at a few facilities inspectors found "closed shear valves that had accomplished exactly what they were designed to do—the shear valve closed," preventing the release of product.

The IPCC report assesses a wide range of complementary adaptation and disaster risk management approaches that can reduce the risks of climate extremes and disasters and increase resilience to remaining risks as they change over time.

The final October 2011 report of the Defense Science Board Task Force on *Trends and Implications of Climate Change on National and International Security* (www.fas.org/irp/agency/dod/dsb/climate.pdf) offers the Department of Defense important considerations related to this subject. This report also focuses on the need to manage consequences of climate change. And as tank programs might note, the report states: "the single greatest direct driver of impact on the human habitat is water—too much or too little. Water and water management are key factors to food, energy, and economic development."

So what do our tank programs say to an owner/operator who has just gone through or may be about to go through a disaster? Does the tank program in your state provide owner/operator guidance for different kinds of disaster scenarios? If your state has prepared suggested emergency procedures, let us know.

The nation's tank programs exist out of concern for protecting our water resources from contamination associated with releases from tank systems. We depend on the owner/operator to comply with applicable regulations. In an extreme weather or wildfire event, tank systems, owner/operators, and water resources all stand to lose. So my question is this: Shouldn't tank owner/operators be provided with effective best management practices that they can refer to in the event of such circumstances? USEPA's *Underground Storage Tank Flood Guide* is a great template (see page 5). ■

USEPA's Underground Storage Tank Flood Guide

In November 2010, USEPA's Office of Underground Storage Tanks (OUST) released its *Underground Storage Tank Flood Guide* (EPA 510-R-10-002), which is available at www.epa.gov/oust/pubs/ustfloodguide.htm. This 22-page guide is designed to help state UST regulators and tank owners prepare for any catastrophic effects and environmental harm that could occur as a result of flooded UST systems and help return these UST systems to service as soon as possible. It provides simple guidelines and useful information for state, local, and tribal authorities in the event of a threatened or actual flood; information about preparing for a flood, important actions after the disaster strikes, and information on financial assistance. This material was gathered from various federal, state, nongovernmental, and UST industry sources. ■

EXTREMES

Irene Takes Vermont by a Storm

by Ted Unkles

On August 28, 2011, Tropical Storm Irene hit Vermont. Hurricane Irene had already caused a wide swath of damage and destruction along much of the East Coast of the United States, but many people believed that since it had weakened to a tropical storm, it would pose only minor problems when it reached the Green Mountain State. Those people were very wrong. Although wind speeds had diminished slightly, Vermont was deluged by copious amounts of rain, which caused many rivers and streams to flood and rush through valley floors with unimaginable force.

The damage to Vermont's transportation infrastructure was astounding: Hundreds of miles of state highways and town roads were completely washed away. Hundreds of homes were flooded, and a hundred more home heating oil tanks spilled their contents into their basements, resulting in oily sludgy messes. Because Vermont's Petroleum Cleanup Fund covers home heating oil tanks, this one-day event generated claims that added up to what the fund normally expends in a year on home heating oil spills.

Gas stations, mini marts, and other facilities with USTs were also hit very hard. Several UST systems were damaged, and in two cases, the tank systems were utterly destroyed. Vermont has a zero-interest loan program for tank owners to replace and upgrade their tank systems, but as of this writing (November) the two store owners whose USTs were destroyed had not decided whether to replace their UST systems or to simply get out of the gasoline business.

Some Vermont Irene Stories

Upper Valley Grill and General Store

The Upper Valley Grill and General Store in Groton, Vermont, sits beside the Wells River, which is normally a pleasant trout stream. The store had picnic tables on the grassy lawn beside the river, and during the warmer months patrons would regularly sit beside the river and enjoy their lunch. But Irene turned the normally placid Wells River into a raging torrent that jumped its banks and completely destroyed the store's parking lot and gasoline fueling area (see photo below).

As the raging water scoured the parking area, the concrete slabs over both tanks were washed away. Ironically, the concrete slab over one tank ended up atop the second tank, while the first tank was completely lifted onto the ground surface. Most of the gasoline was apparently washed out of the USTs; when the storm was over the tanks were found to be filled mostly with water, and just a few inches of free gasoline floated on several feet of water in both tanks. The UST systems were completely destroyed, but remarkably, the store itself suffered only modest interior damage.

■ *continued on page 6*

Upper Valley Grill and General Store.

■ **Vermont Storm** *from page 5*

Blackie's Store.

Blackie's Store

Blackie's General Store in West Bridgewater, Vermont sits beside the Ottaquechee River. Irene turned this river into another raging torrent, which very heavily damaged the store building, the parking lot, and the underground piping to the dispensers (see photo above). The tanks themselves suffered no damage (or at least none that could be seen by looking down any of the risers). About 10 miles from this location, the Ottaquechee River destroyed the covered bridge in Quechee Village, the video of which was seen in news broadcasts nationwide, and went viral on the internet.

Orphan Tanks

After the flood had receded, an UST was found in the Otter Creek in Proctor. This was a 2,000-gallon, compartmented gasoline tank that contained 75–100 gallons of a water/fuel mix. The Department of Environmental Conservation (DEC) was unable to locate an owner for this tank. We suspect it was a farm fuel tank, but to date no one has come forward. DEC paid for the proper cleaning, removal, and disposal of the tank.

A second tank was found in the Ottaquechee River in Bridgewater. This tank was a heating oil UST that also contained a fuel/water mix. Approximately 70 gallons were removed for proper disposal.

Even USTs that had been properly closed were subjected to Irene's fury. The tank seen in the photo below had been pulled and cleaned and was sitting on the ground in a salvage yard beside the Winooski River. When the river flooded, the tank and dozens of old tires were carried several miles downstream, ending up stranded on an island in the middle of the river. Large pieces of the tank's fiberglass outer wall were found scattered about on the island.

P.S.: Hurricane Irene flooded us out of our offices, and we are now in a "temporary" office in Barre, Vermont. Agency managers assure us that our location is truly temporary, but they also say it may be two, perhaps even three years before we go to a permanent location. As yet, no decision has been made about whether or not to renovate our old offices, which are (obviously) in a flood plain. ■

Ted Unkles is UST Program Coordinator with the Vermont Department of Environmental Conservation, Agency of Natural Resources. He can be reached at: ted.unkles@state.vt.us.

Orphaned tank.

EXTREMES

Arizona Wildfires Test UST Owners, Operators, and Regulators

By Matthew Garcia

The year 2011 has been very trying for Arizona residents because of several major wildfires that burned nearly one million acres, the most for any year in the state's recorded history. More than 50 residences burned during the Wallow and Monument fires and many other dwellings throughout the state were threatened, creating tremendous stress on residents in the path of the fires. There were numerous evacuations in populated areas, including several businesses with underground storage tanks (USTs).

Once the evacuations were ordered, I received frantic calls from UST owners, operators, and contractors asking what they needed to do to protect their systems in the evacuation zone.

The ADEQ UST Section of the Waste Programs Division has worked for decades building trust and communication channels with owners, operators, and contractors, and now it was time to build on that relationship. But since the magnitude of these fires was something the state hadn't encountered, we needed to get up to speed. It was kind of like having a family member asking you for help, and you don't have an immediate answer.

We quickly called the State Fire Marshal's office. They didn't have a set plan either, so we contacted several contractors and industry people with knowledge in wildfires and USTs and came up with several items owners and contractors could do (see below). These suggestions were not official and were broken down according to sites that had time before the evacuation and a contractor would be able to shut down the site safely and sites that had to be evacuated immediately with no time to call in a contractor.

We are in the process of establishing our official processes so they will be in place before the next fire season. ADEQ's goal, which was completed successfully, was to reduce the impact of any environmental damage and provide for the protection of UST systems as well as the safety of residents and firefighters.

I received frantic calls from UST owners, operators, and contractors asking what they needed to do to protect their systems.

Although the fires were devastating, no USTs were damaged. Our rapid response, sound advice, and care did help build on our existing relationships with owners, contractors, and other agencies. While we hope Arizona does not have to go through another wildfire season like 2011, if we do, ADEQ is ready to again help the citizens of Arizona and the environment.

Suggested Actions for UST System Owners/Operators

The following are the suggestions ADEQ gave to owners/operators and contractors during the 2011 wildfires. This list is not an official recommended practice from any state agency or contractor. The suggestions were broken up into three categories: Scenario 1: facilities that had a week or more notice of evacuation; Scenario 2: facilities that had hours or less to evacuate; and Scenario 3: facilities that were in the evacuation area, but had to stay open to provide fuel for evacuees and/or fire/support personnel.

Scenario 1:

- Empty the tanks
- Inert tanks by triple rinse process
- Remove all waste out of the evacuation area
- Trip all fire valves and check emergency vents
- Disconnect all electrical supply to the tank and system
- Close all ball valves and shear valves
- 24 hours prior to fire arrival:
  - Add dry ice
  - Remove all equipment
  - Notify local fire command of the tank status
  - Notify tank insurance provider of tank status and situation

Scenario 2:

- Close all shear valves and ball valves
- Disconnect all electrical supply to the tank and system
- Check all vents for proper function
- Notify local fire command of the tank status
- Notify tank insurance provider of tank status and situation

Scenario 3:

- Contact local fire command for status
- Have back-up/emergency electrical set-up on site
- Notify local fire command of tank status and determine proper emergency action if needed
- Notify tank insurance provider of tank status and situation. ■

Matthew Garcia is an inspector for the UST section of the Arizona Department of Environmental Quality. He can be reached at garcia.matthew@azdeq.gov.

EXTREMES

Tanks in the 2008 Iowa Floods

by Paul Nelson

The 2008 Iowa floods were devastating and unimaginable for thousands of people in the state. Dealing with cleanup and recovery was even worse. Many UST owner/operators in eastern Iowa saw their sites completely flooded, and in some cases, their tanks floated out of the ground.

To ensure sites in the flood zone safely returned to operation, the Department of Natural Resources (DNR) UST Section developed an emergency flood policy that included an UST system checklist, which was to be completed by an Iowa licensed installer/installation inspector or compliance inspector. Seventy-two sites were identified from FEMA flood maps as affected by the flood. Each site identified was sent a letter and a checklist.

Field office personnel assisted by visiting the flood plain sites to confirm which sites were submerged. Forty-two sites were identified as having been submerged by floodwaters and were required to complete the UST Emergency Flood Policy checklist (at least those that wanted to remain in business). Twenty of the 72 sites were not submerged by floodwaters. Seven sites reported water in their tanks, requiring tank cleaning. Nine tanks from three different sites were displaced and floated.

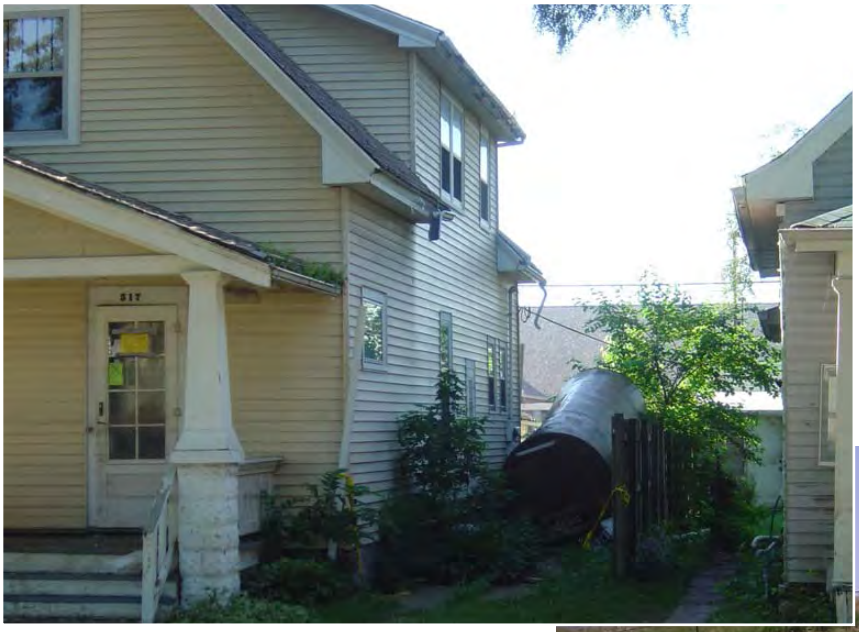
Several of the affected sites had filled their tanks with product to counter the buoyancy forces only to find that their tanks were still in place but water had filled the tanks where there once was product. The capped openings on the tanks were not tight and in one case (on Mays Island) the vent pipes on two tanks were damaged by floating debris allowing floodwaters to enter. ■

Paul Nelson is an Environmental Specialist Senior with the Iowa Department of Natural Resources. He can be reached at paul.nelson@dnr.iowa.gov.

View of downtown Cedar Rapids. Mays Island lies in the center of the river housing City Hall, Veteran's Memorial Auditorium, Linn County Courthouse, a correctional facility, and two USTs.

Clark station tank that floated out of the tank pit. The site was covered by seven feet of water.

More scenes of tanks and floods from Iowa



◄ *Clark station tank that made it to this neighbor's yard. The tanks were not anchored and empty.*

▼ *Clark station tank that made it to the interstate. It cast a shadowy figure as it floated down an unlit street at night, past emergency responders in a jon boat.*

▼ *A daycare facility found this new playground equipment in their front yard after the flood.*

▼ *Unanchored, empty tanks float out in Oakville.*

SNAPSHOTS FROM THE FIELD

What Happened Here?

At about three o'clock on a Friday morning in September, residents near Sunny's convenience store and gas station in Newport, Nebraska, were awoken by the sound of a loud boom. Sunny's 10,000-gallon fiberglass underground diesel tank (photo A) had exploded due to a lightning strike at the facility during a fierce storm. The force of the explosion hurled large chunks of concrete several feet, leaving a gaping hole and the skeletal remains of the tank (photo B).

A

A close up view of the diesel tank. On the right side just under the concrete is the hole in the super unleaded gasoline tank caused by the explosion of the diesel tank. The water level is about four feet below the top of the concrete.

B

Two large concrete slabs from the top of the diesel tank were blown up and landed upside down on top of each other.

Besides the diesel tank, the facility had an 8,000-gallon super unleaded tank and an 8,000-gallon unleaded tank. All product lines were single-walled fiberglass, and vent lines were fiberglass. An ATG monitor probe was located at the center of each tank. The dispensers had card readers on them that hadn't been used for two or three years. All three tanks had metal spill buckets with metal covers, and all of the riser pipes for the fill and ATG were steel with brass rings at the top.

The Newport Fire Department found that the unleaded tank was still intact; the super unleaded tank had a hole in it, likely caused by the explosion of the adjacent diesel tank. That tank and the diesel tank lost a total of 625 to 700 gallons of product, which was pooled on the water table. All three tanks were removed, and product and vent lines were capped off.

Investigators hypothesized that the lightning came into the building on the telephone line going to the fax and credit card machines (neither the building nor the canopy showed evidence of having been hit by the lightning). Both lines had black soot on the walls where junction boxes were mounted. A black mark on the diesel tank's ATG probe (photo C), likely due to a spark discharge, indicates the probable source of ignition that resulted as the current from the lightning strike moved through the ATG wiring. ■

C

Area of arcing on the diesel ATG probe tube (by the small hole in the center of the picture).

Photos courtesy of the office of the Nebraska State Fire Marshal.

A Message From Carolyn Hoskinson

Director, USEPA's Office of Underground Storage Tanks

It's Been Quite an Autumn 2011

Autumn brings us changes: decreasing daylight, cooling temperatures, and falling leaves. Autumn also signals the end of the federal government's fiscal year. For the national underground storage tank (UST) program, autumn is the time of year to report performance about our core priorities—preventing releases and cleaning up leaks. For a quick overview of the national UST program's 2011 performance measures, see the box below. You can learn more about the UST program's 2011 performance at *www.epa.gov/oust/cat/camarchv.htm*.

National UST Program By The Numbers

(as of September 30, 2011)

- 590,104 active USTs
- 1.77 million USTs closed
- 70.9 percent of UST systems in significant operational compliance with release prevention and leak detection
- 501,723 releases confirmed
- 413,740 cleanups completed

For more 2011 UST performance measures: *www.epa.gov/oust/cat/camarchv.htm*.

But there's more good stuff to add to your UST/LUST quivers. I want to make sure you know about our prevention work (biofuels and proposed UST regulations) and our cleanup activities (national LUST cleanup backlog study and petroleum brownfields).

PREVENTING UST RELEASES

Biofuels

With the United States moving toward a greater reliance on alternative fuels, the national UST program has been focusing on the compatibility of UST systems and biofuel blends. Several months ago, USEPA issued compatibility guidance that provided information on how UST owners and operators can demonstrate the compatibility of their UST systems with stored fuels containing certain percentages of biofuels.

The guidance indicates that one of the options for demonstrating compatibility is a manufacturer's approval that UST components are compatible with the fuel stored. To help UST owners and operators who choose this option, two of our industry partners—Petroleum Equipment Institute (PEI) and Steel Tank Institute (STI)—are making manufacturers' compatibility statements available on their websites. Thank you to PEI and STI for sharing this information widely on your websites; this is another example of how UST partners work together to protect our country's groundwater from UST releases. (See also Field Notes on page 23)

UST Compatibility Resources

- EPA's June 2011 Compatibility Guidance: *www.epa.gov/oust/altfuels/biofuelsguidance.htm*
- PEI's UST Component Compatibility Library: *www.pei.org/PublicationsResources/RegulatoryCompliance/USTComponentCompatibilityLibrary/tabid/882/Default.aspx*
- STI's Tank Manufacturer Statements of Compatibility: *www.steeltank.com/Publications/E85BioDieselandAlternativeFuels/ManufacturerStatementsofCompatibility/tabid/413/Default.aspx*

Also, in the 2011 federal budget, USEPA's UST program received 2.5 positions (known as full-time equivalents or FTEs) to help the nation's continued migration toward alternative fuels. USEPA headquarters and regions agreed that these additional positions will serve as a National Biofuels Team, supporting our national effort and collectively serving as a resource about UST issues associated with biofuels and other alternative fuels. The team is currently developing a work plan. Please contact Andrea Barbery at barbery.andrea@epa.gov or 703-603-7137 if you have biofuels issues you want the team to consider including in the work plan.

USEPA's Office of Research and Development (in particular, the Environmental Technology Verification program) developed a quality assurance plan that evaluates automatic tank gauging systems in USTs storing ethanol-blended fuels and tested two vendors' technologies. When completed in a few months, we will share the results of this effort, which will increase our technical knowledge of the effectiveness of leak detection technology in biofuels service.

Proposed UST Regulations

On November 18, USEPA published in the *Federal Register* a proposal that strengthens the 1988 UST regulations by increasing emphasis on properly operating and maintaining UST equipment. While we considered environmental needs in developing the proposal, we were also very sensitive of future

■ *continued on page 12*

Message From Carolyn Hoskinson *continued from page 11*

costs to UST owners and operators and, consequently, minimized UST system retrofits. Briefly, the proposed revisions:

- Ensure all USTs in the United States, including those in Indian country, meet the same minimum standards
- Close regulatory gaps and accommodate new technologies
- Improve prevention and detection of UST releases, which are a leading source of groundwater contamination.

In developing these proposed revisions, USEPA reached out to a wide variety of interested and affected UST stakeholders, resulting in valuable input, which significantly helped us identify the scope of our proposed changes. I am extremely appreciative of the efforts of all who shared their input with us.

The proposal's public comment period is open for 90 days from when the proposal was published in the *Federal Register*, which means we can accept comments until February 16, 2012. I hope you will provide us with your comments, per instructions in the *Federal Register* notice. See *www.epa.gov/oust/fedlaws/proposedregs.html* to access the proposed regulations, *Federal Register* notice, and additional resources.

CLEANING UP UST RELEASES

National LUST Cleanup Backlog Study

At the end of September, we issued *The National LUST Cleanup Backlog: A Study Of Opportunities* (see *www.epa.gov/oust/cat/backlog.html*), which provides state regulators and other interested stakeholders with:

- A detailed understanding of the LUST releases backlog and why the pace of cleanups is slowing
- Data compiled from 14 state LUST cleanup programs
- Key findings derived from analyzing the data
- Opportunities to help reduce the backlog in the 14 states studied, as well as more widely across all state cleanup programs.

The study confirmed some hypotheses related to the existing LUST backlog (e.g., that the remaining backlog is dominated by groundwater-contaminated sites). It also questioned others (e.g., that all high-priority sites have been assessed and that all soil-only sites, which are often referred to as low-hanging fruit, have been addressed). The study also revealed that many state UST programs are already applying backlog reductions strategies, such as:

- Reviewing data and files
- Employing temporary staff to close more releases
- Using multi-site agreements to encourage responsible party activity
- Using pay-for-performance and other incentives for contractors to reach closure
- Referring low-priority releases to brownfields programs or others, such as voluntary cleanup programs.

USEPA is supportive of these ongoing strategies, as well as other potential efforts, such as exchanging best practices and continuing to build on states' successes.

Now that the study is completed, we will be developing targeted backlog reduction strategies in cooperation with states, tribes, and other stakeholders. We will work with USEPA regional and state UST partners to identify next steps, gather additional promising backlog reduction strategies, and implement the strategies.

Petroleum Brownfields

In September, we also issued *Opportunities for Petroleum Brownfields* (see *www.epa.gov/oust/pubs/pbfopportunities.htm*), a document that gives readers:

- Information about the types of petroleum brownfields properties
- Opportunities and challenges petroleum brownfields present
- Ways these sites can be successfully addressed and reused.

This document presents examples of reusing petroleum brownfields properties in the commercial, industrial, transportation, residential, and open land categories. It discusses lessons learned through historic case studies and provides a list of resources about funding, technical issues, and partnership opportunities. The document provides technical assistance for revitalizing petroleum brownfields, particularly reuse of abandoned gas stations. It is the third in our series of petroleum brownfields documents. You can access our petroleum brownfields documents, plus our petroleum brownfields web pages, on USEPA's website (see *www.epa.gov/oust/petroleumbrownfields/index.htm*).

EPA's Petroleum Brownfields Documents

- Opportunities For Petroleum Brownfields *www.epa.gov/oust/pubs/pbfopportunities.htm*
- Petroleum Brownfields: Developing Inventories *www.epa.gov/swerust1/pubs/pbfdevelopinventories.htm*
- Petroleum Brownfields: Selecting A Reuse Option *www.epa.gov/oust/pubs/pbfreuseoption.htm*

We believe that identifying reuse opportunities and providing assistance to transform petroleum brownfields properties will help inspire additional cleanup of the backlog of open LUST release sites.

Our National UST Program Protects Groundwater

USEPA's UST program efforts—as well as those of our state, territorial, tribal, local government, and industry partners—culminate in one overarching goal: protecting our groundwater. It is a goal that is essential for our country and will continue to guide our work for future years. ■

OUST UPDATE

Topics Covered in USEPA's Proposed Rules

USEPA's proposal revises the UST technical regulation in 40 CFR part 280 by:

- Adding secondary containment requirements for new and replaced tanks and piping
- Adding operator training requirements for UST system owners and operators
- Adding periodic operation and maintenance requirements for UST systems
- Removing certain deferrals
- Adding new release prevention and detection technologies
- Updating codes of practice
- Making editorial and technical corrections

USEPA is also proposing to update the state program approval (SPA) requirements in 40 CFR part 281 to incorporate the proposed changes to the UST technical regulation listed above.

USEPA developed resources to help interested and affected stakeholders review the proposed revisions to the 1988 UST regulations. For details, go to: *www.epa.gov/oust/fedlaws/proposedregs.html*. ■

Check Out OUST's New Petroleum Vapor Intrusion (PVI) Compendium

The PVI compendium is now available at *www.epa.gov/oust/cat/pvi/index.htm*. It provides information about OUST's efforts to develop policy guidance on PVI and provides links to supplemental technical materials as well as state guidance documents. Tabs at the top of the pages help you to navigate through the compendium. You can also access introductory information, such as an overview of PVI, work products (e.g., information papers, webinars), and additional vapor intrusion resources.

Vapor intrusion occurs when vapor-phase contaminants migrate from subsurface sources into buildings. One type of vapor intrusion is PVI, in which vapors from petroleum hydrocarbons such as gasoline, diesel, or jet fuel enter a building. The intrusion of contaminant vapors into indoor spaces is of concern due to potential threats to safety (e.g., explosive concentrations of petroleum vapors or methane) and possible adverse health effects from inhalation exposure to toxic chemicals.

For questions or more information about the PVI compendium, contact Hal White at white.hal@epa.gov. ■

USEPA Region 9 Video Highlight's ARRA-Funded LUST Cleanup Work in Navajo Nation

Check out USEPA Region 9's YouTube video on LUST projects funded by the American Recovery & Reinvestment Act (ARRA) in the Navajo Nation at *www.youtube.com/watch?v=2KYg4jnHdk8*. The video features benefits to the local tribal firm conducting the cleanup work, the Navajo community, and the environment made possible with the ARRA funds.

Tribal lands have some of the highest unemployment rates in the nation; many areas lack adequate access to electricity and clean drinking water. By cleaning up contaminated lands and protecting groundwater resources, tribal communities can be assured that petroleum releases from LUST-impacted soil and groundwater will not continue to cause negative impacts to their communities.

USEPA allocated roughly $6.3 million from ARRA funding for cleaning up LUSTs on tribal lands across the country. The funding was provided to expand agency efforts to clean up eligible sites on tribal lands, in an effort to restore property for future use opportunities.

Region 9 received roughly half of the funding to assess eligible tribal LUST sites in California, Nevada, and Arizona. The national contractor for this work is a 100 percent American Indian-owned firm. The funding provided USEPA with an incredible opportunity to clean up the most contaminated sites on tribal lands. ■

SNAPSHOTS FROM THE FIELD

Kevin Henderson, a consultant, formerly with the Mississippi DEQ, sent this shot of E85 corrosion in a STP sump. "I think that the bright bluish-green mineral crystallized on the automatic line leak detector vent tubing is copper acetate," says Henderson. "This mineral precipitates out of solution on the surface of copper under the right conditions. The right conditions are high humidity, acetic acid, and a copper surface. Obviously, the conditions are right within this sump. The mineral could be any one of various copper salts (e.g. copper sulfate) but I believe it is most likely copper acetate." (See this photo in color in the online version of LUSTLine *at* **www.neiwpcc.org**

Tank-nically Speaking

by Marcel Moreau

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

Someday My Facts Will Come...Part 2

As promised in my March 2011, LUSTLine *article, this follow-up article will take a closer look at what some of the testing statistics generated by Crompco, a leading UST testing company headquartered in Pennsylvania, can tell us about the current state of our UST systems. To provide different viewpoints on the data, I've also enlisted Tom Schruben, an independent environmental risk-management and UST-equipment-failure investigator, and Ed Kubinsky of Crompco, to contribute to this article as well.*

About Our Data

Crompco has been in business for 30 years and operates up and down the East Coast from Florida to Maine, with a strong presence in the Mid-Atlantic states. Unless otherwise stated, the data presented here are a compilation of the testing done by Crompco in Maryland, Pennsylvania, New Jersey, New York, and Massachusetts from January 2004 through August of 2011.

Crompco is primarily in the UST testing business, performing traditional tank and piping tightness testing, sump and spill bucket leak testing, and line leak detector operational testing, and providing annual certification of automatic tank gauges (ATGs) and the various sensors that are plugged into them.

Crompco primarily uses the following equipment and test methods:

- **Tanks:** Estabrook Ezy-3 Locator Plus (a non-volumetric, underfill tank testing methodology)
- **Lines:** Petro-Tite line tester
- **Under-dispenser and tank-top sumps:** hydrostatic testing
- **Spill buckets:** both hydrostatic and vacuum-based methodologies.
- **ATG and associated sensors:** per manufacturer's instructions and regulatory guidance.

Crompco has been using the same testing technologies for a number of years, so this variable is constant. Crompco also has a seasoned team of testers, most with many years of experience, so most of the test data we will be looking at were gathered by a relatively small group of people.

In the interest of preserving some of Crompco's proprietary data, all of the numbers here are presented as percentages. But in all cases, the percentages are based on hundreds to thousands of individual tests, so we can be reasonably confident that the percentages presented here represent accurate trends and are not flukes due to a small sample size.

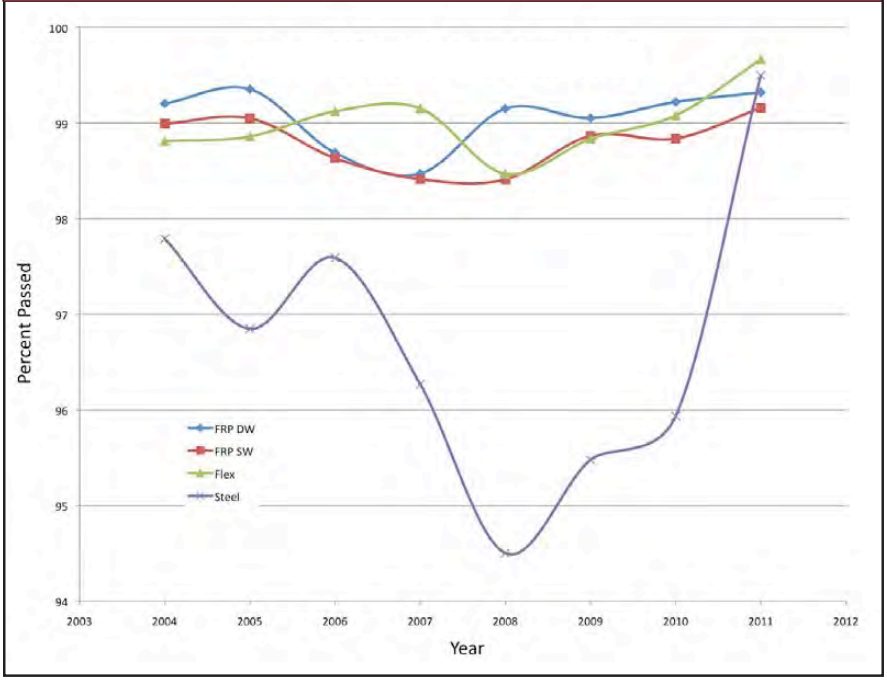
The Facts

Here are some graphs and a brief discussion of what we think might be going on.

Piping

Overall, the piping tightness-testing data (Figure 1) show that all types of piping are performing pretty well. There does not appear to be a significant difference among single- or double-walled fiberglass piping or the flexible piping systems that are in service today. Ed says they still test some of the older yellow Total Containment piping systems, but we made no attempt to sort these out from the flex-pipe category. Remember, these statistics are for passing tests—there was no evaluation of the condition of the pipe. There are, however, some pretty scary looking old flex-pipe systems that still manage to get passing test results. Steel piping systems have a slightly lower passing rate than FRP or flexible pipe, but steel is still doing reasonably well. The dramatic improvement in steel pipe performance in

FIGURE 1. PERCENT PIPING TESTS PASSED



2011 may not be a reliable trend as there have been relatively few tests of steel piping systems conducted in 2011.

Given the prevailing wisdom that leaks today are mostly in piping, the near perfect performance of these piping systems may seem a bit perplexing. Where are the piping leaks?

When reviewing these data, keep the following in mind:

- These piping tightness test results do not include the dispenser components or the submersible pump. This is because most tests are conducted with the ball valve at the submersible pump closed, so any leaks in the submersible pump head will not be "seen" by the test. Likewise, Crompco testers typically run the initial line test with the crash valve open so the dispenser components are tested, but if a leak is found in a dispenser component, the test is re-run with the crash valve closed so the dispenser is no longer included in the test. If the test with the crash valve closed passes, the result is recorded as a pass and would appear as a pass in our data. Crompco reports the leak in the dispenser separately to the owner or operator of the facility. So the leaks that are part of our database are leaks that were found between the ball valve and the crash valve. This would include flexible connectors in fiberglass piping systems and end fittings on flexible piping systems, but not leaks in the submersible pump head or inside the dispenser cabinet.
- Liquid leaks in dispensers and submersible pumps are very often visible when a cover or lid is removed. Most service technicians who observe a leaking filter, meter, flexible connector, or functional element are not going to call in a tightness tester to confirm the leak. As a result, your typical service technician will likely discover a lot more liquid leaks (as opposed to vapor leaks) in the course of a year than your typical tightness tester. The service technician will simply replace the leaking component and there will be no tightness-test results to document the leak—only perhaps a test conducted after the repair to document that the piping is tight. The point here is that we need to look beyond tightness-test data to get a handle on the universe of UST releases. While dispensers and submersible pumps have been largely overlooked by the UST regulations, they are clearly significant contributors to the LUST side of the program.

Tanks

Overall, the tank-testing data (Figure 2) show that all types of tanks are performing pretty well, though not quite as well at the piping. Fiberglass tanks are performing a bit better than steel tanks. Somewhat disturbing is the sudden decrease in the passing rate of double-walled steel tanks, and to a lesser extent the fiberglass tanks. This is true only for 2011 and although we have only partial data for 2011, the number of tanks tested in each category is still significant. These are trends worth keeping an eye on.

■ *continued on page 16*

FIGURE 2. PERCENT TANK TESTS PASSED

■ Facts, Part 2 *from page 15*

When reviewing these data, keep the following in mind:

- The data we currently have do not indicate whether the tank failed to pass because of either a liquid leak in the bottom of the tank or a vapor leak from a tank-top fitting. This information could likely be gleaned from the data sheets for the tests, but we have not conducted that analysis yet.
- The double-walled tank failures may be underestimated. I know that in Maine, for example, a service technician who finds that the interstitial space of a tank is full of fuel will typically pump out the fuel from the interstitial space and return a week or so later to see if the fuel has returned. If the interstitial space is again full of fuel the tank is generally considered to have failed and a tightness test is not conducted. Maine has documented more than 50 failures of jacketed and double-walled steel tanks over the last five years.
- Maryland requires heating oil and emergency generator tanks to be tested at 15 years of age and every 5 years thereafter. A fair number of these tanks are present in the Maryland data, and our statistics may be skewed a bit by the inclusion of these tanks in our tank-testing statistics.
- The results of these tank tests are encouraging when viewed through a historical lens. Back in the late 1970s, when one of the first regulatory-driven tank-testing programs was conducted in Prince Georges County, Maryland, passing rates for tank tests were 50 percent. When USEPA conducted their tank-testing survey in the mid-1980s, the passing rate was 65 percent. That we are achieving tank-test passing rates generally above 95 percent in recent years is a measure of how far we have come in our quest to improve the integrity of our storage systems. Still, we should keep an eye on these numbers and maybe dig a little deeper to see how today's tanks are failing to be sure that our passing rate isn't slipping as our tank population ages.

FIGURE 3. PERCENT SUMP TESTS PASSED

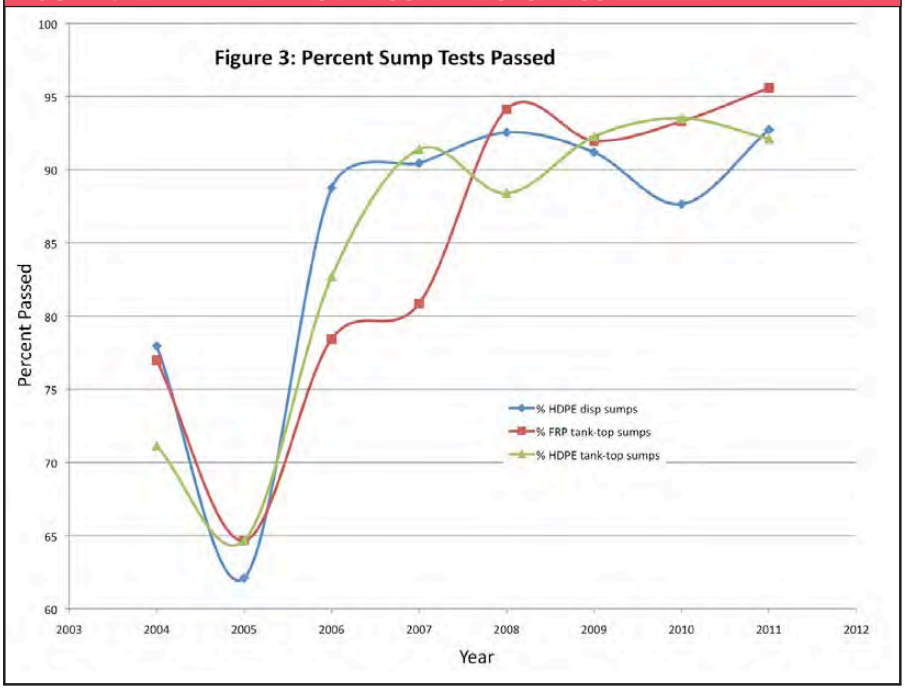
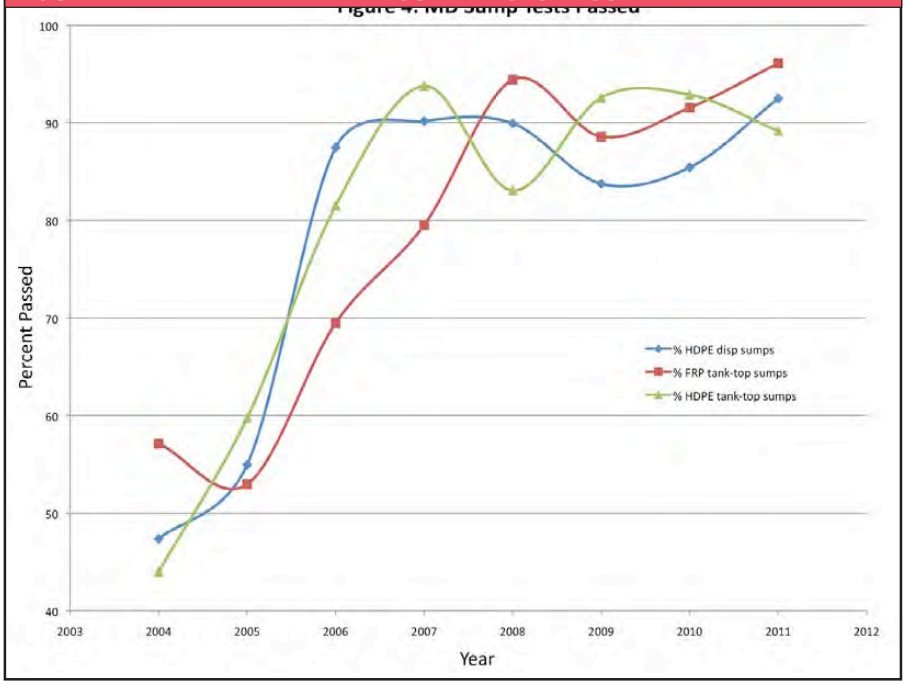


FIGURE 4. MARYLAND SUMP TESTS PASSED



Sumps

Keep in mind that a technician may make simple repairs to sump components (e.g., tightening a loose hose clamp) before conducting a test or after a failed test. Some of these passing results (Figure 3) may have initially been "fails" that were repaired and passed when retested. In other words, sumps in the "as found" condition might have a lower passing rate than what is reflected here.

The sump testing trend is encouraging in that it shows that greater numbers of sumps are passing tests over time, an indication that once sumps are made tight, a good many of them will stay tight for a while. The data show little difference in the performance of fiberglass versus high-density polyethylene (HDPE) plastic sumps. This is perhaps an indication that the major issues with sump leaks are associated with the penetration fittings that seal around the piping and

electrical conduit that go through the side of the sump walls.

The pronounced decline in passing tests in 2005 is most likely due to a new sump-testing requirement that went into effect in Maryland in that year. Because a large number of the Maryland sumps were being tested for the first time, a large percentage of them failed. The sump-testing data for Maryland only (Figure 4) demonstrate that once the initial leak problems are addressed, sump performance increases substantially over time and levels off to about a 95 percent passing rate after a few years.

Spill Buckets

The trend in spill buckets is similar to the sump trend (Figure 5). There is a high failure rate initially that improves with time as leaky spill buckets are replaced. As this new generation of spill buckets ages, they may begin to fail as well and we should see a decreasing trend in the passing rate over time. If such a trend comes to pass, it would give us an indication of the real-world life expectancy of spill buckets.

Line Leak Detectors

Figure 6 shows the percent of electronic and mechanical line leak detectors (LLDs) that were successfully able to detect a three-gallon per hour leak each year. Overall, the electronic line leak detectors are performing better than the mechanicals, although the performance of the mechanical LLDs is steadily improving. We're not sure what is responsible for the improvement in the passing rate of the mechanical LLDs, but it may be the result of either better procedures for testing LLDs or improvements in the manufacturing of LLDs that have made them more reliable.

The dip in the performance of the electronic LLDs in 2005 and 2006 is likely due to a large increase in the number of electronic LLDs that were tested in MD and NJ in those years. These were presumably electronic LLDs that had not been tested previously. The substantial increase in failure rate for the "first time" tests points to the importance (despite some manufacturer's claims) of evaluating the performance of these devices. Failure of electronic LLDs to detect leaks can be due to improper programming, air pockets in the piping, or failure of the hardware itself. Review of the actual test records would be required to determine which of these factors might be responsible for the failed tests.

FIGURE 5. SPILL BUCKET TESTS PASSED

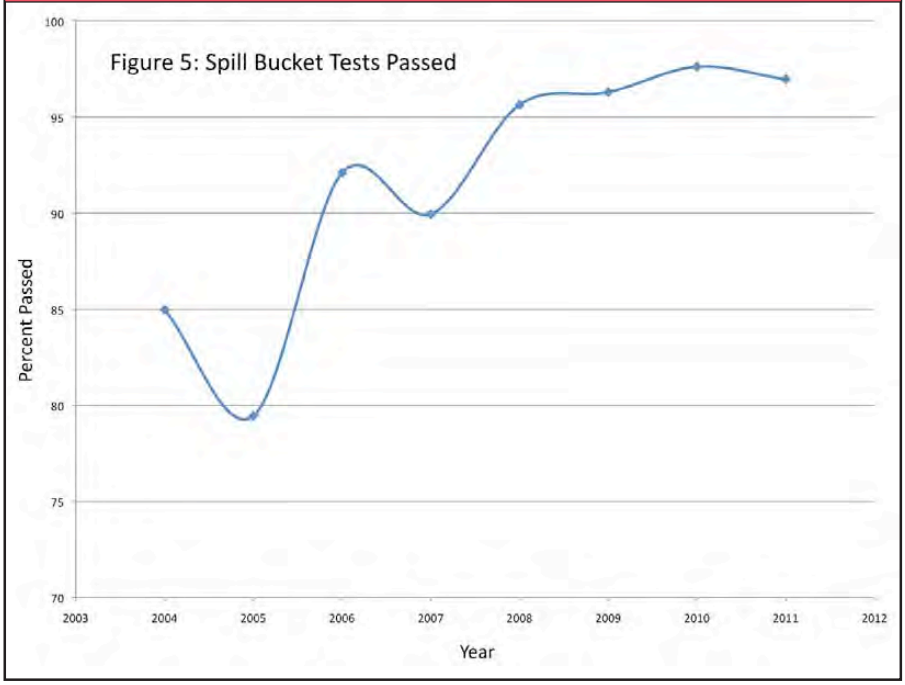
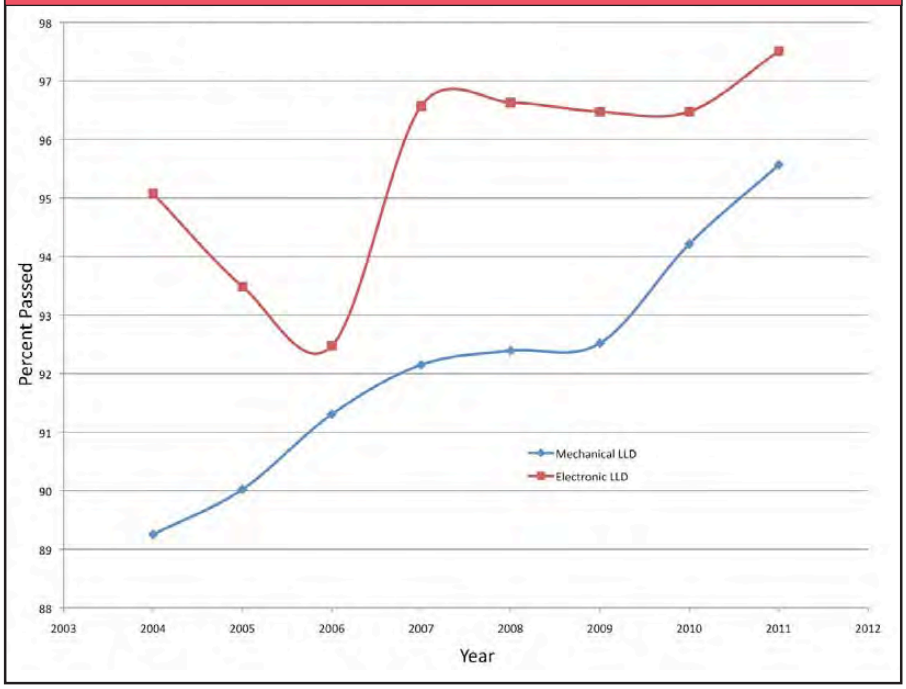


FIGURE 6. PERCENT LLD TESTS PASSED



Monitor Certification

Monitor certification typically involves checking the functionality of the different components of a tank gauge, including everything from the alarm and indicator lights to the sump and interstitial space sensors. The data (Figure 7) show a pronounced dip in 2006 and 2007. This dip is associated with large increases in the number of tank gauges that were tested in these years in Massachusetts and New York, and likely indicates that when checked for the first time, the performance of UST equipment is substantially less than the performance when equipment is routinely tested. Even when routinely tested, however, the passing rate for ATGs seems to level off at about 85 percent. Just looking at the raw data, it is not possible to tell whether the failures are due to programming errors, burned-out light bulbs, or

■ *continued on page 18*

■ Facts, Part 2 *from page 17*

failing sump sensors. A closer look at the individual records would be required to answer these questions.

Compliance Inspections

A number of states have third-party inspection programs, and Crompco personnel are certified as inspectors in a number of states. The data for Maryland, Massachusetts, and Pennsylvania (Figure 8) strongly point to some consistency issues among the state programs. While nearly all inspections conducted in Massachusetts have a passing result, in recent years less than 20 percent of the inspections conducted in Maryland have had a passing result. Pennsylvania fits in the middle, where generally between 40 and 60 percent of inspections have a passing result. These dramatic differences in results are likely due to substantial differences in the compliance criteria in each of these states. Ed says the low passing rate in Maryland may be because the state's inspection criteria include not only the usual UST issues but also Stage II vapor recovery equipment, maintenance records, and testing documentation.

A representative of a very conscientious tank owner who has tanks in several states and saw a presentation that included these compliance inspection statistics commented to Ed that, "It's funny, in Pennsylvania I never have a facility operations inspection that fails, yet in Maryland I never have a third-party inspection that passes." A conscientious tank owner who has a uniform standard of UST operation for all of his storage systems and who operates in these three states would have good cause to be frustrated.

FIGURE 7. MONITOR CERTIFICATION TESTS PASSED

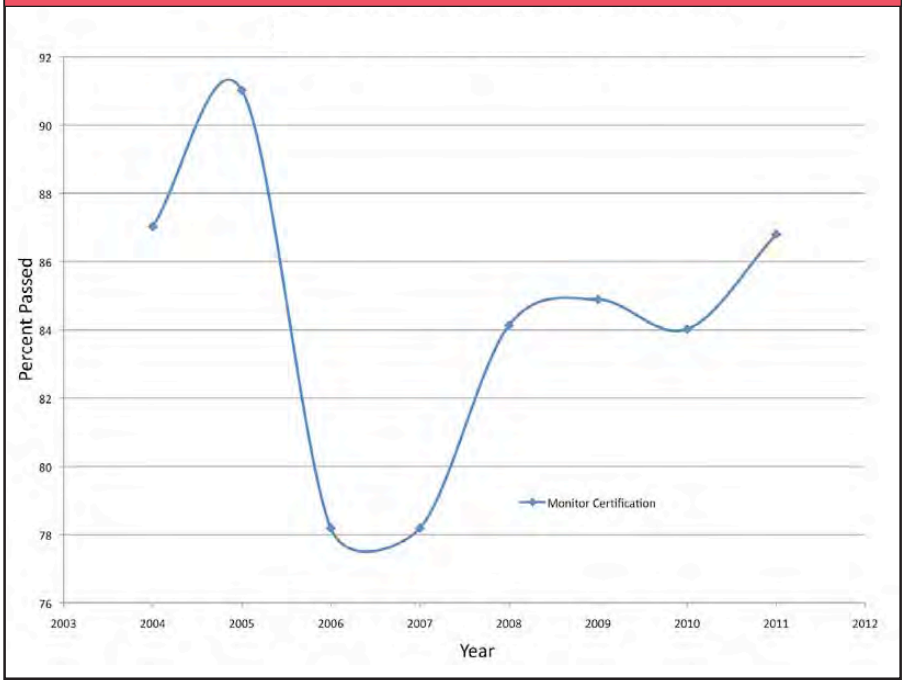
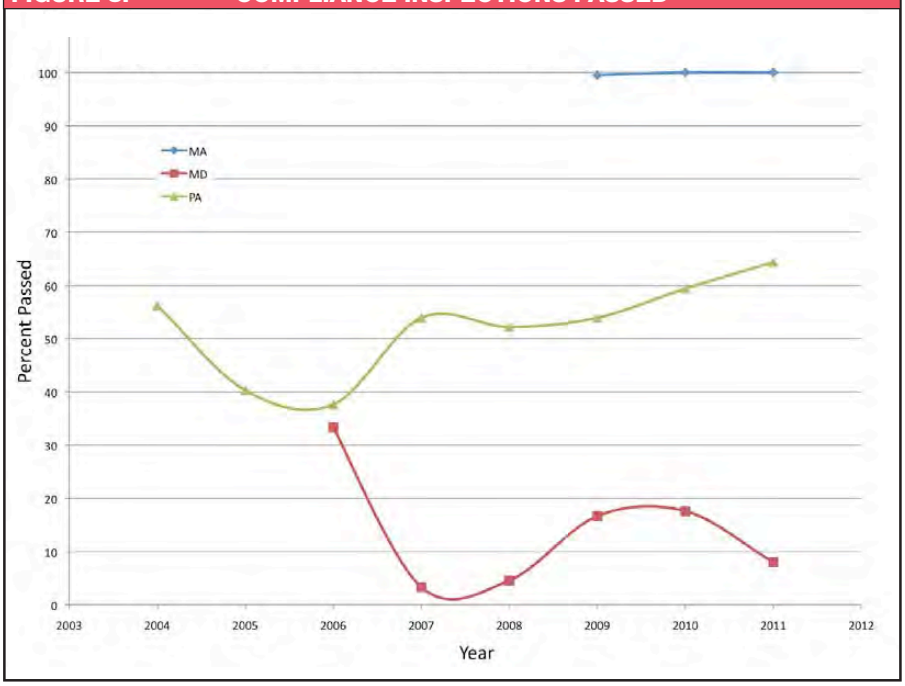


FIGURE 8. COMPLIANCE INSPECTIONS PASSED



So What Have We Learned?

Here are our observations:

- While we have not applied any formal statistics to these data, the test numbers are fairly large and the trends fairly consistent among different states, so we feel that these data are reasonably reliable. Overall, it looks like UST system integrity is generally good and improving in the states that we evaluated.
- Tanks and piping are performing quite well, but there are some trends worth watching and it may be worthwhile to dig deeper into the data to try to understand the causes behind some of the observed trends. Are failures related to the type of fuel or some other factor? Where are the failures happening in double-walled steel tanks—vapor leaks at the top or liquid leaks at the bottom?
- Take this analysis with a large grain of salt. Storage systems that pass tightness tests are not necessarily free of releases. Some components are not included in routine tests and repairs are often made before test results are reported. Testing data will underestimate release events because components that frequently leak (i.e., dispensers and submersible pumps) are not reported as part of piping tightness tests, and service technicians who observe leaks repair them without conducting a tightness test. We need to consult with service technicians to get a more complete picture of how

USTs are performing. It might also be instructive to gather data on the "as found" condition of containment sumps and spill buckets so we can have a better idea of whether these components are tight when the tester first comes to a site.

- Sump and spill bucket integrity testing appears to improve the reliability of these systems. Sump and spill bucket integrity is typically low during a first round of testing but improves over time. Reliability of sumps and spill buckets is critical for secondary containment to be a viable leak-detection (and, even more importantly, leak-prevention) method.
- We should study why ATG systems are failing certification procedures so we can figure out how to improve their reliability. Ed says that this may be possible by delving further into the records.

A big question is: Will compliance inspection procedures and compliance criteria ever be standardized enough to compare compliance inspection results from state to state? At the moment the differences between state evaluation procedures and passing criteria make such comparisons and data aggregation impossible. Eventually, we may arrive at a "just right" consensus on compliance inspections, but for now comparing data across states only tells us that states are wildly different in their approaches, much to the consternation of multi-state tank owners. ■

Postscript

As we dig into the data, we keep finding new questions to ask and new ways to slice and dice the numbers. We're thinking there are likely at least a few more LUSTLine *articles in these numbers. Are you interested? Let us know:*

-Tom Schruben:
tschruben@ustcostrecovery.com
-Ed Kubinsky:
ed.kubinsky@crompco.com
-Marcel Moreau:
marcel.moreau@juno.com

Also, we'll be presenting and discussing testing data at a session at next year's National Tanks Conference not only from Crompco, but also from Tanknology and Protanic. See you there!

Those Lead Scavengers Still Persist in Old Product

by Jim Weaver and David Spidle

Thomas Midgley, Jr. patented the use of tetraethyllead (TEL) as a gasoline additive in 1926 (Midgley, 1926) to eliminate the newly found problem of engine knock. TEL was not a benign additive as it tended to precipitate on engine components. So Midgley soon found compounds, now known as "lead scavengers," that would prevent this problem by combining with lead during combustion. Early on, lead and lead scavengers were sold as a package to be added to gasoline at refineries.

One prominent "scavenger," ethylene dibromide (EDB), proved to be an effective solution to this problem. However, when the law of unintended consequences was applied, EDB proved to have lower volatility, higher water solubility, and more toxicity than benzene. EDB has a maximum concentration level (MCL) 100 times lower than benzene (0.05 µg/L EDB vs. 5 µg/L benzene) and has been found to persist in groundwater.

EDB has been discussed in *LUSTLine* several times. Ron Falta and Nimeesha Bulsara of Clemson University described many of the issues associated with lead scavengers in LL #47 (Falta and Busara, 2004). Based on their study of South Carolina data, they found that EDB was detected above its MCL at 25 percent of sites and at concentrations of 0.5 µg/L to more than 50,000 µg/L. In LL #50, Read Miner of South Carolina reported on a study of 104 EDB confirmed sites to better understand the lead scavenger problem. The results showed plume lengths from 100 to 2,800 feet and concentrations up to 40,000 µg/L (Miner, 2005). The prospects for various remedial technologies were assessed from experience at these sites.

In subsequent *LUSTLine* issues Steve Burton from USEPA Region 4 pointed out that leaded aviation gasoline and racing fuel were still sold, but that manufacturers' material safety data sheets didn't always indicate the presence of the lead scavengers (Burton, 2005). Mark Toso (Toso, 2007) reminded us that 1,2-dichloroethane (DCA) was also a lead scavenger and that in Minnesota, EDB detections were rare in comparison to DCA detections. That fewer EDB detections were seen in Minnesota's groundwater than in South Carolina's could be attributed to various causes, including differences in geochemistry and temperature.

The USEPA Office of Underground Storage Tanks (OUST) and Office of Research and Development (ORD) analyzed groundwater samples submitted by state tanks agencies from sites that were likely to contain leaded gasoline releases. The study found that EDB was above its MCL at 42 percent of sites, and DCA, as detected, was above its MCL at 15 percent of sites (Wilson et al., 2008). As a result of all of this work, OUST issued a recommendation that states test for the presence of lead scavengers at sites where they are likely to persist (*www.epa.gov/oust/cat/lead_scavengers_memo_05212010.pdf*).

Ferreting Out State Data

To address an aspect of lead scavengers that was not previously studied, we asked states for product samples from pre-1985 release sites to see how much of the scavengers were still in old product (Weaver et al., 2011). We received gasoline samples drawn from wells located primarily in eastern states, which were about evenly divided between north and south. With our 76 samples in hand from 10 states and 41 sites, we analyzed for TEL, EDB, and DCA.

Some of the results were as expected: Samples containing TEL or other forms of lead (tetramethyllead and triethylmethyllead), also contained EDB and DCA. Some leaded gasoline samples contained only EDB, which could be due to leaching of the more highly water soluble DCA. And then some leaded gasoline samples contained no scavengers, presumably also a result of leaching.

■ *continued on page 20*

■ Lead Scavengers *from page 19*

Beginning in 1974, USEPA mandated the sale of unleaded gasoline to meet the needs of 1975 model year vehicles. For a while, both unleaded and leaded gasoline were sold at gas stations, and it's likely that some stations had leaks of both leaded and unleaded gasoline. Of our samples, 37 percent met USEPA's definition of unleaded gasoline (less that 0.05 grams per gallon lead). Some of these contained no scavengers, as expected. A fraction, however, contained scavengers at concentrations almost as high as the leaded gasoline, while some contained EDB-only at low concentrations. We explored all possibilities to explain these data. Analytical error, preferential leaching, incorrect formulation of the additive package, as well as others were considered and discarded in favor of the following two hypotheses.

First, consider the possibility that EDB was used as an agricultural fumigant until its two main uses as a pesticide were revoked in 1983 and 1984. Could the agricultural use of EDB in groundwater, in effect, contaminate unleaded gasoline from nearby leaking tanks by partitioning from the water to the unleaded gasoline? Using the properties of EDB and a transport model, we found that the agricultural EDB could indeed explain the existence of unleaded gasoline samples containing only a few mg/L of EDB.

Ten to twenty years are needed to produce this level of contamination because with the maximum EDB in groundwater of 15 μg/L, only a small amount of mass is available at any given moment to partition into the unleaded gasoline. Although this explanation is plausible, several of our samples were from urban areas. These could be the result of contact with a contaminant plume that originated from leaded gasoline, rather than agricultural use of EDB. The same mechanism would be at work—groundwater that contains EDB "contaminates" unleaded gasoline, resulting in concentrations of EDB in unleaded gasoline up to about 20 mg/L.

Second consider the group of our unleaded gasoline samples that contained appreciable amounts of EDB and 1,2-DCA. In a few samples the concentrations were almost as high as those found in the leaded gasoline. Again, these are concentrations that shouldn't exist, because the unleaded gasoline should be free of lead scavengers. After ruling out analytical errors, we hypothesize that these samples are the result of multiple releases of leaded and unleaded gasoline.

If sites exist where the leaded gasoline is not commingled with the unleaded gasoline, then the scavengers can partition into the groundwater. The organic leads remain in the gasoline phase because the solubility of the organic leads is very low. The groundwater contaminated with scavengers contacts the unleaded gasoline, and over time the groundwater "contaminates" the unleaded gasoline. Our model results show that this is a plausible explanation of these samples and that several years are required to complete EDB transport through the leaded and unleaded gasoline.

Thinking It Through

Looking back at our leaded gasoline samples, some of these had fairly low lead content, but the use of lead in gasoline was more variable than most people think: During the lead phase-down, the lead content of gasoline was highly variable and concentrations could range from 0 g/gal to a maximum of 4 g/gal in the early years and up to 1 mg/L in the late 1980s (Weaver et al., 2010, figure 1). On the other hand, some of the samples could represent commingled leaded and unleaded gasoline and the concentrations would depend on the ratio of the two as well as the lead content of the leaded gasoline. At some sites commingling of product may have resulted in samples with low lead content, while at others the two gasoline types might have been fairly well separated, so the unleaded gasoline gained scavengers.

These scenarios can also explain the extended persistence of EDB and DCA contamination in aquifers. If the releases were such that the scavengers had to migrate through the unleaded gasoline zone, a long time would be required to exceed the scavenger-holding capacity of the unleaded gasoline. In effect, the unleaded gasoline acts like a large sink for the scavengers. This would be similar to placing a huge reservoir of organic carbon into the aquifer; it would retard the transport of the contaminants and then return them to the groundwater over time. In effect, the source lifetime is increased and the plume exists for longer periods in the groundwater.

The various studies of lead scavengers—South Carolina (Falta and Bulsara, 2004; Minor, 2005), U.S. groundwater (Wilson et al., 2008), and this 2011 study—show that widespread contamination still exists from lead scavengers at old release sites. Because releases of unleaded gasoline can occur after previous leaded gasoline releases, lead scavenger contamination could persist from a time when scavengers weren't considered in site assessment. To eliminate exposure to these contaminants, and as noted in OUST's recommendation, sampling and analysis for scavengers is very much needed at sites where releases of leaded gasoline are likely to have occurred. ■

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This paper has been reviewed in accordance with USEPA's peer and administrative review policies and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

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■ *continued on page 26*

The "Twofer" Economic Theory

How Symbiotic Relationships Can Benefit Multiple Governmental Organisms

by Gary Lynn

Whenever I need two of anything, I look for a twofer…can't beat getting two for the price of one! Certainly there are worse philosophies to live by, and in our current political and economic climate, this may be one of the few viable ways to obtain additional resources. So with the twofer economic theory in mind, New Hampshire's leak prevention and petroleum remediation programs have worked out a number of cooperative strategies that help both programs. Achieving simultaneous progress in multiple programs is a welcome challenge for the hard-core twofer lover.

The Sleuthing Advantage

The ultimate objective of the UST compliance program is leak prevention. On the release side, the petroleum remediation program is tasked with cleaning up leaks quickly and cost effectively. If releases are prevented or eliminated faster, both the remedial program and the reimbursement fund benefit, and the tank program fulfills its mandate. Working together on leaks is therefore advantageous to both programs—a classic twofer—but not always a modus operandi in tank programs.

In New Hampshire, we are lucky to have a staff member, Jason Domke, who worked at an environmental consulting firm, then as a tank inspector, and now with our remedial program. Over time, the tank and remedial programs have worked out a mutually beneficial arrangement that takes advantage of his background. Jason visits each tank closure so he can direct initial remedial efforts before the excavation is backfilled, dramatically reducing long-term remedial costs. During this same site visit he completes a tank leak autopsy. His familiarity with tank hardware and leaks makes him the perfect candidate for both activities.

Cooperation among programs goes beyond this, however. Monitoring-well networks are in place at about one-third of the state's active gas stations, due to past releases. These networks have successfully detected new releases at a number of sites where leak detection equipment did not. Whenever the groundwater monitoring data suggest that a new leak is present, Jason is sent out to investigate. He completes a normal tank inspection that helps the tank program fulfill its three-year tank-inspection-cycle mandate, and he also dissects the tank system until he identifies and eliminates the leak. In a number of cases, his troubleshooting eliminated leaks that were impossible to detect via normal site inspections and standard leak detection methods.

For example, Jason was sent to troubleshoot a facility where groundwater contamination was detected in a monitoring well near the dispensers. His detective work uncovered serious compliance issues that led to the release. The owner failed to report two unusual operating conditions: 1) one of the dispensers had been hit by a car, and 2) the line leak detector was in alarm. A cosmetic dispenser repair failed to include retightening the crash valve, and the line-leak-detector alarm was traced to a leaking flex connector. Quick detection and elimination of the leaks minimized the release and future cleanup costs.

In another case, Jason found a large subsurface vapor leak resulting from improperly manifolded vapor recovery lines—a leak large enough to cause indoor air and groundwater problems but small enough to pass the pressure-decay test. Once again, the problem was buried underground and missed by ongoing inspection and leak detection efforts.

Jason even found an intermittent problem at another site caused by a line-leak-detector diaphragm failure. It only leaked during the infrequent periods when the pump was activated at this low-volume gas station—lines and tanks tested tight. Persistence was the key. There are many other examples; in every case leak troubleshooting started immediately, thanks to Jason's seasoned sleuthing prowess, and a leak was arrested earlier than it would have been otherwise.

In addition to all these efforts, Jason participates in all of our operator training sessions. He is able to provide graphic examples of the impacts of inattention on leak prevention, help troubleshoot facility owner issues, and answer questions concerning the remedial program.

The advantages to each of our tank programs are obvious. The remedial program saves money on cleanup costs by minimizing the size of releases, removing source areas early on in the process, and helping the leak prevention program uncover weaknesses in their leak prevention efforts. The prevention program also benefits by having an additional resource for inspections, operator training, and leak autopsies.

The Tank Upgrade Deadline, Foreclosures, and Temporary Closures

One of the biggest challenges facing New Hampshire's tank compliance program is its 2015 deadline for closing all single-walled tank and piping systems. The single-walled systems meet federal regulations but not our more stringent state rules. In addition to that looming deadline, there have been a rash of foreclosures and "temporary" tank closures brought on by the harsh economic climate for gas stations. Here, the petroleum brownfields and the tank compliance programs have common interests and another possible twofer opportunity.

In New England, petroleum brownfields programs have indicated that they are finding it difficult to locate eligible sites. To be eligible for state grant assistance, the owner

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■ **Twofer Economics** *from page 21*

of a property cannot be both liable and financially viable, and the owner must be looking to redevelop or sell the property. Essentially, the brownfields programs are looking for the same sites that the tank compliance program needs to address.

Owners that aren't financially viable tend to have their tanks in temporary closure, are unable to afford to upgrade or remove their tanks, and are more likely to be looking to sell or redevelop their property. Brownfields programs can remove tanks, when required as part of the site assessment, as well as complete due-diligence investigations and hazardous materials surveys of buildings. Tank compliance programs benefit by the removal of the tanks, new ownership, or creating a more financially viable property.

To take advantage of this opportunity, the tank program has developed data-mining computer queries that provide information on all tank systems that need upgrades, are in temporary closure, and are double-walled tanks that have failed. In addition to data mining, the tank inspectors talk to tank owners about their plans and problems. When the tank inspectors identify owners that would like to remove tanks but are unable to do so, they alert the petroleum remediation program, which passes the information on to the appropriate local, regional, or statewide brownfields program. This collaborative effort has addressed, to date, more than 50 tanks and 25 facilities. While this is a little less than 10 percent of the tank upgrade universe, it will make a significant dent in the 2015 tank upgrade deadline if we are able to continue at the current pace of cooperative assistance.

Lessons Learned

What we've learned over the years is broadly applicable:

- Information sharing is critical. Without a good understanding of an allied program, it is impossible to find efficiencies and successfully leverage them.
- Improvements in efficiency and resource allocations are possible whenever programs share similar goals and overlapping site locations (e.g., combining tank inspection with the vapor recovery program was very successful in our state).
- Cooperative strategies typically result in better overall program outcomes. Petroleum brownfields site identification is significantly enhanced in our state by direct contacts made by our tank inspectors, mutually benefiting both programs.

Cooperation and cross-fertilization between programs is likely to continue. Just the other day, for example, Mike Juranty, tank compliance program administrator, announced that his horse stalls need mucking out. I need a load of manure to activate my leaf compost pile. Looks like another twofer is on its way that would have been impossible to pull off without good communication between programs. ■

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Why New Hampshire UST Operators Are Choosing Classroom Training

by Suzanne Connelly

New Hampshire's Class A and B operator training statute allows various alternatives for compliance—International Code Council (ICC), online courses, webinars—but the option of attending the Department of Environmental Services (NHDES) day-long classroom training has become the preferred choice among operators. Classroom-style training has many benefits. There is value in the interactions between speakers and operators, in handling actual equipment, and in sharing experiences with the regulated community at large.

Quality presenters are an essential feature to classroom training. New Hampshire uses six presenters from different areas of their Oil Compliance section. Engineers offer expertise on compatibility and how it applies to the installation and maintenance of a tank system. Inspectors explain how to recognize the signs of failed or faulty tank components and bring attendees up to date on UST news and regulations. In addition to the presenters, the trainees also share their own experiences during discussions, another advantage to this educational setting.

Although webinars and online programs are convenient, they tend to lack the hands-on benefits of an interactive classroom. Such participation allows prospective Class A and B operators to see and handle assorted tank components. NHDES UST staff have collected and cleaned their display pieces in order to demonstrate ways in which UST components can be compromised in contrast with how functioning equipment should appear.

For example, broken vent caps show the kind of damage that can be caused by hailstorms. Softened piping demonstrates what can happen when an incompatible fuel compromises certain tank-system components. Damaged dispenser nozzles due to customer misuse show attendees that it's in their best interest to check their equipment periodically. The importance of monthly visual inspections is driven home for the operator who has firsthand exposure to the equipment.

Evaluation forms provide feedback to presenters and the overall operator training program. Their remarks reinforce NHDES' commitment to training Class A and B operators through their preferred classroom setting. Such efforts will certainly help New Hampshire reach the U.S. Energy Act August 8, 2012, operator training deadline. ■

Suzanne Connelly supervises the UST Operator Training Program for the New Hampshire Dept. of Environmental Services. She can be reached at Suzanne.Connelly@des.nh.gov.

Field Notes

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

PEI Lends a Hand on Compatibility and Equipment Testing Issues

USEPA has cleared E15 for use in certain Model Year 2001 and newer light-duty motor vehicles, and it won't be long before the new higher-level blend fuel is registered and legal to market.

Federal law (40 CFR §280.32) requires that underground storage tank systems (USTs) be compatible with the substance to be stored. If tank owners wish to store fuels with 15 percent or more ethanol—or diesel with more than 20 percent biodiesel—the obvious choice for new facilities is to install equipment listed by Underwriters Laboratories (UL) as compatible for that fuel. Equipment manufacturers now have equipment available that is compatible with these new blends. But what about the legacy UST systems that were purchased and installed before this newer equipment was listed and made available to tank owners?

USEPA guidance says UST system owners also may demonstrate compatibility and meet the requirements of 40 CFR §280.32 if the manufacturer of the UST component approves it as compatible. USEPA identified 12 types of UST components that must be compatible with the substance to be stored—again, either listed by UL or approved by the manufacturer as compatible. The list is extensive and includes:

- Tank or internal lining
- Piping
- Line leak detectors
- Flexible connectors
- Drop tubes
- Spill and overfill prevention equipment
- Submersible turbine pumps and components
- Sealants (including pipe dope and thread sealants), fittings, gaskets, o-rings, bushings, coupling, and boots
- Containment sumps (including submersible turbine sumps and under-dispenser containment)
- Release detection floats, sensors, and probes
- Fill and riser caps
- Product shear valves

PEI and its members see manufacturer approval as a reasonable and practical approach to the listing alternative. Shortly after USEPA identified the four elements that UST component manufacturers were required to include in their compatibility statements, manufacturers began to draft their letters.

The elements component manufacturers must include in writing on compatibility are:

- An affirmative statement of compatibility
- Specifying the range of biofuel blends the component is compatible with
- Directly from the manufacturer.

The issue then became how to get the letters in the hands of the UST owners/operators, regulators, and equipment vendors who needed them.

It occurred to us at PEI that a single, industry-wide repository for the affirmations of all manufacturers would bring a great deal of efficiency to the distribution process. The UST Component Compatibility Library was created in late summer of 2011 to do just that.

Residing at *http://www.pei.org/PublicationsResources/ComplianceFunding/USTComponentCompatibilityLibrary.aspx*, the Library contains statements from manufacturers of products in the 12 affected categories identified by USEPA. As of this writing, it contains statements from over two dozen manufacturers. Available 24/7, all letters are posted as PDFs that can be easily downloaded and printed. The letters are on company letterhead and include a name and contact person should questions arise. ■

PEI's Recommended Practices for the Testing and Verification of Spill, Overfill, Leak Detection, and Secondary Containment Equipment at UST Facilities

USEPA has proposed to revise its 1988 UST regulations (see story page 11) by increasing the emphasis on properly operating and maintaining equipment. Although the 1988 UST regulation required that owners and operators have spill, overfill, and release detection equipment in place, it did not require proper operation and maintenance for that equipment. For example, USEPA required that spill prevention equipment capture drips and spills when the delivery hose is disconnected from the fill pipe but did not require periodic testing of that equipment. The proposed revision published in the November 18, 2011 *Federal Register* will require that UST equipment is operated and maintained properly, which should go a long way in improving environmental protection.

USEPA is proposing owners and operators test equipment by using either requirements developed by the manufacturer of the equipment or a code of practice developed by a nationally recognized association or independent testing laboratory. The manufacturer's requirement is an option only when the owner/operator knows who made the equipment and that the specific manufacturer has developed a testing requirement.

In response to the proposed regulation, USEPA anticipates that nationally recognized associations or independent laboratories will develop codes of practice for spill, overfill, leak detection, and secondary containment equipment tests. The agency also anticipates that manufacturers will develop testing requirements. In

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addition, USEPA is providing implementing agencies flexibility to allow other methods they determine to be protective of human health and the environment as the manufacturer's requirements or a code of practice. This option allows alternatives in the event that codes of practice and manufacturer's testing requirements are not developed.

Those of us in the industry have known for quite some time that for leak detection, release prevention, and overfill equipment to be operated effectively and safely, it must be maintained, inspected, and tested for proper operation on an ongoing basis. A little over two years ago, requests from UST system owners and operators, equipment testers, and regulators encouraged PEI to embark on a project to produce a single authoritative source of information—a code of practice—that represents a synthesis of industry procedures and manufacturer's recommendations relating to testing and/or verifying spill, overfill, leak detection, and secondary containment equipment. A draft of that document, *Recommended Practices for the Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities* (PEI/ RP1200), is in the final stages of production and will soon be available for comment at *www.pei.org/rp1200*.

The practices described in PEI/RP1200 are the consensus recommendations of the PEI Overfill, Release Detection, and Release Prevention Equipment Testing Committee. The committee is made up of representatives from equipment suppliers, tank owners, leak detection and release prevention testers, industry-related associations, and the regulatory community. In instances where there were differences or omissions in material available from existing sources, this committee has included its own consensus recommendations based on the practical experience of its members. ■

NOTE: *PEI's procedures provide that anyone can review and comment on its proposed recommended practices. Because of its length and technical nature, a 45-day comment period has been established. You are encouraged to review the draft carefully. If you find it acceptable as written, no response is necessary. On the other hand, if you take issue with any of the language in the recommended practices, please submit comments on the form available at www.pei.org/rp1200 by the deadline shown.*

Remembrance

Warren Rogers, Father of SIR

by Marcel Moreau

Dr. Warren Rogers, founder and president of Warren Rogers Associates, Inc., passed away on October 29. Warren was known in the tank world for developing a means of predicting the failure of unprotected steel tanks and for introducing Statistical Inventory Reconciliation (SIR). Until he arrived on the underground storage tank scene in the late 1970s, that world had never attracted the interest of statisticians.

"Oil men," as they were known in those days, were baffled by why some steel tanks seemed to last forever and some failed in a few years. Warren did a little studying of corrosion and figured that with a little data, he could answer that question. In 1981, his analysis produced a methodology for tank-life prediction that was incorporated into Connecticut's first-generation regulations and used by some major oil companies to prioritize their tank-upgrading programs.

In the 1990s, corrosion companies used the methodology extensively to evaluate whether or not a storage tank was suitable for the addition of cathodic protection. Using industry data, Warren famously calculated in 1982 that some 70,000 tanks were leaking at that time and that another 350,000 would be leaking in five years. in 1984 he appeared in the original *60 Minutes* piece on the leaking tank problem, a broadcast that helped bring the tank problem to the average American's awareness.

Inventory control was another field where Warren's unshakable confidence in the value of data and the ability of statistics to reveal the truth led him to develop SIR. While others would later imitate Warren's lead, none would ever equal the depth of his analysis or his grasp of what all those inventory measurements could tell you. With the development of computers and ATGs, Warren saw early on the possibility that these tools could take inventory to levels of accuracy that no one had ever dreamed possible, and after years of development, a completely automated inventory procedure was born.

Warren has passed on. But he leaves the tank world an awesome legacy of using data and statistics to solve real world problems. His vision and his talents significantly shaped the tank world we see today. ■

FAQs from the NWGLDE

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

Secondary- and Spill-Containment Test Methods

In this LUSTLine *FAQs from the National Work Group on Leak Detection Evaluations (NWGLDE), we will discuss the reasons why there is an absence of secondary- and spill-containment test-method equipment listings. Note: The views expressed in this column represent those of the work group and not necessarily those of any implementing agency.*

Q. ***Why are there no secondary- and spill-containment test methods on the NWGLDE list when the NWGLDE has a Secondary- and Spill-Containment Test Methods Team?***

A. Before we answer the question, we want to make sure everyone understands what kinds of test methods fall under these categories. Secondary-containment test methods are used to test the integrity of tank-top and piping transition containment sumps, and under-dispenser containment sumps, while spill-containment test methods test the integrity of spill catchment basins (spill buckets).

If you look at our mission statement at *www.nwglde.org*, you will find that the appearance of a method on the NWGLDE list is dependent on a third-party evaluation being performed on that method in accordance with a protocol found to be acceptable by the work group. Since there are currently no protocols for evaluating secondary- and spill-containment test methods that have been found to be acceptable by the NWGLDE, there can be no third-party evaluations and thus no equipment listings for these test methods

Q. ***Why are there no acceptable protocols for evaluating Secondary- and spill-containment test methods***

A. Most state, territorial, and local regulatory agencies do not have regulations that require secondary- and spill-containment testing. Those that do require the testing are currently approving or simply allowing the use of secondary- and spill-containment test equipment based either on the manufacturer's performance claims or without consideration of performance, rather than waiting for the equipment to appear on the NWGLDE list. As long as the equipment is allowed to be used without a third-party evaluation, there would seem to be no incentive to invest in writing a protocol and performing a third-party evaluation.

However, for underground storage tank and piping leak detection equipment there is an advantage to being listed by the NWGLDE. These manufacturers do not have to pursue approval from each and every state, territorial, and local regulatory agency, because most regulatory agencies' underground storage tank and piping leak detection equipment approvals are based on whether or not the equipment is listed by the NWGLDE. Since only a few agencies regulate secondary- and spill-containment test methods, there is currently no regulatory agency approval advantage to being on the NWGLDE list.

One other thing that could also be discouraging protocol development is the lack of either national consensus or regulatory performance standards for secondary- and spill-containment test methods. Since there is currently a variety of these test methods on the market that vary significantly in performance, manufacturers may be putting off investing in a protocol and third-party evaluations now in order to try to avoid having to repeat the evaluations if a nationally recognized performance standard is established that is more stringent than their performance claims.

Q. ***What will it take to encourage secondary- and spill-containment test method protocols to be written?***

A. Protocols will most likely be written and third-party evaluations performed when most states require secondary- and spill-containment testing in accordance with a nationally recognized performance standard. The best way this can be accomplished is for USEPA to write regulations requiring this testing and encourage regulatory agencies to adopt them.

The good news is that USEPA is currently looking at their first major revision to the federal underground storage tank rules since the rules came out in 1988, and the agency has proposed operation and maintenance requirements for UST system components, including requirements to perform secondary- and spill-containment testing.

USEPA is proposing to require UST-system owners and operators to test tank and piping interstitial areas used for release detection (and not continuously monitored) at least once every three years using vacuum, pressure, or liquid testing. Sumps used as secondary containment must also be tested under the proposed rule change, unless the sump is double-walled and the space between the walls is monitored continuously. Additionally, USEPA proposes to require spill-containment testing at installation and at least every 12 months thereafter, unless the spill containment is double-walled and the space between the walls is monitored continuously.

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Testing of these areas would need to be in accordance with express requirements developed by the manufacturer, a performance standard developed by a nationally recognized association or independent testing laboratory, or requirements established by the implementing agency. The proposed rule can be viewed at *www.epa.gov/OUST/fedlaws/proposedregs.html* and includes details about the continuous monitoring exception.

In the meantime, if a manufacturer wants to try to get a jump on the evaluation process, the NWGLDE is willing to review new secondary- and spill-containment test protocols and third-party evaluations. Once a third-party evaluation is performed and submitted to the NWGLDE, if found acceptable, the equipment could be listed with each test method's limitations, precision, and accuracy. When nationally recognized performance standards are finally in place, if the listed equipment is within those standards, the equipment would be able to remain on the NWGLDE list. ■

■ About the NWGLDE

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

NWGLDE's Mission

- Review leak detection system evaluations to determine if each evaluation was performed in accordance with an acceptable leak detection test method protocol and ensure that the leak detection system meets 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.

Jacksonville, MD: Exxon Hit with $1.5 Billion in Compensatory and Punitive Damages

In 2007, Glen Thomas, a resident of Jacksonville, Maryland, wrote an article for *LUSTLine* titled "It Should Never Have Happened: The Story of a 26,000-Gallon Gasoline Release in Jacksonville, Maryland and Its Aftermath on This Rural Community." This summer, after a six-month trial in the Circuit Court for Baltimore County, Maryland, the 160 households and businesses that brought suit against ExxonMobil Corp. had the satisfaction of receiving a verdict in their favor, amounting to $495 million in compensatory damages and $1 billion in punitive damages associated with the 2006 gasoline leak discussed by Thomas.

The jury of six women deliberated for two days on the amount of punitive damages, which, according to the law offices of Peter G. Angelos PC, the firm that represented the plaintiffs, covered intentional misconduct by Exxon, including misrepresentations in information it gave county officials and the Maryland Department of the Environment (MDE). Jurors also faulted the company for not mentioning the release on a sign that was posted for a few days on the site, which said the station was "Temporarily Closed for Upgrade." The release had been ongoing for 34 days before it was reported to the MDE.

The jurors awarded compensatory damages for diminution of property value, past loss of use and enjoyment, fear of cancer, fear of loss of property value, and medical monitoring, although not all plaintiffs sought damages in every category. Plaintiffs received an award for diminution of some 60 percent of the pre-release value of their home, $750,000 for emotional distress due to fear of cancer, $250,000 for emotional distress or anxiety over diminution in the value their property, and substantial awards in varying amounts for past loss of use and enjoyment. Medical monitoring awards ranged from less than $10,000 to more than $1 million based on individual life expectancies.

As Glen Thomas noted in his article, "It should never have happened." Exxon has noted an appeal. ■

UST Caselaw Digest Now Available

USEPA's Office of Site Remediation Enforcement (OSRE) has prepared an Underground Storage Tank Caselaw Digest to serve as a reference tool to assist USEPA headquarters and regional staff, as well as state agency staff in their enforcement efforts. The digest is a comprehensive compilation of documents related to the federal UST enforcement and compliance program. OSRE will continue to periodically update the digest, which is available at *http://intranet.epa.gov/oeca/osre/documents/lust/index.html.* ■

■ Lead Scavengers *from page 20*

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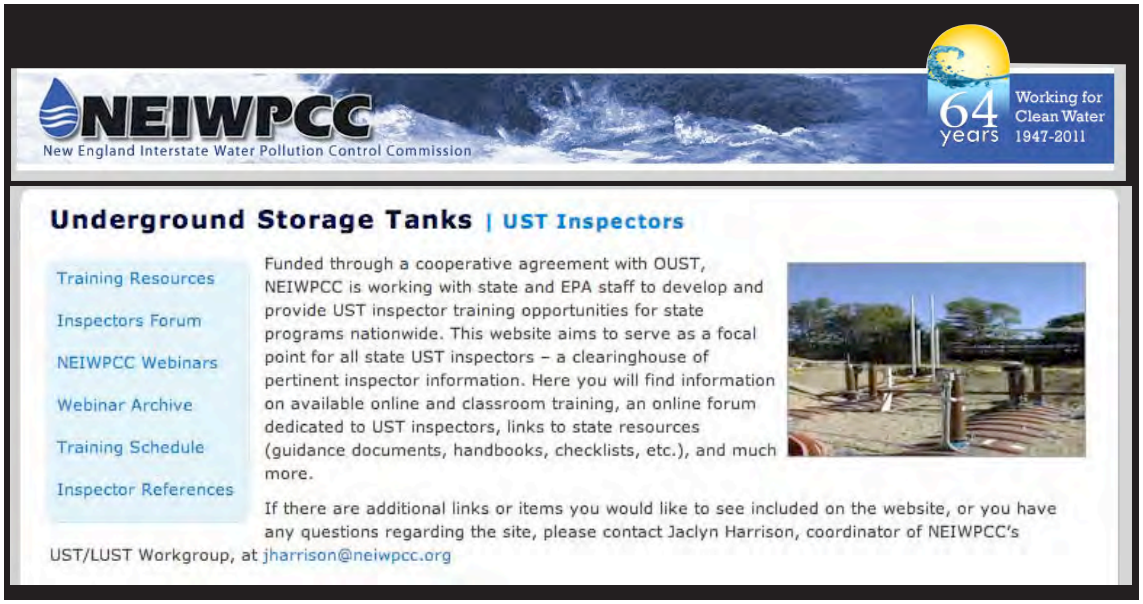
Visit NEIWPCC's Online Clearinghouse for UST Inspectors

The New England Interstate Water Pollution Control Commission (NEIWPCC) has been working with USEPA's Office of Underground Storage Tanks (OUST) for over 25 years to enhance information-sharing and provide training among state, territorial, and tribal UST, LUST, and State Fund programs. NEIWPCC coordinates with OUST to increase national UST compliance and improve the knowledge base of UST enforcement officials by developing both online and in-person inspector training sessions and hosting a dedicated UST inspector website.

Since 2010, NEIWPCC, OUST, and a national UST Inspector Training Team comprised of federal and state UST representatives have been engaged in an ongoing process of developing UST inspector training courses. Training topics are chosen based on state recommendations and recognized issues. Past presenters include field experts, state inspectors, manufacturers, and UST equipment vendors. Since the Team's inception, six national webinars (i.e., Tank and Line Tightness Testing, Second Tank and Line Testing, Secondary Containment, Corrosion Protection, New Installations, and High-Throughput Facilities); six region-wide, in-person trainings; and one region-wide webinar have been offered. One new webinar (Automatic Tank Gauges) is scheduled to be offered.



In early 2010, NEIWPCC launched an UST inspector website developed solely to serve as a clearinghouse for UST inspector news, training information, and compliance tools. The website also hosts an online forum where federal, state, and tribal UST inspectors can upload questions and comments in order to promote inspector interaction and discussion. Finally, the website includes registration information and archives of advanced training webinars coordinated by NEIWPCC. To find information on webinars, classes, and to access the Inspector Forum, visit *www.neiwpcc.org/ustinspectors.asp*. ■

Join the Team

Slots are available for state and regional inspectors to participate on the National Inspector Training Team. The time commitment is minimal, and you will have the opportunity to provide valuable feedback and guidance on UST inspector needs. For more information, contact Jaclyn Harrison, NEIWPCC, at 978-349-2507 or jharrison@neiwpcc.org.

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The *LUSTLine* Index is ONLY available online.
To download the *LUSTLine* Index, go to *www.neiwpcc.org/lustline/* and then click on *LUSTLine*.

NATIONAL TANKS CONFERENCE & EXPO

Registration for the 23rd National Tanks Conference and Expo in St. Louis, Missouri, is now open! The 2012 agenda features sessions covering a wide range of underground storage tank topics, including operator training, remediation technologies, and crucial financial responsibility issues. In addition to the educational sessions, ample opportunities for informal networking will be provided, allowing you to share knowledge and experiences with fellow attendees. The Expo will once again feature informative booths from states, tribes, and federal agencies, as well as displays from vendors showcasing the latest tanks-related products and services. As a host city, St. Louis offers several outstanding social opportunities which we know will enhance your conference experience.

The conference website will be updated regularly with the latest information, so please visit it often. Additionally, if you wish to be included on the National Tanks Conference e-mail list to receive periodic updates and reminders about the conference, please send your e-mail address to NTCInfo@neiwpcc.org. We look forward to seeing you in St. Louis in March! ■