

L.U.S.T. LINE

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



UNITED WE STAND...DIVIDED WE FIZZLE

How Geographic Corridors and Petroleum Brownfields Can Be a Symbiotic Force

by Steven McNeely

In Kansas City, Missouri, area-wide approaches have been shown to accelerate redevelopment of urban petroleum-tank sites and effectively support community revitalization. Among recently recognized petroleum brownfields revitalization corridor projects are the city's Troost and Prospect Corridors. Using USEPA USTfield Pilot funds, the State of Missouri assisted the Department of City Planning and Development for the City of Kansas City by hiring a contractor to perform two "feasibility studies" that identified 47 UST properties along the Prospect Avenue Corridor and 203 known or suspected tank sites along the Troost Avenue Corridor in the city's urban core. The initial focus on these sites was a result of the use of LUST Trust Funds. The contractor reviewed relevant city department databases, city records and permits, and fire insurance maps. The contractor also performed site visits on each block in the targeted area in order to determine if an UST existed or was previously located on the property.

The feasibility studies identified properties that might be impacted with petroleum contaminants, including sites where the presence of an UST could not be confirmed. The data was put into an electronic database, which included information regarding historical site occupancy; location and ownership; current land use; UST status; site inspection information such as property and building square footage and structural condition; and potential eligibility for the state tank insurance fund. This information was used for internal management decisions and has been provided on a timely basis to prospective developers, both public and private, interested in properties in the study areas.

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KANSAS CITY, MISSOURI

◀ Prospect Corridor

▼ Green Impact Zone



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As a result, seven key urban redevelopment projects involving some of the studied petroleum sites have already been assisted, including the Satchel Paige Park, the Citadel Plaza, the Wabash Village affordable housing project, the DeLaSalle Education Center expansion project, the Palestine Commons senior affordable housing project, and the Ashton Villas affordable housing project. The Satchel Paige and DeLaSalle projects are actively in the process of assessing, cleaning up, and redeveloping UST sites in the study areas.

The studies have given the city another important tool to focus redevelopment efforts on key properties in the Prospect Avenue and Troost Avenue corridors. Information regarding Kansas City's Brownfields Program can be found on the Internet at <http://www.kcmo.org/CKCMO/Depts/CityPlanningandDevelopment/PropertyRelocationandEconomicDevelopment/BrownfieldsRedevelopments/index.htm>.



L.U.S.T.Line

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These initial area-wide assessment and planning efforts are also providing invaluable support for a current initiative known as Kansas City's "Green Impact Zone," a national, "place-based" model strategy designed to concentrate federal stimulus funds and other resources, and integrate multiple federal, state, and local programs, to transform a 150-square block area of Kansas City that has experienced decades of severe abandonment and economic decline.

In this area, about 25 percent of properties are vacant lots and another one-sixth contain vacant structures. Less than half the homes are owner-occupied and almost 20 percent of all mortgages were delinquent over the last two years. The initiative includes housing rehabilitation and weatherization programs, community policing and services, job training, health and wellness programs, and brownfields redevelopment built around a comprehensive neighborhood outreach program and using sustainability as a catalyst for transformation.

Within and near the Green Impact Zone, 186 known and suspected brownfield properties have been identified, of which 94 are known or potential UST sites identified by the Troost and Prospect Corridor Area-Wide surveys. Already, USTfield corridor site survey information is being coordinated with major Green Impact Zone initiatives, such as the \$30 million Troost Bus Rapid Transit or "MAX" line. Several known or suspected UST sites have been identified on or near MAX line stops, stations, park-and-ride locations, and adjacent blighted properties, and present opportunities to combine transit development with brownfield reuse.

The Green Impact Zone in central Kansas City's urban core offers a unique opportunity to demonstrate how regional strategies and key partnerships can reverse decline and create economic reinvestment.

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Wanted: Some High Priority Corridors

Kansas City's Troost and Prospect Corridors represent two of many "high priority corridors" across the country that provide opportunities for public and private partners to collaborate, leverage available

resources, and refine working relationships to ultimately enhance community revitalization efforts. What's special about all of these geographically linked, multi-site initiatives is the level of synergy that exists among perspective partners and the opportunities that become available to streamline implementation policies and procedures that can be transferable to blighted geographic areas in other parts of the country. These projects are testaments to the economic challenges facing our country and an affirmation of a willingness to collaborate that will inevitably result in successful endeavors. (See LL #53 for three stories on successful highway-corridor initiatives.)

USEPA's petroleum brownfields program continues to promote the revitalization of corridors as a means to link site reuse, broader stakeholder coordination, and area-wide planning. These geographic corridors target economic development areas, enterprise zones, environmental justice, and other areas of special focus that provide opportunities to enhance the revitalization of multiple petroleum brownfields sites.

The agency provides the technical assistance needed to help with site identification, assessment, cleanup, redevelopment planning, community outreach, and other needs identified by the communities and organizations impacted by these sites. By combining our assistance efforts along these former transportation corridors, some of the implementation nuances associated with petroleum brownfields can be negotiated and resolved, and the lessons learned can be used to educate other stakeholders.

That Old Failure to Communicate

Yet, with all our assistance, the need to enhance information exchanges and develop and issue guidance and clarifications to help stakeholders surmount known implementation hurdles remains a never-ending challenge. In other words, the opportunities offered by the petroleum brownfields program may not be well communicated to those who could use the resources. The unique attributes associated with petroleum contamination can seem overwhelming to local and tribal governments

California's Century Boulevard Corridor

The Village at Century project in Inglewood, California, assembled 16 acres of blighted and vacant properties into a 193,000-square-foot commercial development—the first of a two-phase, 51-acre redevelopment project to revitalize the local neighborhood. Century Boulevard is a major transportation corridor to the Los Angeles International Airport. From 1950 to the early 1990s, the area was a high-density residential development; however, due to the increase in noise pollution from the airport and the lack of local investment, the area became run-down and underutilized.

The Inglewood City Council adopted the Century Redevelopment Project Area to eradicate blight and address issues related to economic stagnation, dilapidated housing stock, high crime rates, and needed traffic and circulation improvements around the Century Corridor. The Council worked in partnership with residents, the business community, public agencies, and community organizations to revamp the area. Public meetings were held to hear the collective concerns and recommendations of the community. In a collaborative effort, the Inglewood Redevelopment Agency, Los Angeles World Airports, and the Federal Aviation Administration worked together with the community to improve conditions along the boulevard.

An assessment of the project area discovered high levels of volatile hydrocarbons from leaking underground storage tanks in several places. The installation of a remediation system substantially reduced the contamination in the soil to levels below those established by the California Regional Water Qual-



ity Board. The California Orphan Site Cleanup Account (OSCA) program's funding—more than \$1 million in assessment and cleanup grants toward the \$32 million project—influenced national retailers to contribute to and support the project. The Village at Century includes eight major retail spaces as well as a number of smaller shops. It is estimated that the retail center area has created approximately 500 full- and part-time jobs and generates over \$600,000 of tax income to the city annually. The Village at Century has dramatically improved the character of the area and continues to encourage new investment. ■

because they require specific technical expertise.

In recent years much ado has been made about the implementation challenges and the opportunities associated with the revitalization of petroleum brownfields. Some of the challenges are inherent to any collaborative effort, but those hurdles are exacerbated by the unique characteristics associated with the universe of petroleum sites and their respective funding sources.

Even with the wealth of accomplishments and success stories compiled over the resulting years, efforts to target the development of those lessons to address specific areas of need remained elusive. Obviously, the definition of a "petroleum brownfield" exceeds the limited universe of federally regulated USTs, and those practitioners who don't work collaboratively with their respective implementing agencies find the whole prospect extremely perplexing.

For example, eligibility determinations can be made by either the state or federal government and in many cases interested parties do not know who to contact. This area of

potential inconsistency is often further complicated when the implementing agencies overseeing aspects of petroleum brownfields and/or revitalization efforts reside in different agencies and interested parties still expect one-stop answers. These are not insurmountable hurdles, but they do require a higher level of coordination than usual, which can be difficult, especially during fiscally constrained times.

Packaging, Packaging, Packaging

USEPA's early brownfields revitalization efforts were facilitated by collaborations in targeted areas known as "Showcase Communities." These areas provided a forum for public and private entities to focus their collective attention and resources to move projects to fruition. They helped diverse stakeholders identify, negotiate, and reach mutual revitalization goals to surmount their collective challenges. Those goals involved the efficient management of available resources, which helped optimize site assessment, cleanup, and ultimately the reuse of targeted sites.

Those accomplishments did NOT occur overnight, but they did leave a series of lessons for subsequent practitioners to use as a guide. The need to ensure community involvement and planning, the optimization and use of available resources, and the transfer of lessons learned to other projects are obvious lessons derived from these earlier target areas. Those same lessons are applicable to the broader universe of petroleum brownfields, especially when packaged into a more marketable portfolio.

And this is the beauty, the sheer economic and social brilliance, of the geographic corridor. It is based on the old adage attributed to Aesop: "United we stand (a chance to secure a grant), divided we fall (or shall I say fail to secure any funds)." We are preaching coordination, resource leveraging, and partnerships along targeted areas where community revitalization and petroleum brownfields coincide—where other housing, transportation, and job/business development needs coincide. They just need to be packaged and marketed together!

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■ Geographic Corridors *from page 3*

The current economic stimulus effort focuses a great deal of attention on socioeconomically challenged communities, and by collaborating on a corridor project, communities, that might not be able to secure a nationally competitive grant on their own could form a coalition or partner to combine their efforts.

Hey States, It's Time to Toot Your Own Horns

While those of us at USEPA do our best to tout the wealth of publicly available petroleum brownfields success stories and the associated lessons learned (www.epa.gov/oust/petroleum-brownfields), these are just the tip of the iceberg. Our stories pale by comparison to the universe of sites that have been assessed, cleaned up, and ultimately made ready for reuse.

Just think of it: when the federally regulated tank program began in 1988, about 2.1 million tanks were in operation nationwide. Now some 650,000 remain. What is the story with all of those sites that were closed? Some are probably just sitting there, waiting for someone to notice them, others, thousands, have been transformed thanks to the gumption of various state programs, towns, individuals, and entrepreneurs.

In order to maximize our collective accomplishments, we need to do a better job of demonstrating the return on the investment of tax dollars used to oversee site assessments and design corrective action plans, which ultimately prepare sites for reuse, and convey those accomplishments in clear terms that others can understand. If states would toot their own horns, all of us would learn from their experiences, and it would be a giant ostrich feather in their own caps.

Perks of the Multi-Site Approach

When our corrective action projects complement ongoing community revitalization efforts, they provide an excellent opportunity to enhance community involvement, especially when properly explained to interested parties. For years OUST has championed the use of "geographically aligned corridors" as a means for state remediation programs to identify and evaluate potential

policies and practices in order to surmount petroleum brownfields implementation hurdles. Projects such as Arizona's Route 66 Partnership, Colorado's Historic Byways, and California's Highway 99 initiatives, to name a few publicly available examples, have become our mantra.

Projects that address multiple sites in a focused geographic area provide greater opportunities to:

- **Leverage available funds**, such as advising eligible entities on how to apply for and secure community-wide assessment and cleanup revolving loan funds and other improvement funds that are available to larger areas/greater populations. Multiple sources of funds can be integrated and applied to the revitalization of a targeted area.
- **Develop an inventory of sites along with a better understanding of how to use available site information.** Small sites may not interest developers, but assembling small sites into a larger property portfolio may attract more developers and/or enhance larger development projects. An inventory of sites itself may suggest an opportunity for area-wide planning.
- **Benefit from economies of scale**, allowing for area-wide investigation, development-incentive districts, lower remediation costs per site, similar area geology and hydrology and area background conditions, one set of partners to work with on several sites, and one area-wide cleanup and revitalization plan to address multiple sites.
- **Enhance cross-program coordination**, to improve and streamline planning efforts and maximize the use of resources and partnerships to help educate a larger portion of our constituents.
- **Capture comprehensive information** regarding new jobs and investment, higher property values, and increased tax revenues returned to the community.
- **Provide an outreach forum** to help educate and motivate other interested stakeholders about opportunities in their areas.

Secrets to Their Success

Corridor-based projects such as those in Kansas, California, Alabama, and Florida described in this article and in Colorado's Historic Byways Initiative (see LL#53) provide a means to enhance communities, not to mention our communications and outreach efforts. They are exciting undertakings that are already reinvigorating places that really and truly needed a lift.

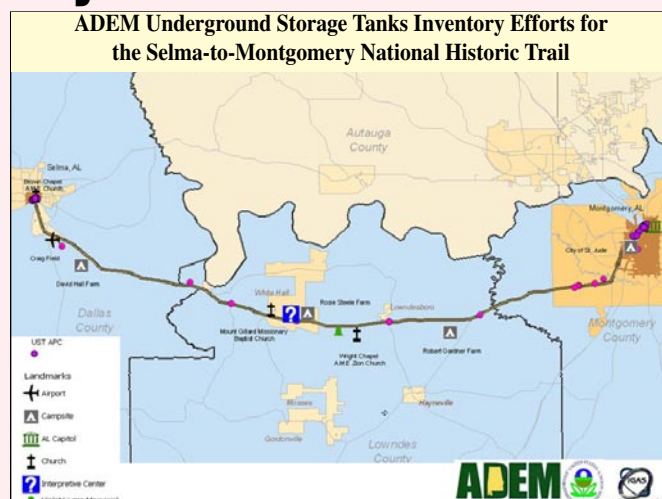
Three key elements that can be attributed to the success of the Century Boulevard Corridor in California are listed below. These elements apply to the other corridor projects mentioned in this article and are transferable and customizable to any serious corridor revitalization undertaking.

- **Community support.** The leadership of and dedication to outreach by the city council helped to ensure community support for the project. Having a local champion for the project was a key component in driving the project forward. Since it is easier to gain community support when the project meets community needs, the local community determined the most beneficial redevelopment option. Multiple neighborhood problems were addressed in one renewal package, rather than piecemeal and over time, and several needed improvements were addressed together—environmental cleanup, transportation improvements, and commercial redevelopment. In the case of Kansas City, for example, individual community interests were championed by the elected officials and various community groups. The same happened in Alabama along the Selma to Montgomery corridor, but only after they focused their attention in a collaborative manner.
- **Public funding and program coordination.** A public and private partnership promotes the coordination of regulatory programs and streamlines administrative procedures; it also allows for a multi-stakeholder examination of cleanup solutions and risk sharing. The partnership provided a forum for the integration of people, ideas, and resources, and

Alabama's Selma-to-Montgomery National Historic Trail

Alabama's Selma-to-Montgomery National Historic Trail (a portion of US 80) was created by Congress under the National Trails System Act of 1968. Like other "historic" trails covered in the legislation, the Alabama trail is an original route of national significance in American history, including the 1965 Voting Rights March. The Alabama Department of Environmental Management (ADEM) is working to determine the nature and extent of environmental concerns associated with 30-45 petroleum brownfield sites along the trail. These sites will be assessed and cleaned up to meet any reuse options that both end users and the community identify and agree upon. The Alabama Department of Revenue (ALDOR) will work with local communities to capture and advertise the benefits, such as jobs created or increased property values, associated with the revitalization of these underutilized sites. The Alabama Department of Transportation (ALDOT) is integrating aspects of its roadway improvements as a complement to the project.

The timing of this project coincides with the release of Recovery Act funding. As a result of prior collaborative efforts in this area of the country, representatives of ADEM, ALDOR, ALDOT, the U.S. National Park Service, U.S. Army Corps of Engineers, and the other public and private stakeholders are positioning themselves to optimize coordination and resource leveraging so their economic stimulus projects better complement community/local planning efforts. As more federal and



state agencies begin to spend their economic stimulus dollars, greater attention should be directed toward readily available opportunities to identify, assess, and clean up these "shovel ready" abandoned sites. The cross-fertilization of public and private resources and assistance can expedite efforts to work through barriers and bring more public and private stakeholders to the table so more of these sites are returned to productive use. ■

identified various concerns, partnerships, and resources early in the planning and development process. The state's Orphan Site Cleanup Account program's funding influenced national retailers to commit to the project.

- **Environmental benefits.** While the project was not focused on contaminated sites, it did incorporate them into the redevelopment plans and result in their being cleaned up. The cleaned-up petroleum sites are no longer in the state's LUST cleanup backlog and no longer pose a threat to human health or the environment.

The Petroleum Brownfields Action Plan

USEPA's 2008 *Petroleum Brownfields Action Plan: Promoting Revitalization and Sustainability* (www.epa.gov/oust/rags/petrobactionplan.pdf) provides the framework we plan to use to support petroleum brownfields revitalization efforts. (See "A Message from Carolyn Hoskinson" on page 7.) Again, not to sound like a broken record, we just need more input and examples from our practitioners to make the road easier to travel. As

more regions, tribes, states, and communities identify "corridors" and other opportunities to enhance their petroleum brownfields revitalization efforts, we will strive to augment our communications and outreach efforts on their behalf.

When implementation hurdles are encountered that impede progress, we will provide targeted support to address those impediments and share lessons learned. As we continue to support our petroleum brownfields revitalization efforts, we will also explore and evaluate policies to facilitate the revitalization of these sites—again, pending adequate input from our stakeholders and available resources. As always, we look for opportunities to forge partnerships that promote investment in and the sustainable reuse of these sites.

Speaking of sustainability, the petroleum brownfields program provides USEPA with a perfect opportunity to explore and promote this important goal. Such opportunities include supporting sustainability pilots initiated by the agency's Brownfields office; investigating pilot programs to extend geographic, multi-site approaches toward sus-

tainable objectives; and identifying Environmentally Responsible Reuse and Redevelopment (ER3) pilot projects.

The recent announcement of the Partnership in Sustainable Communities (www.epa.gov/smartgrowth/2009-0616-epahuddot.htm), a federal cross-agency effort of the USEPA, the U.S. Department of Housing and Urban Development (HUD), and the U.S. Department of Transportation (DOT) to coordinate programs and resources on five revitalization projects, provides an excellent opportunity for our program to leverage a burgeoning public-private partnership that could augment our community outreach efforts (especially in underserved and/or disadvantaged geographic areas that may be more negatively impacted).

Each of the resulting projects will address environmental contamination and transportation and affordable housing needs within a defined area. The implementation hurdles associated with these areas seemingly represent our latest and greatest avenue to duplicate lessons learned from earlier collaborations in showcase communities as they apply

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Florida's Tamiami Trail (US Highway 41)

The Tamiami Trail Petroleum Brownfields Revitalization Initiative is designed to remove the environmental component of that investment risk. In other words, it is intended to further local economic development projects by enhancing technical assistance, environmental assessment, and cleanup services for LUST sites in that corridor. The targeted communities are those along the scenic highway route, which extends almost 70 miles within Manatee and Sarasota Counties, and includes the cities of Palmetto, Bradenton, Sarasota, Venice, and North Port. So far, partners in this collaboration include the local municipal, county, and economic development agencies; USEPA; and the Florida Department of Environmental Protection (FLDEP). Plans are to expand this partnership to include the Florida Department of Transportation, non-profit groups, businesses, environmental consultants, UST owners/operators, cleanup contractors, site managers, and the people in communities along the Tamiami Trail.

The groundwork for the Initiative began with a kick-off meeting of partners in March 2009. In June, a workshop entitled "Brownfields 101 & Tamiami Trail Petroleum Brownfields Initiative" was held by USEPA and the FLDEP UST and Brown-

fields Program. The development of a strategic plan and communication plan will provide a road map for short-term and long-term activities for the initiative. Planning is underway to begin a comprehensive inventory of historic UST sites, with sponsorship from USEPA. Manatee and Sarasota County jurisdictions will apply for a USEPA Coalition Brownfields Community-wide Petroleum and Hazardous Waste Assessment grant to identify and address sites along the trail. Other leveraging of resources is planned for the future. ■



■ Geographic Corridors *from page 5*

to petroleum brownfields. What we hope to accomplish requires additional work and coordination, but opportunities abound!

Take the Plunge

For years regulatory programs touted their efforts to protect human health and the environment as the sole justification for their resource expenditures. But over time, such claims lost their luster and fell on deaf ears; critics saw these expenditures as wasteful because they were seemingly unsupported by more tangible benefits. Then, like a phoenix rising from abject neglect, came the revitalization of contaminated sites—brownfields programs—ushering in a new era of accountability and renewed interest. The notion of protecting human health and the environment, while laudable, is now complemented with other performance measures, such as job creation and increased property values and tax revenues. Those metrics have helped place a new light on petroleum-brownfield sites, and now is the time for states and local governments to seize the moment.

Every state has a former transportation corridor that once served as a major transportation route. Some of these former hubs contained service station sites that either closed prior to the development of the tanks pro-

gram or as a result of it. These and other impacted communities provide prime sites for economic stimulus efforts as well as excellent opportunities to educate others on petroleum brownfields revitalization projects that could be supported by various federal, state, and/or local programs and funds.

As a result of government stimulus efforts, other public and private stakeholders will be looking for investment opportunities in these newfound revitalization zones. If we want to highlight our program's role in the grand revitalization scheme of things, nothing beats a targeted corridor to help showcase and convey our expectations and derived benefits. If the inventory of petroleum brownfields (e.g., grant applications or interest) is increasing in your region, tribe, state, or local community, consider developing a corridor project to foster your communications, outreach, and partnership efforts.

The road to the revitalization of petroleum brownfields may ultimately become easier to travel as the implementation hurdles are addressed and the bumps along our path become smaller and easier to navigate. Opportunities abound along corridors plagued by petroleum brownfields. We just need to take the plunge and identify those corridor projects.

We're Here to Help

By their very nature, collaborative ventures must be supported by interested stakeholders. It can often take a while for the stakeholders to identify the challenges in order to meet the needs of their constituents, but that need not be the case with petroleum brownfields, certainly not now. Now, with the focus on petroleum brownfields and economic stimulus corridors we have a unique opportunity to enhance change quickly and at a larger scale. The timing couldn't be better!

For example, as mentioned earlier, the Partnership in Sustainable Communities is looking for five "pilots." This type of public-private partnership provides an excellent opportunity to not only enhance community revitalization efforts but also to more systematically implement aspects of our Petroleum Brownfields Action Plan. From USEPA's perspective, this is an impetus to enhance coordination among the respective tanks, brownfields, land revitalization, and Smart Growth programs along targeted corridor areas. This is fertile ground for every eligible entity to potentially leverage aspects of our collective implementation assistance.

Many of our established internal partners already offer a wealth of assistance that could be targeted

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A MESSAGE FROM CAROLYN HOSKINSON

Director, USEPA's Office of Underground Storage Tanks

Happy Anniversaries

Paper, Silver...and Greener Too

We humans have the unique ability to recollect our past and anticipate our future. Commemorating an anniversary is one way we get to think back to the significant events of our lives and look optimistically toward what's ahead. We celebrate happy anniversaries, such as holidays and birthdays; we also remember the anniversaries of the not-so-good occasions, such as losing a loved one or traumatic events in history. Taking time to reflect on anniversaries underscores and highlights the significance of these cycles and our leanings toward a more optimistic future.

With the ending of our fiscal year and the end of 2009 fast approaching, I thought about the underground storage tanks (UST) program within the context of its anniversaries. Two major milestones jumped to mind, and I want to share those with you here.

This autumn marked one year (the paper anniversary) since USEPA issued a petroleum brownfields action plan in October 2008. November 8 was the silver anniversary of the national underground storage tank program, signifying 25 years since the program was created.

Petroleum Brownfields Action Plan at One Year

In October 2008, USEPA issued the *Petroleum Brownfields Action Plan: Promoting Revitalization and Sustainability* (www.epa.gov/oust/rags/petrobfactionplan.pdf) to address the 200,000 or more vacant properties littering our highways and urban neighborhoods. These eyesores are waiting to be cleaned up, reclaimed, and returned to productive reuse.

The action plan lists four initiatives that are guiding USEPA as we step up our efforts to foster the cleanup and reuse of petroleum-contaminated brownfield sites. Over the past year, we accomplished a great deal and are still doing more. I am extremely proud of our progress in implementing the action plan, which is fostering efforts that government and the private sector can take to promote sustainable reuse of petroleum-contaminated brownfields properties. I am confident that we will build on our achievements and continue to make progress under each initiative.

Below I list just a few of our accomplishments and ongoing work under each initiative. For a complete listing and more details, see EPA's *Petroleum Brownfields Action Plan: One Year Later* (www.epa.gov/oust/petroleumbrownfields/index.htm).

Initiative 1 – Better Communication and Outreach to Petroleum Brownfield Stakeholders

■ Updated and expanded our petroleum brownfields website (www.epa.gov/oust/petroleumbrownfields), which now provides information explaining how to clean up and reuse petroleum brownfields, how to explore financing such efforts, and where to find examples of successful projects that illustrate how reusing sites can revitalize communities.



■ Increased our interaction and engagement with stakeholders to promote smart growth. For example, in conjunction with USEPA's Smart Growth program, we are working with Smart Growth America, a coalition of groups working to improve the ways in which we plan and build towns, cities, and metropolitan areas to raise awareness of reuse opportunities presented by abandoned petroleum sites.

Initiative 2 – Provide Support to State, Tribal, and Local Governments

- Published three new resources for stakeholders:
 - *Petroleum Brownfields: Selecting a Reuse Option*, October 2009, EPA-510-R-09-004 (www.epa.gov/oust/pubs/pbfreuseoption.htm) describes examples of successful redevelopment projects and presents a wide variety of reuse options, such as commercial, public, residential, greenspace, and mixed-use.
 - *Revitalization in Indian Country: Petroleum Brownfields* (www.epa.gov/brownfields/state_tribal/tribal.pdf) provides detailed information on applying for and using USEPA Brownfields grants for petroleum sites in Indian country.
 - *Petroleum Brownfields: Developing Inventories*, May 2009, EPA-510-R-09-002 (www.epa.gov/oust/pubs/pbfdevelopinventories.htm) guides those who wish to create inventories of low-risk petroleum-contaminated brownfields and helps identify opportunities for redevelopment by presenting examples of successful efforts in a number of communities.

■ Promoting targeted geographic support to foster projects that will demonstrate what can be accomplished when coordinated remediation efforts by several public and private entities are applied to a defined geographic area, such as a transportation route or corridor.

■ Working with a number of stakeholders in the Southeast to support multistate redevelopment efforts in Alabama (Selma and Montgomery) and Florida (Tamiami Trail).

Initiative 3 – Explore Policies to Facilitate Increased Petroleum Site Revitalization

■ In cooperation with the Environmental Law Institute, studying local and state statutes, regulations, and policies that either impede or foster reuse of petroleum brownfields.

■ Working with HUD and DOT to study cross-agency redevelopment barriers in disadvantaged communities.

■ Integrating smart growth and green concepts in the Bedford-Stuyvesant neighborhood of New York City to create more energy-efficient buildings and green jobs that achieve better environmental and community outcomes.

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MESSAGE FROM CAROLYN HOSKINSON *continued***Initiative 4 – Forge Partnerships to Promote Investment in and Sustainable Reuse of Petroleum Sites**

■ Created a sustainability and petroleum brownfields section as part of our updated and expanded petroleum brownfields website (www.epa.gov/oust/petroleumbrownfields/pbsustain.htm).

■ Showcasing reuse of a former Portland, Oregon, gas station as one of 16 brownfields sustainability pilots. Oregon Tradeswomen, Inc., a nonprofit and brownfields job-training grant recipient, is redeveloping the gas station into a community center and using the project as a training ground and model for other green redevelopment projects (www.epa.gov/brownfields/sustain_plts/factsheets/tabor_spfs.pdf).

■ Working with DOE's National Renewable Energy Laboratory on the feasibility of siting renewable energy projects at a number of contaminated land and abandoned mine sites, including petroleum-contaminated sites, across the country.

Underground Storage Tank Program's 25th Anniversary

November 8, 2009, marked 25 years since Congress added Subtitle I to the Solid Waste Disposal Act and created the national underground storage tanks program. Over the past quarter century, many people have done a great deal of work to keep our nation's land and water safe by preventing and cleaning up underground storage tank releases.

Congratulations to our tank partners—states, territories, tribes, industry, owners, and USEPA—for all you've accomplished. Over the past 25 years, these partners displayed dedication to the tanks program, enthusiasm in addressing the enormous task of preventing and cleaning up UST system releases, and collaboration in working toward our common goal of protecting our land and groundwater.

Over the past quarter century, USEPA and our partners closed over 1.7 million substandard tanks that, if they had failed, would have leaked petroleum and other chemicals into the nation's environment; cleaned up more than 388,000 petroleum leaks, approximately 80 percent of all reported releases; and reduced the number of new releases from a high of almost 67,000 in 1990 to under 7,200 in 2009. Today, tank systems are much less likely to leak and cause significant environmental problems. More than anything else, this quarter century milestone is a testament to the successes that can be achieved when diverse partners come together to achieve a common goal.

As we celebrate this 25th anniversary, let's not lose sight of the many challenges still ahead for the national tanks program.

All remaining 611,500 active, federally regulated tanks must be inspected every three years. All tank operators must be trained in accordance with newly established standards. The backlog of just over 100,000 releases yet to be cleaned up needs to be addressed. We must ensure, in an accountable and transparent manner, that the \$200 million Recovery Act money to assess and clean up petroleum underground storage tank leaks is used expeditiously to clean up releases, create jobs, and stimulate the economy. We will continue to develop strategies to promote cleaning up and reusing the hundreds of thousands of abandoned gas stations (petroleum brownfields) all across the country.

I know that along with our program challenges, the UST program has often been presented with unplanned challenges. Some include unforeseen issues such as those surrounding alternative fuels and diesel exhaust fluid. Others include our continuing need to learn new and better ways to improve our awareness and gain knowledge about issues such as ethylene dibromide (EDB) and vapor intrusion and apply that to our ever-changing world of leak detection, assessment, and cleanup technologies.

Still other unplanned challenges include improving our ability to learn from each other and to work smarter and greener, all the while continuing to achieve our long-standing program goals through efforts like green remediation. Finally, we need to take better advantage of new tools, such as webinars and social networking, so we can improve communication with our traditional UST stakeholders and enhance community-engagement efforts.

If the last five years are any indication of the level of interest in the UST program, we should be heartened to see that, even after 25 years, attention to the UST program is not waning. For proof, we need only look to the Energy Policy Act of 2005, which provided authority to strengthen tank prevention programs. More recently, the American Recovery and Reinvestment Act of 2009 shows significant support of the LUST program; as one of only six USEPA programs to receive money, Congress appropriated an infusion of almost four times our annual cleanup appropriations.

I close with my thanks to all of our partners—the diligent and talented staff in USEPA headquarters and regions; state, territorial, and tribal tank programs; and those across the regulated community who played an important part in the tank program's achievements over the past 25 years. I appreciate your cooperation, your support, and all your efforts. You've made a significant difference in the UST program's ability to prevent releases, clean up leaks, and keep us moving toward a greener America. ■

22nd National
**TANKS
CONFERENCE
& EXPO**



September 20-22, 2010

THE 2010 NATIONAL TANKS CONFERENCE will be held September 19-22, 2010 at the Westin Hotel Boston Waterfront in Boston, MA. The National Tanks Conference Website (www.neiwppc.org/tanksconference) contains all conference information including agendas, registration, exhibitors, hotel, and destination information, and much more. Information on the website will continue to be updated so be sure to stop by often.

CALL FOR ABSTRACTS: NOW OPEN! We are currently accepting abstracts for the 22nd National Tanks Conference and Expo. We are inviting anyone interested in giving an oral presentation, poster, or workshop to visit the conference website and submit an abstract or idea! The Call For Abstracts will be open until February 12, 2010. The conference planning team is particularly interested in presentations, posters, and workshops that focus on cross-programmatic issues addressing UST, LUST, and State Fund.

EXHIBITING AT THE 22ND NATIONAL TANKS CONFERENCE AND EXPO As in the past, the 2010 National Tanks Conference and Expo will showcase the latest and greatest in tanks-related products and services. We invite you to join us in Boston to exhibit your product or service to the 500+ anticipated attendees. Interested in exhibiting? Contact Michele Piazza (mpiazza@neiwppc.org, (978) 323-7929) for more information or visit the Exhibitors section of our website!

Stimulus and Brownfields

The Perfect Marriage, a Messy Divorce, or Badly in Need of Counseling?

by Gary Lynn

At first blush, funding for leaking underground storage tank (LUST) cleanups through the American Reinvestment and Recovery Act (ARRA) appears to be an unprecedented opportunity to stimulate the cleanup and redevelopment of brownfields sites. There are many reasons for this optimism. First of all, \$200 million in LUST Trust Funds for state stimulus projects is a lot of money. Second, most state and federal brownfields funding is restricted to assessment activities, whereas cleanup funds for brownfields sites are typically in short supply. The possibility of using ARRA funds for brownfields cleanups would be very good news, and state agencies, which are good at spending cleanup money cost-effectively, could happily use this infusion of money to actually get some of their brownfields sites cleaned up. Sounds like a marriage made in heaven? Well...yes...but...let's not just jump into it.

Delving into the details of ARRA, you quickly realize that this marriage has the potential for some money and compatibility problems—the two leading causes of marital strife, money being number one. For example, there are restrictions on the type of sites that can be worked on. Sites in question must have federally regulated tank systems (e.g., consumptive-use heating oil tanks and small farm and residential motor fuel tanks are “out”). The “in” tanks must be either abandoned or have known contamination, and the site must be a priority for the regulatory agency.

There are also programmatic unknowns—how to report, how to comply with the Davis Bacon Act of 1931, and how to “buy American” when China makes nearly everything. Even more chilling, cost recovery is required. If money is the number one cause of marital discord, cost recovery will certainly force monetary issues to the forefront.

But, never inhibited by a challenge and being a bunch of romantics by nature, New Hampshire Department of Environmental Services (DES) staff have successfully clambered over the hurdles and still believe that the brownfields/ARRA marriage is worth a go. However, before proceeding with the nuptials, we must caution all who dare to enter into this commitment to consider certain compatibility issues. The best way for us to impart this cautionary note is to share stories from a few ARRA projects at New Hampshire brownfields sites that eventually became happy matches.

Who Invited the Sheriff?

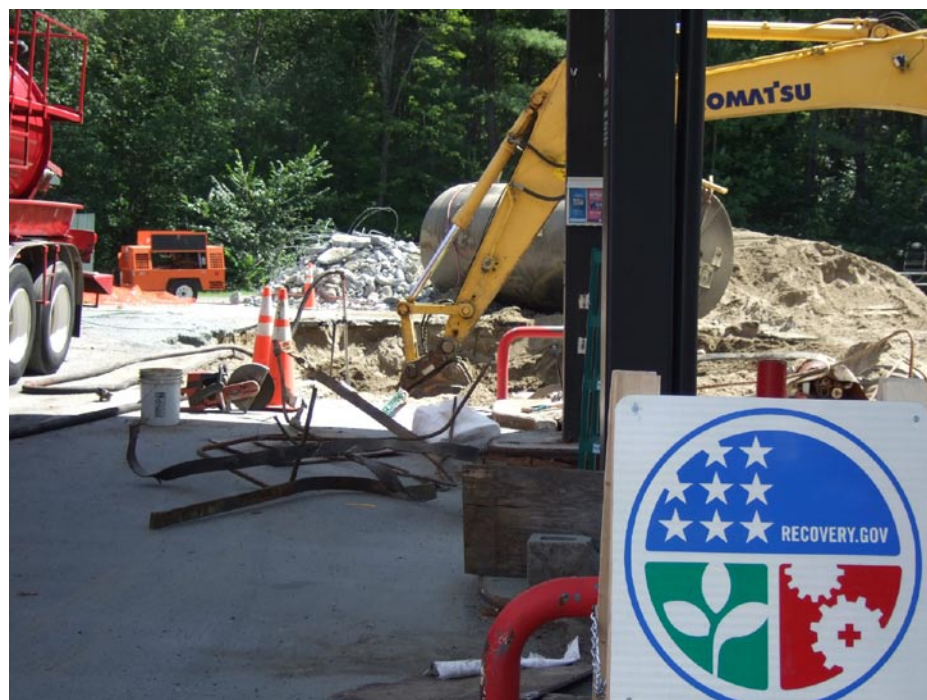
The first ARRA project to be completed in New Hampshire was a foreclosure site. In New Hampshire there are two foreclosure options: judicial and non-judicial. Most foreclosures go through the non-judicial, power-of-sale process (sometimes called a sheriff's auction). In our state, the property owner has no right of

redemption after the foreclosure sale; all rights are foreclosed. At this particular site, the foreclosure auction was held and then the site went into limbo. DES had to sort out a number of complex issues very quickly.

The former owner was liable but not financially viable, and until the foreclosure sale is consummated at closing, neither the bank nor the prospective purchaser actually holds title to the property (financially viable but not liable). Meanwhile, the “winner” of the foreclosure sale could not obtain financing for the property from her bank as long as there was uncertainty about the status of the three 20-year-old tanks on the property. The bank holding the mortgage was taking a six-figure loss and was not willing to assess and clean up the site. The site was truly in limbo, with no one on the hook to address the environmental issues and the closing scheduled in just 30 days.

It didn't help that the site was near a stream and that product had

■ continued on page 10



Tanks being removed during assessment activities, after the foreclosure auction.

■ Stimulus and Brownfields *from page 9*

seeped into the stream on several occasions in the past. The tank systems were at the end of their functional life, and DES was concerned about the property being vacant and the tank systems being unattended for a long period of time. We decided that taking action at the site was a priority and that we would use stimulus money to assess and clean up the site, and thereby break the impasse.

Based on our research on the foreclosure status of the property, there was no viable responsible party subject to cost recovery. Additionally, the prospective purchaser would be paying for partial backfill, compaction, and repaving of the site. Cost recovery was a key issue because it had the potential to disrupt the purchase-and-sale agreement, thus keeping this site in foreclosure and the business shuttered.

Thirty days, however, is not a lot of time to assess and close a tank system, develop a design for the replacement tanks, and approve the design plans (design development/reviews use private sector or state, not stimulus, funding due to LUST Trust fund restrictions). However, the bank, prospective site owner, and DES (tank and remedial sections) worked closely together for a common purpose. The tank closure report was finalized two days before closing, and the closing went without a hitch. The country store and gas station reopened in late October, and new jobs were created through hiring new employees, inventory purchases, tank-system closure, and tank-system replacement.

This site demonstrates how complex it can be to do the necessary research and make cost-recovery decisions. DES had to understand the foreclosure status of the site and financial viability of the original owner. Although an outstanding outcome (i.e., assessment and cleanup of an UST release, redevelopment of a contaminated site, and job creation) was achieved, the margin of error was small and the timing was critical.

Spooky Honeymoon at a North Country Hotel

Bethlehem, a small town in the North Country, took the former Maplehurst



The boarded-up Maplehurst Hotel.

Hotel for taxes. For 20 years, this 1876 vintage hotel had been vacant, structurally challenged, and a favorite haunt for vandals. Environmental issues at the property included a buried 500-gallon gasoline tank, a drum-full of waste oil, and asbestos that hung in sheets from piping in the boiler room. The tank was legally empty and had been abandoned for at least 20 years. Some soil staining was visible around the top of the tank.

An odd wrinkle to the site was its past use as a golf and tennis camp. One of the little-known quirks of the stimulus funding is that it cannot be used at any casino, gambling establishment, aquarium, zoo, golf course, or swimming pool. A frantic search of aerial photos indicated that the property never had a golf course or pool; the campers recreated at the existing municipal or private course in the town.

DES removed the contaminated soil and the tank; the drum was removed at the same time, using a different funding source (stimulus money can only be used for tank-related work). Our concern prior to initiating the work was to ensure that our cleanup assistance would not come with a hidden price tag due to cost recovery.

New Hampshire law is pretty clear for tax-deeded properties.

Municipalities are provided qualifying holder liability protection when they acquire property via a tax-deed, and tax liens are given a priority over corrective action cost-recovery liens. Nationally, each state has a different mix of statutory protections for municipalities that tax deed properties. It is important to check your state-specific requirements.

Under the federal UST rules, however, the municipality would be liable as an operator of the tank system if a tank contains product. In this case, the tank was historically emptied. So the contaminated soil and tank were removed, and brownfields funding will be used to address the asbestos issue.

For DES, helping to set the stage for demolition of this neglected eyesore was very worthwhile, but examining cost-recovery issues carefully upfront was extremely important to obtaining site access and an agreement with the town on removing the tank. The town is attempting to find a developer for this historic property but may eventually have to resort to demolition to address serious site-safety issues.

Greek History Lesson...Opa!

An elderly Greek American couple owned a former service station on a quarter-acre lot in Pittsfield. The tanks had been "temporarily" out

of service since 2005, and a wall of the building had collapsed early last year under the winter snow load. The town had condemned the property, and the single-walled piping would need to be upgraded before the tank system could be reopened. In a nutshell, the property had been for sale for more than two years and was essentially valueless. However, the Town of Pittsfield placed a high priority on redevelopment of this downtown lot.

The owners were not financially viable and, in fact, needed to obtain a reverse mortgage to stay in their home. The colorful and personable husband who owned the property had long ago fled the Greek civil war, jumped ship in Venezuela, and now was our stimulus program partner.

Based on the site's proximity to a sensitive receptor (the river) and presence of abandoned tanks less than 30 feet from the river, DES agreed to use stimulus money to address the environmental contamination. In conjunction with the site assessment and remediation, we removed the underground storage tanks and are now expediting the site-closure review. Closure of the site following the assessment of the abandoned tanks for releases will facilitate efforts by the town and the regional planning commission to redevelop the property.

Know Who You Are Marrying

Like all marriages, you have to know and get along with your partner. ARRA funding can be a powerful addition to the arsenal of weapons available to address petroleum-contaminated sites. The sites, however, have to be selected with great care, and pertinent cost-recovery and ARRA funding-eligibility requirements must be painstakingly considered and followed. If you are considering such a wedding at any of your brownfield sites, be sure you know a few key personality traits about the site and the funding. Things like:

- **Is the site eligible (e.g., the work must be related to federally regulated tank releases)?** Don't get stuck explaining to the law that the farm and heating oil tanks just slipped by you.
- **Are you consistent with the latest program guidance?** Read your e-mails. The guidance is rapidly evolving and you don't want to have to explain to the auditors why the guidance wasn't followed.
- **What about cost recovery?** It's key for LUST sites. Determine who is liable for cost recovery and the impact of cost recovery on redevelopment of the LUST site.

- **What about timing?** Very important. Frequently developers or prospective purchasers of brownfields sites need a fast response. How fast can you get things done, and is it possible to streamline your process? For example, the use of federal funds for ground-disturbing tank assessments results in the need for a review by our Division of Historical Resources. (Section 106 of the National Historic Preservation Act requires reviews for the potential for federally funding activities to disturb "historic properties.") The Division of Historical Resources is willing, however, to grant us a programmatic approval for all ground-disturbing work that is confined to the footprint of the tank and piping installation. Elimination of site-specific reviews saves time.

It sure would be easier to elope. If you plan to go ahead and marry the brownfields site of your dreams, plan on prying in-laws (auditors), a large elaborate wedding (ARRA requirements), and money issues (cost recovery). New Hampshire believes that love conquers all, but we are idealistic romantics. ■

Gary Lynn is the Supervisor of the Petroleum Remediation Section of DES. He is a frequent LUSTLine contributor and can be reached at Gary.Lynn@des.nh.gov.



Condemned Pittsfield, New Hampshire, building.

In the next issue of LUSTLine we will celebrate the work states have done one year after the American Recovery and Reinvestment Act of 2009.

What's That, a Methane Plume?

What Minnesota Is Learning About Denatured Ethanol, E85 Releases, and Methane Gas

by Mark Toso

Minnesota has always been at the forefront in using ethanol-blended gasoline. In 1997 we became one of the first states to mandate a 10 percent blend (E10). As the state's environmental regulatory agency, the Minnesota Pollution Control Agency (MPCA) didn't consider E10 to be an issue. After an informal review, the potential differences between an E10 and an ethanol-free gasoline release were deemed minor and covered under existing investigation and cleanup policy, which is based on groundwater plume delineation. No ethanol-specific issues have arisen from E10 releases since then. But the increased use of high-percentage ethanol-blend fuels (e.g., E85) and a state mandate to ramp up to ethanol blends to E20 by 2013 has given us reason for concern.

Ethanol use has rapidly expanded nationwide, and especially in Minnesota. Currently Minnesota has about 25 percent of all E85 stations in the United States; we rank fifth in ethanol production, with a permitted capacity to produce 1 billion gallons a year. For this reason, we have been contacted by other states seeking advice on investigating and remediating releases of high-percentage ethanol-blended fuels. All these factors led us to reevaluate our current policy to see if it is adequate for assessing ethanol-blend fuels greater than E10.

Most studies on ethanol-blend fuels have focused on E10, so information on higher percentage ethanol blends is lacking. Research has shown that ethanol can extend petroleum plumes in groundwater because of co-solvency and that it is preferentially degraded before BTEX compounds. Ethanol can also alter BTEX sorption and retardation and, at higher concentrations, it can exhibit toxicity to microorganisms, resulting in the potential for longer groundwater plumes that may put more water

supply wells at risk. While we have not encountered any major issues with E10 under our current policy, we recognized that we really didn't know how higher blends such as E85 would behave. We knew that methane generation might be an issue with higher blends, but this scenario had not been evaluated.

Study Sites Identified

A study by Cápiro et al. (2007) really brought to light the potential issues with higher percentage ethanol blends. In a bench-scale E95 (fuel-grade denatured ethanol) release into a continuous-flow sand tank, it was found that ethanol migrated upward and spread laterally within the capillary fringe area above the water table. This significantly retarded the vertical and horizontal migration of ethanol. The hydrocarbons phase separated within the capillary fringe, resulting in lower-than-expected dissolved contamination. Interestingly enough, simulated pumping (as in a pump-and-treat system) recovered 98 percent of the ethanol but only 25 percent of the hydrocarbons. All this appeared to have possible implications to release-site investigations.

While we hadn't had any confirmed releases of E85 by late 2006, spills of denatured ethanol (E95) had occurred on a fairly regular basis in Minnesota. Most had been remediated by soil excavation, but there were two large E95 derailment sites that the MPCA, along with other stakeholders, decided could be used to investigate the subsurface effects of a high-percentage ethanol fuel release in more detail. With funding from the American Petroleum Institute, USEPA, MPCA, and our state Petroleum Tank Release Cleanup Fund, and working in collaboration with Dr. Roy Spalding from the University of Nebraska, we initiated a research project at these sites, located in Balaton and near the town of Cambria in southern Minnesota.

The Balaton release (60,000 gallons) occurred in July 2004, and the Cambria release (28,000 gallons) occurred in November 2006. Both releases were excavated to the extent practicable following the release and were being monitored under current closure policy. Groundwater monitoring was initially conducted for BTEX and ethanol.

During the early phases of the project it was discovered that there were no standard laboratory analytical methods for ethanol and that labs running ethanol analysis may be subject to high detection limits. Working with our Health Department's environmental laboratory we developed a method for quantifying ethanol in groundwater based on a modified version of USEPA Method 8260 with detection limits of approximately 50 µg/L.

In 2007 we installed additional monitoring wells and soil-gas monitoring points at both sites. Well screens with shorter intervals (5 to 7 feet in length) were used versus a standard 10-foot screen length, and we began to collect analytical data for ethanol, methane, acetate, and other bioattenuation parameters in groundwater. Soil gas collected from soil-gas monitoring points was analyzed for fixed gases (i.e., methane, oxygen, carbon dioxide) and volatile organic compounds (VOCs), including ethanol.

Methane in Groundwater

The results to date seem to confirm the findings of the Cápiro study. At the more recent Cambria release, ethanol concentrations of up to 5.5 percent were detected in groundwater. The ethanol was restricted to the areas of the original release and had not migrated. Groundwater conditions were reduced, with no dissolved oxygen and very high dissolved iron. Initially, very little methane was found in groundwater and soil gas, but after one year,

the methane groundwater plume had rapidly expanded laterally and moved downgradient from the release source. This was believed to result from the initial toxic effects from ethanol on microorganisms that apparently delayed methane production. (See Figures 1 and 2.)

At Balaton, the older of the two releases, methane production was already well established. A large plume of dissolved methane at saturation limits was present in groundwater, and this too had migrated with the natural groundwater gradient. However, ethanol was last detected in December 2007 at 78 $\mu\text{g/L}$. Since then, the site has maintained a large, stable plume of dissolved methane without the presence of ethanol.

This behavior implies that ethanol is degrading to intermediate compounds that in turn degrade to methane via fermentation. This was verified by acetate concentrations, which were detected at 33,000 $\mu\text{g/L}$ at Balaton (and up to 107,000 $\mu\text{g/L}$ at Cambria). In addition, very high levels of dissolved organic carbon (DOC) were detected at both sites (up to 3,000 $\mu\text{g/L}$ at Cambria). Both of these analytes also migrated away from the source areas.

Methane in Soil Gas

The soil gas monitoring points were sampled using one-liter evacuated canisters for laboratory analysis of VOCs, including ethanol, by TO-15 and for fixed gases by USEPA 3C. Methane was detected up to 53.8 percent by volume at Balaton, which is similar in magnitude to the methane generated from a municipal solid waste landfill. The explosive range for methane is 5–15 percent. Methane was also detected at 2.7 percent in a surface soil-gas sampler, which explains our initial difficulty in zeroing our field instruments.

We also evaluated the use of field meters for measuring fixed gases, including methane, in soil-gas monitoring points. A good correlation was found between a Landtec GEM™ 2000 landfill gas monitor and USEPA 3C. An in-line carbon filter was used to remove VOCs from the air stream that will also be detected by the GEM™ 2000, thus providing a more accurate measurement for methane. Measured concentrations of methane in soil gas fluctuated

FIGURE 1 Cambria Site: Extent of methane in groundwater June 2007 (groundwater flow direction is northeast)

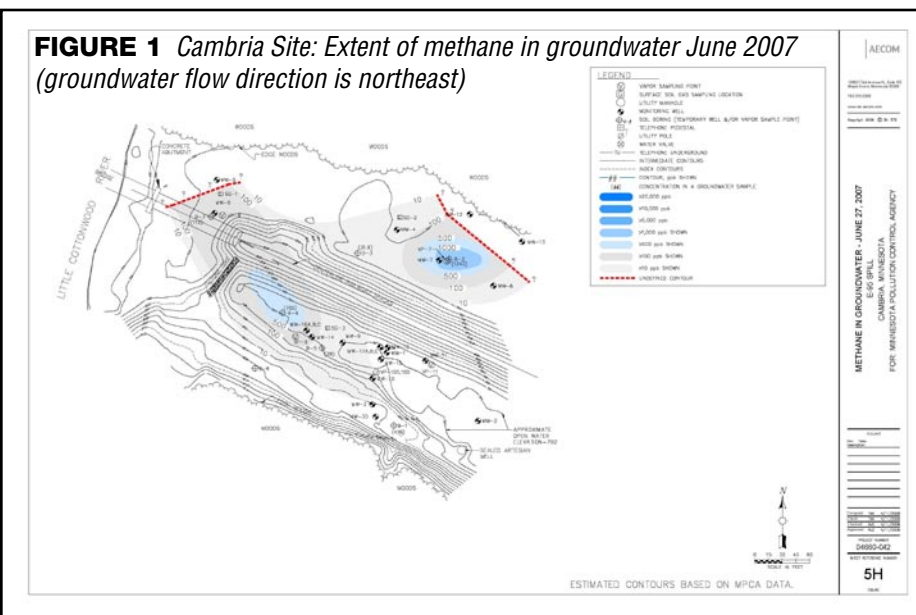
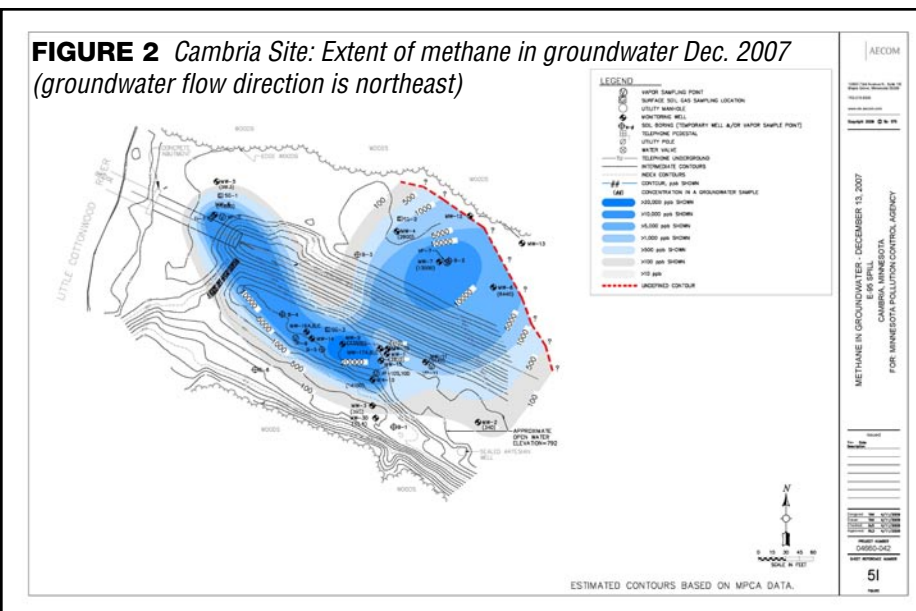


FIGURE 2 Cambria Site: Extent of methane in groundwater Dec. 2007 (groundwater flow direction is northeast)



between monitoring events, possibly due to barometric and temperature effects between sampling events. Since methane is highly degradable once aerobic conditions in the soil column are encountered, this may also have played a role in the fluctuation. Concentrations of methane in groundwater proved to be much more consistent over time versus levels measured in soil gas.

Risk? Observations? Questions?

The fieldwork and data analysis at both sites is ongoing and we haven't fully evaluated all the data, but some general conclusions can be drawn. Most importantly, because explosive levels of methane are present in soil gas at both sites, it's apparent

that methane is a major risk driver for releases of high-percentage ethanol fuels. This risk continues, even after ethanol has degraded (over two years at Balaton), and as yet, we don't know for how long. This observation implies the need for dissolved methane analysis at high-percentage ethanol fuel releases. Other parameters such as acetate and DOC might also be useful to characterize biotenuation, but clearly other parameters than just ethanol need to be analyzed.

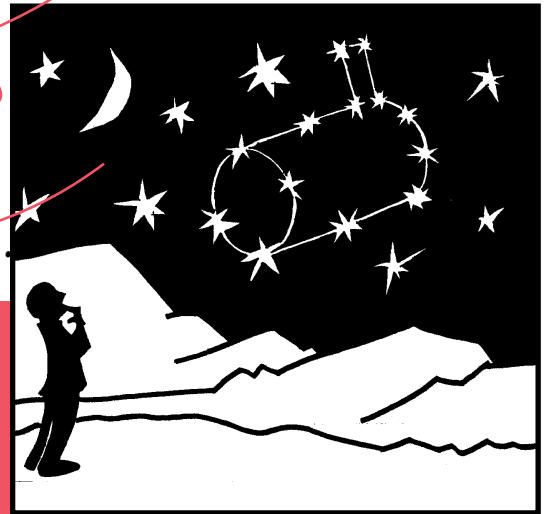
Methane was also shown to migrate with the groundwater gradient whereas ethanol did not. This may imply that alternative site characterization methods, such as suction lysimeters, may need to be used

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Wander LUST

a roving column by Patricia Ellis.....

Pat Ellis is a hydrologist with the Delaware Department of Natural Resources and Environmental Control (DNREC). The opinions expressed in this column are hers and not necessarily those of DNREC. Pat welcomes your comments and suggestions and can be reached at Patricia.Ellis@state.de.us.



Revelations of a Value Stream Mapping Project

What Is Value Stream Mapping, and Why Would Anyone Want to Do It?

About two years ago, Delaware's Tank Management Branch (TMB) Corrective Action Group participated in training to "Go Lean." No, none of us lost weight, but we did manage to streamline some of the steps in our corrective action process. Going lean in government refers to a variation of techniques applied in Japanese manufacturing systems that seek to eliminate waste and inefficient approaches to administrative processes (do you old timers remember TQM?).

The Title V permitting group of the Delaware Natural Resources and Environmental Conservation's (DNREC's) Air Resources program was the first in the department to undertake the process. Our LUST Corrective Action Group was next. The Brownfields Program of DNREC's Site Investigation and Restoration Branch has gone through the process as well, and now our TMB compliance inspection group is working their way through the process, specifically for the new tank installation approval and the vapor recovery permit processes. Funding for taking various DNREC programs through this training was provided by the Delaware Manufacturing Extension Partnership, and training was conducted by Ultimate Lean, Inc. of Rockville, Maryland.

The fundamental objective of going lean is to create the most value while consuming the fewest resources, through the tool of Value Stream Mapping. "Value" is defined from the customer's perspective. Mapping the value stream involves identifying all of the steps, both value-added and non-value-added, required to complete a product or service from beginning to end. The "value stream map" is the visual representation of a value stream; it helps to reveal waste and problems with flow and serves as a blueprint for improvement.

The process was a collaborative effort between the Tank Management Branch, stakeholders, and other DNREC agencies involved in our value stream (i.e., consultants, owner representatives, the Underground Injection Control Branch, Site Investigation and Restoration Branch, The Office of the Secretary, TMB Technical staff, TMB administrative staff, and a facilitator).

Mapping the "Current State"

The first step we undertook was to identify the value stream to be mapped. Our identified value stream was to map a project from time of receipt of sample results, acknowledging that the site had experienced a release, all the way through inves-

tigation of the release, corrective action, if warranted, through to issuance of a closure letter.

Every single step in the process was identified, as well as the estimated amount of time to accomplish that step and the amount of lag time between steps. This process gives us the "current state" of the process, which is the foundation for the "future state," which eliminates waste and improves the flow of the process. When the leaner future state has been mapped, an implementation plan is developed to support the objectives of the program.

When we had finished mapping our current state, we had between 52 and 71 steps. The "steps" include both the "big" stuff—reviewing the sample results, researching the site, drafting letters, reviewing work plans, reviewing results of investigations, determining whether investigations are sufficiently complete, setting up requirements for remedial action—and also all sorts of "little" stuff, such as mail coming into the building through the receptionist, being sorted to our branch, being logged into the mail system, delivered to the project officer.

For example, when you have reviewed a report, a letter gets drafted, a work order is prepared for the administrative assistant, a letter

goes to your manager for review and then back to the administrative assistant to make corrections, put on letterhead, printed, given back to the project officer for a signature, returned to the administrative assistant, copies are made, envelopes are prepared, the letter is logged out, and finally put in the mail.

With every step that we included on the flow charts, we had to estimate the process time—how long it actually took us to do each task (on the average) and the lag time—how long the papers sat around waiting for the next step to happen. We identified areas where process improvements were necessary to achieve our future state. These areas were then identified on the flow charts by “Kaizen Bursts,” which are rapid improvement processes focused on eliminating waste, improving productivity, and achieving continual improvement. Areas for improvement were prioritized, and an action plan was developed for what, who, when, and why.

We also considered the use of electronic signatures on our letters, so that after the manager had reviewed the letter, the administrative staff would make any necessary changes, drop in the electronic signature, and send out the letter. If there were substantive changes made by the manager, the letter would return to the letter-writer before it was finalized. We haven’t implemented the electronic signature policy yet, and may not. Some of us control freaks want to have a last look at the letter before it goes out, particularly to see that any changes were made correctly.

An additional experiment that we tried was to create a series of project-tracking boards that we posted in the hallway. It included visual tracking of about ten different due dates for each of our projects, as well as all sorts of color-coded dots and messages. In theory, staff was to post dates of such items as reports received, letters written, and due dates for reports and have periodic group “stand-up” meetings to review the boards. The boards would

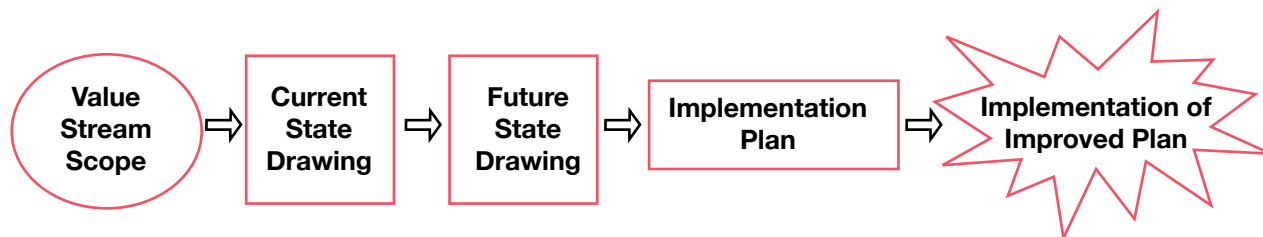
an update about what we are doing about any item that is 90 days past due and may need enforcement.

Another suggestion we tried was the idea of “time slicing,” where you set aside certain blocks of time each day to work uninterrupted—hit the “send calls” button on your phone, close your office door, and work with no disruptions. No one is to bother you during your time slice, except in an emergency. Some people loved the idea, but others didn’t. If you missed a call, you could spend the next few days trying to catch up with the person. We realized that different people have different work styles, so after a mandatory trial period, time slicing became optional.

Other Moves Toward the Future State

Other projects our group is working on include the updating of various guidance documents to improve the quality and completeness of report submissions. Our process had evolved over the years, but our guidance document hadn’t. The first guid-

VALUE STREAM MAPPING PROCESS



Mapping the Current State. Each step in the value stream has a process box describing the step in the process. Also included in the box is the technology used, personnel involved (e.g., administrative staff, project officers, managers), paper versus electronic information flow, when an outside resource is involved (e.g., letter going out to RP or consultant, or a different DNREC group for review or approvals), the actual process time for each step, the lag time waiting for processing, and the percentage of the time that the work produced is “correct and accurate.”

Our Kaizen Bursts

One of the places where we saw room for improvement was the time it took for managers to review letters. Part of the solution for this was the creation of additional standardized letter templates. Certain language had always been included in letters, but individual project officers also used their own boilerplate letters. Having additional boilerplate letters to pull from speeded up letter writing and made the letters more technically consistent and easier for managers to review quickly.

provide a visual tracking mechanism showing whether the ball was in our court or had been lobbed back to the responsible party and consultant.

This experiment proved to be too cumbersome, but we have modified our LUST database to provide us each with weekly e-mail notifications of which reports are due that week. It does require that you actually enter due dates into the database when you send out a letter, so that the database will know to e-mail you a nagging reminder. At corrective action group meetings, we are required to provide

ance document to be produced is the *Hydrogeologic Investigation Guide*, a detailed description of what material must be submitted when a hydrogeologic investigation is required by DNREC.

Also in the hopper is a Remedial Action Guidance document, which describes what needs to be in a remedial action work plan—establishing cleanup goals and progress reports for various types of remedial actions. The thinking is if we describe in detail our requirements and expect-

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■ WanderLUST from page 15

tations, the quality of work should improve. Also slated for development are LNAPL and vapor-intrusion guidances and a revision to our RBCA process document to include these pathways.

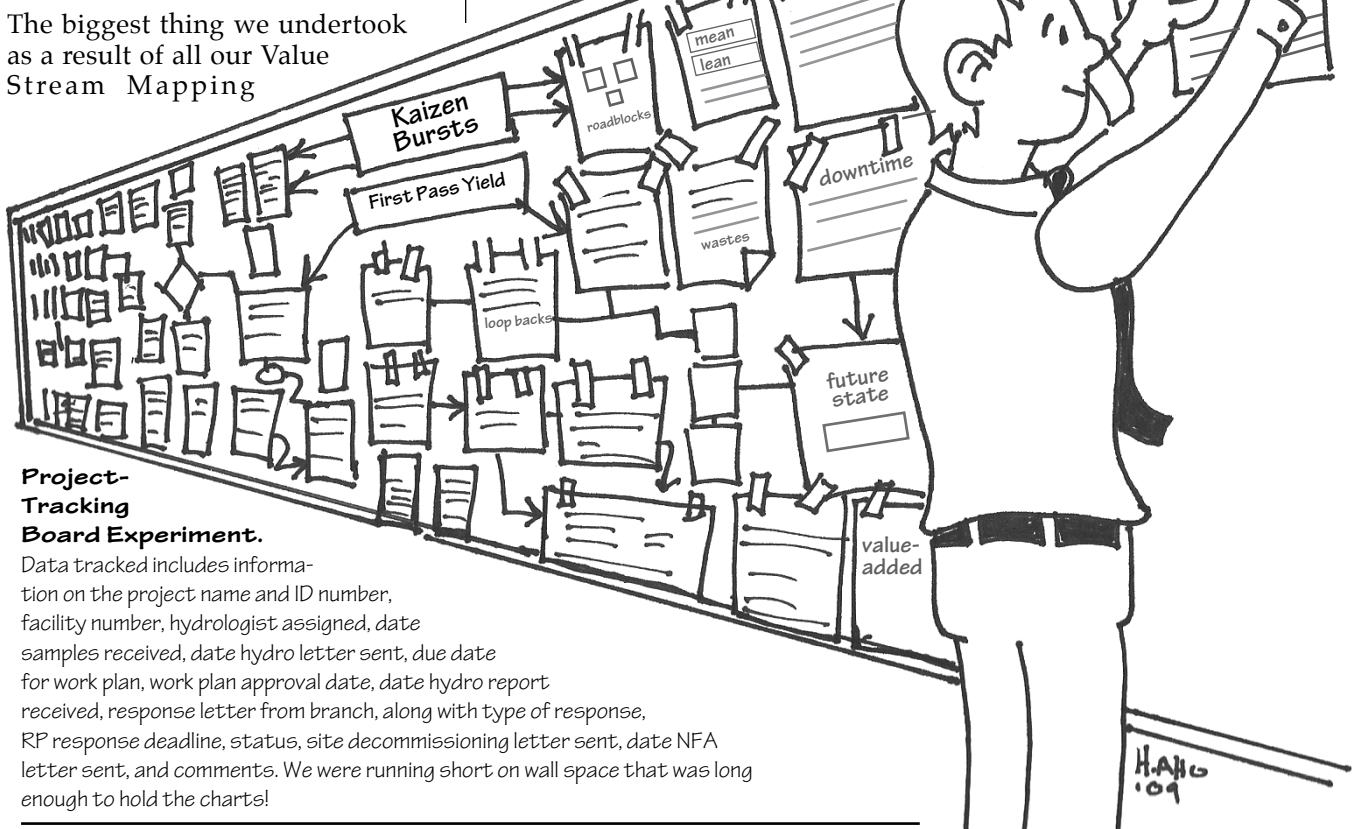
And the Most Daring Move... Eliminating the Investigation Work Plan

The biggest thing we undertook as a result of all our Value Stream Mapping

letter requiring that an investigation be conducted.

In this more traditional scenario, the consultant would do some field-work and prepare a report for submission to DNREC. We would review the report, decide that additional investigation was needed, and ask for an additional work

particularly large or complex site, additional investigation may still be required and a work plan submitted for approval for



Project- Tracking Board Experiment.

Data tracked includes information on the project name and ID number, facility number, hydrologist assigned, date samples received, date hydro letter sent, due date for work plan, work plan approval date, date hydro report received, response letter from branch, along with type of response, RP response deadline, status, site decommissioning letter sent, date NFA letter sent, and comments. We were running short on wall space that was long enough to hold the charts!

and associated soul searching was the elimination of the requirement for consultants to submit a work plan and obtain approval prior to conducting the first phases of an investigation. In fact, preparation of the Hydrogeologic Investigation Guide was undertaken because, in the absence of a work plan, there should at least be helpful and up-to-date guidance.

This move (which is still in pilot-test mode) is supposed to allow for the possibility that a consultant can take several mobilizations to the field to define the extent of contamination, within an allowable timeframe, without having to submit several separate work plans for each phase. In the past, a responsible party (RP) had 30 days to submit a work plan for approval, and the final report would be due within 120 days of our

plan. Sometimes this step was repeated several times—one or two trips to the field to conduct direct-push sampling, going a little bit farther each time, followed by installation of monitoring wells. After each step, a report would be submitted. Sometimes the consultant would propose additional sampling in his report, and sometimes he'd wait for us to tell him that it was necessary. In some cases, letters and work plans would go back and forth for months...not to mention the necessity of applying for well permits each time. Not particularly efficient.

So, eliminating a bunch of loop-backs has shortened the time required to conduct a relatively complete investigation. Now, consultants have 120 days to get us a reasonably complete report that defines the extent of contamination. On a par-

the additional work. In our initial hydro-investigation letter, we do recommend that RPs and consultants give us a call and schedule a teleconference to discuss the scope of the investigation. In practice, most don't call. If the RP wishes to submit a work plan for the first phases of investigation, we will still review it and issue an approval (or non-approval letter).

If given a chance, we are happy to provide valuable information to help direct an investigation. For example, the facility may have had previous LUST issues, so we may have information available on depth to groundwater, flow direction, other potential sources of contamination, or whether an air rotary drilling rig may be necessary due to concerns such as depth to bedrock or location of previous tank systems.

Where's the Work Plan When You Need It?

But the lack of a work plan can present its own vexing set of circumstances and inefficiencies. For example, I recently reviewed a facility report where none of the six monitoring wells installed were located downgradient of any of the probable sources for the site. Every well installed at the site was located upgradient or crossgradient of probable sources (e.g., tanks and dispensers). Why no wells downgradient? Did anyone notice the stream down there?

Wonder of wonders, the upgradient/crossgradient wells looked pretty clean, with one exception—the upgradient-most well. That well had defects of gasoline chemicals-of-concern. Could this contamination have come from the tank field that existed in the 1950s and 1960s, whose location we don't know? The consultants forgot, however, to analyze for the lead scavengers, which would have been required for an old tank field and even for the current tank field, based on the age of the tanks, and would have helped us establish the source. This contaminated part of the site was also the previous location of a dry cleaner, and in their introduction to the report, the consultants mentioned analyzing for VOCs in this area, but evidently forgot to do so.

And to top it off, the wells that they installed had 25-foot-long screens, with 15 feet of screen below the water table. Normally, we prefer a 10-foot screen, with five feet below the water table, so the water samples collected are more representative of the top of the water table. If I want to sample deeper to help identify a diving plume, I'll screen a well deeper with a short screen. While eliminating the submittal of a work plan may move some sites along faster, all of the problems with this report could have been avoided if a work plan had been submitted, or even if a phone call had been made to discuss the general scope of the investigation.

Smoothing Out the Lumps

So far, I'd give mixed reviews to the "No-Work-Plan" idea. Many consultants are perfectly capable of completing an investigation without a preapproved work plan, but others

have managed to pick some bizarre sampling locations, missed analyzing for some of the required analytes, installed wells with screens that are too long, or failed to provide sufficient documentation about site conditions. We also get a lot of "That's how we do it in New Jersey" (or Pennsylvania, or Maryland). We're hoping that the new guidance document will help. For example, if the no-work-plan approach results in data gaps, we haven't worked out who will pay for any additional work that is necessary.

My work prioritization scheme involves turning around a work plan relatively quickly, while I may let quarterly monitoring reports age gracefully before receiving a complete review (they get a quick look when they first come in to see if there have been drastic changes or requests for some sort of action by me). Work plans have typically been high on our priority list so the consultant can get started, and unless the plan is particularly bad, they don't normally take that long to review.

Then there is the approval letter. Getting an approval letter out is like a "Tag, you're it," and puts the ball back in the RP/consultant court. Under our new system, many consultants will now e-mail a map and data table with the results of the initial investigation, along with suggested additional sampling points. Sometimes there is a follow-up phone call to discuss additional investigation. We can provide a quick response, usually by e-mail, approving the next steps. This is good; it can eliminate several weeks of paper shuffling and results in the submission of a more complete investigation within the deadline. So we'll see.

In the past, the consultant prepared and submitted the "Mother, May I?" (work plan) and we responded with a "Letter of Okie Dokie" (work plan approval letter). We decided that the process could be streamlined from what we had been doing, but it works more smoothly if the RP and consultant work together with their project officer to have the process go well.

In my opinion, streamlining the work plan, rather than eliminating it, would be a better option. Believe me, I've gotten work plans that were 30-40 pages long, where every-

thing that is to be done on the site is described in excruciating detail. We can eliminate some of that by providing detailed guidance on what is expected. Detail is required only if there are going to be deviations from the guidance. The details can go in the final report. Most consultants have boilerplate language for things like how wells are going to be purged or how they decontaminate equipment.

By the way, to make these changes go more smoothly, during the time we were working on Value Stream Mapping we migrated our LUST database from Microsoft Access to a SQL server, which includes databases for all DNREC programs (DEN or the Delaware Environmental Navigator). At the same time, we expanded the information that the LUST database contains, making it more useful than just a way to generate the semi-annual USEPA STARS report. It now also serves as a project tracking/management tool.

It's Not Pretty at First

Our honest mapping of the current state identified some process inconsistencies, loop backs resulting in long lead times, delays in getting letters out, and state employees doing consulting for the RP, when it's supposed to be done by the consultant. But we've seen some improvements in the time needed to get a project through the regulatory hoops. We are now quicker and, yes, maybe a little bit leaner, with a few more projects slated to help us shed a few more pounds. ■

..... SNAPSHOTS FROM THE FIELD



Photo courtesy of Rich Heathcote

Case Study: Ethanol-Blended Fuels and Leak Detection

by Kevin Henderson

In the last issue of LUSTLine, I described a scenario in which the ingress of water into a single-walled UST containing ethanol-blended fuel may not be detected by non-volumetric ("vacuum") precision tightness-testing methodologies. (See LL #62 "The Transient Behavior of Water in Ethanol-Blended Fuels—Implications for Leak Detection".) Since that article was published, the scenario I described occurred in the State of Mississippi, confirming my theoretical implications. This incident involved a large multi-state petroleum marketer that, as it turns out, has also experienced similar incidents within the last year in Alabama, Georgia, and North Carolina. So, what happened in Mississippi? Why is this occurring? And what can be done about it?

What Happened?

The USTs at this facility are 10,000-gallon single-walled steel tanks that were installed in 1989. The facility was acquired by the current owner in April 2008 and was converted from conventional gasoline to E10 (10% ethanol) in June 2008. The present owner has been conducting statistical inventory reconciliation (SIR) to meet the leak-detection requirements and has received "passing" results for every month that the UST system has been in operation. The inventory data utilized in the SIR analysis was acquired via an automatic tank gauging (ATG) system.

On May 20, 2009, cars were reportedly stalling out as they were leaving the facility after fueling with premium gasoline. Manual gauging of the premium tank revealed that phase separation of the E10 fuel blend had occurred, given that several inches of mixed water/ethanol were at the bottom of the tank. The premium tank was immediately shut down and efforts initiated to determine the source of the water. Initially, it was believed that water was entering the tank through defective caps on the tank fill and ATG risers. After these two items were repaired, all of

the existing phase-separated fuel was removed from the tank and a new delivery of fuel was made into the premium tank.

Test One: "Pass"

Three days after the repairs and delivery of new fuel, a precision tank-tightness test was conducted with a commonly used non-volumetric "vacuum" test methodology which relies on a water sensor that is installed at the bottom of the tank to detect water ingress. The tank was manually gauged through the fill riser, and it was determined that 27½ inches of fuel were in the tank and no water was detected. Groundwater was at a height of 74 inches above the bottom of the tank, as determined from observation wells installed within the backfill of the tank excavation.

Initially the tank tester was unable to pull the amount of vacuum in the tank needed to conduct the test. It was quickly determined that a gasket on the submersible turbine pump (STP) housing was leaking. After the STP was pulled, the test operator manually gauged the tank and detected 3½ inches of "phase separation" at the STP end of the tank. Strangely, no water or phase separation was detected when the tank was manually gauged at the ATG riser or at the fill riser. The operator plugged the STP riser and was able to achieve the vacuum needed to conduct the tightness test.

The premium tank passed the tightness test; the operator did not hear any evidence of a leak and the water sensor installed in the ATG riser did not detect any water ingress. The existing phase-separation fluids (mixed water/ethanol at the bottom of the tank) were removed from the tank, and it was left out of service after the test pending repairs to the STP.

Test Two: "Pass"?

Two days after the tank passed the initial tightness test, a new STP was installed, and another tightness test conducted, as is required any time

repairs are conducted. For this test, the operator pulled the ATG riser so that he could place the water sensor in the middle of the tank. Manual gauging conducted before the start of the tightness test revealed that 22 inches of fuel and ¾ inch of phase separation were present in the tank (measured through the tank-fill riser). Observation wells again indicated that groundwater was at a height of 74 inches above the bottom of the tank.

After beginning the test, the water sensor tripped after 20 minutes, presumably indicating ingress of water. As is common practice, the test operator readjusted the water sensor and continued the test in an effort to confirm the initial indication of water ingress. After continuing the test for another 1½ hours, no additional water ingress was detected. Therefore, the test operator again declared the test result to be "pass." However, after manually gauging the tank again after the conclusion of the test, the operator determined that there was now 7/8 inch of phase separation in the tank, representing a net gain of 1/8 inch of phase separation.

Since the test operator was aware of the issues involved with detecting water ingress in ethanol-blended fuels, he noted on the test data sheet that, although the tank passed, the validity of the test was unknown due to the presence of phase-separation fluids at the bottom of the tank prior to conducting the test.

Test Three: "Fail"

Given this tank owner's prior experiences with similar tank failures over the past year (i.e., tank failures that occurred in Alabama, Georgia, and North Carolina prior to the Mississippi tank failure) and the tightness-test operator's comments about the uncertainty of the test result, this tank was left out of operation until a final determination could be made.

Seven days after the second "passing" tightness test, another tightness test was conducted. For this test, the tank was emptied of all fluids in order to eliminate any uncertainty about whether or not water was entering the tank. Several hours elapsed after the tank was emptied before the test operator arrived at the facility. Manual gauging of the tank revealed 1 3/8 inches of water on the

fill end of the tank and 1⁷/₈ inches of water on the STP end of the tank.

To conduct this test, the STP was again removed and water sensors were placed at both ends of the tank. Observation wells again indicated that groundwater was at a height of 74 inches above the bottom of the tank. A vacuum of 0.5 psi was pulled on the tank and the test was conducted for a total of two hours.

Although there was again no acoustic evidence of a leak, the water sensors did detect ingress. The water sensor at the fill end of the tank alarmed twice, and the water sensor at the STP end of the tank alarmed three times during the course of the test. Manual gauging at the conclusion of the test revealed 2¹/₈ inches of water at the fill end of the tank and 2¹/₂ inches of water at the STP end of the tank. This represents manually gauged water ingress of ³/₄ inches at the fill end of the tank and ⁵/₈ inches at the STP end of the tank over the two hour test period.

Since there was no acoustic evidence of a leak, the location of the hole in the tank that allowed the water ingress is interpreted to be beneath the level of fluid in the tank. Therefore, the breach in the wall of the tank must be at or very near the bottom. The operator declared the result of this, the third tightness test, to be "fail." (See Table 1 for a summary of events at this site.)

Why Is This Occurring?

Has the introduction of ethanol-blended fuels accelerated the internal corrosion of steel tanks? Could it be that these tank failures are the result of a misalignment of the striker plates or improper installation of the tanks such that the gauging stick is not contacting the striker plate? Is there some other mechanism responsible for these tank failures, or is it a combination of several factors?

What about fiberglass reinforced plastic (FRP) tanks? Are ethanol-blended fuels causing the resins utilized in the manufacture of some FRP tanks to soften? Manufacturers have issued various statements concerning the compatibility of their tanks with ethanol-blended fuels. Generally, FRP tanks currently being produced are not of concern, but there is some evidence that certain older FRP tanks may be susceptible. While

TABLE 1. Timeline of events at the facility discussed in this article.

DATE	EVENT	RESULT
June 1, 2008	Tanks converted to E10	?
August 20, 2009	Cars stalling after fueling	Premium tank shut down
August 21, 2009	ATG and fill cap replaced	Contaminated fuel removed and new fuel delivered
August 24, 2009	STP isolated and precision tightness test conducted	Premium tank result = "pass"
August 26, 2009	STP repaired and precision tightness test conducted	Premium tank result = "pass" but validity of test questioned
September 2, 2009	Tank emptied and precision tightness conducted	Premium tank result = "fail"

we continue to receive anecdotal reports of FRP failures apparently associated with the introduction of ethanol-blended fuels, none of these have been adequately documented to draw any definitive conclusions.

While the failure mechanism(s) of both steel and FRP tanks are unknown at this time, efforts are underway to get a better idea of what could be happening. National efforts to conduct compatibility testing in ethanol-blended fuels associated with not only steel and FRP tanks, but virtually every type of material utilized in UST systems is just beginning. In addition, thought is being given to determine the feasibility of conducting causal analyses of known UST-system failures (i.e., leak autopsies). Hopefully, these efforts will help resolve the murky uncertainty and result in tangible data rather than the speculation that is occurring at this time.

What Can Be Done?

Until research and data needed to better understand and prevent tank failures from occurring in the first place are available, our focus must necessarily be directed toward our leak-detection capabilities. Clearly, our ability to detect the failure of a tank containing ethanol-blended fuels via water ingress utilizing our existing leak-detection methodologies leaves something to be desired.

Presently, the Mississippi Department of Environmental Quality is evaluating the ability of existing leak-detection methodologies to sufficiently alert the owner/operator that a failure of tank integrity should be suspected when ethanol-blended fuels and high groundwater conditions are involved. Unfortunately, it seems as though our ability to evaluate leak-

detection capabilities is shrouded in uncertainty and more research and data are needed before any definitive conclusions can be made.

Although these uncertainties exist, one of the more obvious measures that can be undertaken at this time is to require that single-walled tanks containing ethanol-blended fuels be emptied of all product prior to conducting non-volumetric ("vacuum") precision tightness testing when groundwater is above the bottom of the tank. With this one simple measure, we can be relatively certain that the transient behavior of water in ethanol-blended fuels will not mask our ability to detect a tank failure via non-volumetric "vacuum" tightness testing when groundwater is above the bottom of the tank.

However, other questions remain. For example, if the rate of water ingress (relative to the throughput volume of the tank) is not yet great enough to cause phase separation, do our existing leak-detection methodologies sufficiently alert the owner/operator that a tank failure should be suspected? If the owner/operator does not yet suspect a problem, how do we get to the point where a precision tightness test is conducted to confirm whether the tank has failed or is tight? How many tanks have already failed but the rate of water ingress is not yet great enough to cause a noticeable problem? Must we wait until cars are stalling out after fueling before we suspect a tank failure has occurred? Time will tell. ■

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MtBE May Be Gone, But Its Melody Lingers On

by Ellen Frye

While methyl *tertiary* butyl ether (MtBE) is all but gone from the nation's gasoline, its legacy lives on in the courts. It also lives on in the environment—courtesy of LUST releases that occurred during MtBE's heyday as a gasoline additive used by refiners as the oxygenate of choice to comply with the requirements of the 1990 Clean Air Act amendments. The latest case in the MtBE litigation orb ended in New York City on October 19, 2009, when a federal jury found in favor of the city to the tune of \$104.7 million in compensatory damages to be paid by ExxonMobil for contaminating five groundwater wells in the Borough of Queens with MtBE.

Nationwide, dozens of similar cases against oil companies are waiting in the wings and, according to attorney Scott Summy of Baron & Budd, P.C. in Dallas, more cases have recently been filed and more are coming. In 1995, Summy filed the first MtBE groundwater case in the U.S., representing Wilmington, North Carolina, residents against Conoco. He later teamed up with attorney Victor Sher of Sher & Leff in San Francisco to win, in 2002, the first major MtBE settlement agreement by oil companies. In that case, the oil companies paid the South Lake Tahoe Water District \$69 million to clean up 18 wells. Sher was New York City's lawyer on the ExxonMobil case.

The pair teamed up again to win, in 2003, the largest MtBE settlement to date: the City of Santa Monica's water contamination lawsuit, which could eventually cost oil refiners hundreds of millions of dollars. Twenty-two oil companies agreed to settle for \$121 million in cash, plus pay the full costs of a treatment facility. In 2008, Summy won a \$450 million total cash settlement for 150 water providers from 17 states.

The MDL Framework

The New York City versus ExxonMobil case is part of a larger consolidation of MtBE lawsuits. In 2003, MtBE lawsuits filed in state courts by

numerous water providers around the country and state and local governments were transferred to Judge Shira A. Scheindlin of the United States District Court for the Southern District of New York by the Judicial Panel on Multidistrict Litigation (MDL 1358 II) for pretrial information-gathering. These suits remain pending before Judge Scheindlin.

Oil companies subsequently sought to dismiss water-district claims against them, arguing that the lawsuits are unfair and that those directly responsible for spills should be held liable, not the makers of the product. Scheindlin dismissed most of these claims, stating: "Innocent water providers—and ultimately innocent water users—should not be denied relief from the contamination of their water supply if defendants breached a duty to avoid an unreasonable risk of harm from their products." The ruling allowed plaintiffs to proceed with more than 80 lawsuits seeking to hold oil companies responsible for groundwater pollution and the significant costs associated with MtBE cleanup.

New York City v. ExxonMobil

In 2003, New York City sued 23 major oil companies over MtBE contamination from leaking underground storage tanks. Most of the companies reached out-of-court settlements totaling \$15 million. Only ExxonMobil chose not to settle and was, in fact, the first of these consolidated cases to go all the way to trial.

The ExxonMobil trial, which accused ExxonMobil of poisoning five of six groundwater wells, began in August 2009 and had four phases.

At issue in the first phase was the city's plan to build a water-treatment facility (called Station 6) able to treat 10 million gallons of water a day. The Queens water supply is a backup to be used when the upstate reservoir system that normally provides water to the city is out of service during repairs, droughts, or other emergencies. ExxonMobil argued that this water-treatment facility was never

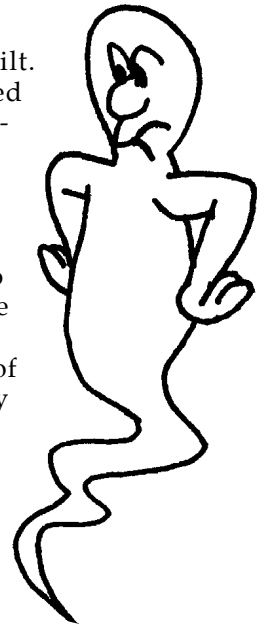
going to be built. The jury decided against ExxonMobil, concluding that the city intends to build the plant within 15 years and to use it within the next 25.

In phase 2 of the trial, the jury had to determine whether MtBE will still be in the wells when the water-treatment project is completed, and how long

the MtBE was going to be present in the Queens water supply wells. The city argued that the MtBE would be present at significant levels for many years into the future, while ExxonMobil argued that MtBE would soon be gone from the aquifer or diluted to minimal levels. The jury agreed with the city and found that MtBE would be present in the water for decades.

The third phase focused on whether ExxonMobil is liable for poisoning the water and, if so, how much it should pay. The jury was asked to decide whether ExxonMobil knew of the potential for groundwater contamination when it added MtBE to its gasoline and whether ExxonMobil failed to warn government agencies, gas station owners, and the public about the danger. The jury decided against ExxonMobil and found that ExxonMobil knew of the dangers posed by MtBE and failed to warn anyone about them.

The city had sought \$250.5 million in compensatory damages to finance construction and operation of its water-treatment facility so the wells in Queens could be reopened and brought back on-line. In reaching its award of \$104.7 million, the jury subtracted a percentage based on ExxonMobil's share of the gasoline market, and an additional \$70



million that represented the cost to treat other contaminants that were also present in the Queens aquifer.

The fourth phase of the trial would have determined whether ExxonMobil should have to pay the city additional money beyond the anticipated cost of the water treatment as punishment for ExxonMobil's bad behavior. This phase was eliminated on October 15, when Judge Scheindlin decided that sufficient evidence had not been presented to merit punitive damages, so this phase of the trial never took place.

The New York City suit is significant because it is the first of the MtBE MDL cases to go before a jury. The city's lawyer, Victor Sher, noted: "This is an important outcome for public water suppliers dealing with MtBE throughout the country."

New Hampshire's Statewide MtBE Lawsuit

In 2003, the State of New Hampshire sued oil companies that had added MtBE to gasoline sold in the state, seeking full recovery for statewide contamination of drinking water supplies. The Attorney General's Office filed the lawsuit on behalf of all New Hampshire citizens. The suit alleges that MtBE escapes easily from tank systems, spreads quickly and extensively through underground aquifers, does not degrade like other gasoline constituents, and requires costly and long-term investigation and cleanup. The lawsuit is pending in Merrimack County Superior Court.

Adding fuel to the fire, a 2008 study, conducted for the NH Department of Environmental Services (DES) by the U.S. Geological Survey, documents widespread MtBE contamination throughout the state in both public and private drinking water wells. The study documents how the chemical has spread and that it persists. For example, one of every two private wells tested in highly populated areas of Rockingham County contains some level of MtBE. (For more information go to <http://pubs.usgs.gov/fs/2004/3119/>.)

Chances are other states will follow suit...so to speak. And the melody lingers on. ■

■ Methane from page 13

to sample the capillary fringe for ethanol, as the Cápiro study noted. There were also interesting results associated with some bioattenuation parameters that we attribute to well screens spanning several discrete biochemical zones in the aquifer. This may necessitate the use of smaller, discreet screen intervals or multi-level wells.

Perhaps the most important observation from this project has been that releases of E85/95 behave much differently than E10, which will require changes in how these releases are investigated. An unanswered question that remains is: At what E-blend do we need to start being concerned about these different subsurface behaviors? There are some indications that the blend might be as low as E20. Exactly where that is and why remains unanswered.

We plan to continue monitoring with emphasis on methane generation and natural attenuation. We need to understand at what point methane generation will cease and these sites will no longer present a risk. We also plan to evaluate acetate and other degradation products to better understand the degradation pathways. In addition, the MPCA collaborated with the University of Minnesota on a bench-scale geochemistry and microbiology column study using soils collected at Balaton. Results, which have not yet been written up, have shed more light on our findings. ■

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■ Geographic Corridors from page 6

to meet our petroleum brownfields implementation needs. That targeted assistance will only occur if appropriate opportunities avail themselves and people seek applicable support.

The Office of Brownfields and Land Revitalization (OBLR) provides a series of "Tools and Technical Information" (<http://www.epa.gov/brownfields/tools/index.htm>) that can help eligible grant recipients better assess and clean up brownfield sites.

The OPEI Smart Growth Office provides a range of resources and tools to help make smart growth planning happen (http://www.epa.gov/smartgrowth/sg_implementation.htm).

These and other resources are being used synergistically to enhance community revitalization efforts along with those leveraged from other stakeholders. For example, if the brownfields revitalization challenges are technical in nature, the Brownfields Technology Support Center (<http://www.brownfieldstsc.org/>) provides direct support to all of our revitalization efforts.

Once again, the key to securing access to these and other resources involves the development of targeted corridor projects that involve all of our internal peers (<http://www.epa.gov/brownfields/contacts.htm>). OUST's Action Plan provides a framework for enhancing ongoing coordination and our webpage provides a clearinghouse for lessons learned. ■

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Steve gives a special thanks to Andrew Bracker, Kansas City, Missouri's Economic Development Coordinator, for providing his introductory overview on the city's petroleum brownfields inventory, assessment, and cleanup efforts and ongoing community revitalization plans. His description of the integration of multiple petroleum brownfields aligned along the Troost and Prospect Corridors into ongoing community revitalization plans shows the value and promise that can and should be derived from "corridor projects."

Field Notes

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

DEF, It's as Easy as One Two Three, as Simple as Do Re Mi

If you have spent any time lately looking around truck stops, car dealerships, and diesel-fleet refueling facilities, you may have noticed some storage tank and dispensing systems being installed. The equipment looks familiar—and you are certainly well acquainted with the type of site on which the installation is taking place—but you may not know much about the new substance that is being stored, metered, and dispensed from these new systems. It's called diesel exhaust fluid, or simply DEF, and it's different from the substances most of us are used to finding at underground and aboveground fuel storage facilities.

Background

In 2000, the USEPA published Tier 2 emission standards for light-duty vehicles and trucks. It set common standards for all passenger cars, light trucks, and medium-duty passenger vehicles. The Tier 2 standards require new diesel vehicles, produced in model years 2009 and thereafter, to meet an average oxides of nitrogen (NO_x) emission level of 0.07 grams per mile.

In 2001, USEPA published a rule setting requirements for new heavy-duty highway engines and vehicles produced after January 1, 2010. The diesel engine NO_x standard for 2010 is 0.20 grams per brake horsepower-hour.

Manufacturers plan to meet these requirements by optimizing engine designs for low emissions and adding high-efficiency after-treatment. Diesel engine and vehicle manufacturers have considered several different types of NO_x-reduction technologies in order to meet these requirements. One technology, selective catalytic reduction (SCR) using DEF, has been chosen by nearly all diesel-engine manufacturers because it can achieve as high as 90 percent NO_x conversion efficiency. SCR technology adds DEF to the exhaust stream to promote these efficiencies.

DEF Characteristics

DEF is a clear, colorless, non-toxic, non-flammable, non-combustible liquid. It is made up of 32.5 percent urea with the balance distilled or deionized water. Urea and water are completely miscible and do not separate in storage. For individuals associated with an underground and/or aboveground storage tank program, it is important to understand that DEF is NOT:

- A motor fuel
- A fuel additive
- A flammable or combustible liquid
- A volatile organic compound

- A hydrocarbon liquid
- A liquid that requires Stage I or Stage II vapor recovery
- A substance that is currently regulated by the federal government.

DEF Is Not Regulated Under 40 CFR Part 280

States have asked USEPA's Office of Underground Storage Tanks whether the agency regulates USTs containing DEF under the federal regulations in 40 CFR Part 280. The primary issue was that DEF may contain a small amount of ammonia, which is a regulated substance under 40 CFR Part 280. According to a memorandum issued September 22, 2009, by Carolyn Hoskinson, Director of USEPA's Office of Underground Storage Tanks, "since EPA expects that the presence of ammonia in a DEF UST will be minimal, it is EPA's view that DEF USTs meet the *de minimis* exclusion and thus are not regulated as hazardous substance USTs under the federal regulation." A copy of that memorandum is available at www.epa.gov/oust.

Hoskinson's memorandum also contains an important caveat, noting that "some states may choose to be more stringent than federal regulations and require DEF USTs to fully comply with state UST regulations." While at this writing I have not encountered any state or local regulator choosing the "more stringent" approach toward regulating USTs containing DEF, it can happen, so PEI is cautioning contractors and facility owners to check first with state and local authorities having jurisdiction regarding any special requirements.

PEI's Recommended Practices for the Storage and Dispensing of Diesel Exhaust Fluid (DEF) PEI RP1100-10

PEI has published a recommended practice for the installation and operation of DEF storage and dispensing equipment that will preserve its quality and prevent releases into the environment. The recommended practices apply to the storage, handling, and dispensing of DEF at motor-fuel-dispensing facilities and repair and maintenance garages. It is limited to storage containers that use a pump and/or meter to dispense DEF.

The single-copy price for RP1100-10 is \$40 for PEI members; \$95 for nonmembers. Member pricing is extended to all regulatory officials. For more information about this special pricing for regulators, contact Keith Wilson at PEI: 918-494-9696 or kwilson@pei.org. ■

FAQs from the NWGLDE

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

More Questions about Throughput!

In this LUSTLine FAQs from the National Work Group on Leak Detection Evaluations (NWGLDE), we respond to questions asked at the recent UST Compliance and Prevention Workshop in Denver regarding throughput limits on leak-detection equipment in general and line-leak detector (LLD) protocol throughput limitations. It may help to look back at the LUSTLine #51, December 2005, FAQ "CITLDS and Throughput" to better understand the following discussion regarding throughput. Please note: the views expressed in this column represent those of the work group and not necessarily those of any implementing agency.

Q. Why do some listings have throughput limits while others do not?

A. The LUSTLine article referred to above explains that the throughput limit requirement in the CITLDS protocol was established because the use of the CITLDS method at busy 24-hour-operation facilities lacks the "quiet time" necessary to obtain enough leak test data to perform a valid test. This is not a problem with external leak-detection methods because they look for leaks outside the tank or in the interstitial space between the inner and outer wall of a double-walled tank. This is also not a problem with most internal methods because they require the tank to be shut down (no filling and/or dispensing) for certain time periods prior to beginning the test and during the test. This shutdown period creates the "quiet time" necessary to allow the tank to become static prior to the test, and remain static during the test without throughput limits.

Currently, the Statistical Inventory Reconciliation (SIR) internal methods of leak detection that are certified to meet the USEPA protocol have similar problems to the CITLDS method. These methods need enough "quiet time" to obtain sufficiently accurate tank-level readings to conclusively find a leak. Again, the busy facilities that operate 24/7 are the concern. They may dispense product on virtually a continuous basis, which creates turbulence in the tank. Also, these facilities receive frequent deliveries of product, which produces both turbulence from the delivery and instability after the delivery due to temperature variations between the delivered and existing product. Unfortunately, the current SIR protocol does not include a throughput limit like the CITLDS protocol. Because of this, the NWGLDE has included the throughputs from the data sets used during the third-party evaluation of the SIR methods. The NWGLDE provides this information for state agencies that may want to consider using this monthly.

Q. Why doesn't the NWGLDE put a throughput limit on systems using LLDs? [This question pertains to the problem of achieving workable leak detection at high throughput facilities where submersible pumps operate for extended periods without an interruption that would allow time for LLD operation.]

A. The quick answer to this question is that the USEPA protocol used to evaluate LLDs does not require the establishment of a throughput limit. But does this protocol really need a throughput limit? The CITLDS test protocol requires a monthly throughput limit in an attempt to create enough "quiet time" to allow conventional CITLDS equipment (not WRA PetroNetwork) to run a valid monthly test. A throughput limit on LLDs would not necessarily create frequent enough pump shutdowns to allow them to detect a 3.0 gph leak within a reasonable time frame. Instead, the NWGLDE believes that the necessary pump shutdowns could be more effectively achieved by a state agency making a rule change that stipulates a specific periodic owner-initiated pump shutdown sequence to initiate the LLD test. This would seem to be a better option than seeking a LLD protocol change to develop a statistical maximum monthly throughput that may or may not achieve the desired pump shutdown frequency needed for valid LLD tests.

Alternately, many states have chosen to augment the leak-detection capabilities of a LLD by also requiring double-walled piping with continuously monitored low-point sumps. The low-point sump sensor may also be tied into the submersible pump circuit to automatically shut off the submersible pump if a leak is detected. ■

About the NWGLDE

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



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USEPA Delays Decision on E15 Waiver, Leaving Hope for the Ethanol Industry and a Trail of Uncertainty in Its Wake

In a December 1, 2009, letter to Growth Energy—a biofuels industry association that asked USEPA to grant a waiver to allow gasoline to contain up to 15 percent ethanol—the agency said that while not all tests have been completed, the results of two tests indicate that engines in newer cars can likely handle an ethanol blend higher than the current 10 percent limit. The agency's decision on whether to raise the blending limit has been postponed until more testing data are available, sometime in mid 2010. The agency also announced that it has begun the process of crafting the labeling requirements that will be necessary if the blending limit is raised.

USEPA hinted that it is likely to support raising the ethanol blend above the current 10 percent limit. "Should the test results remain supportive and provide the necessary basis, we would be in a position to approve E15 for 2001 and newer

vehicles in the mid-year timeframe," wrote Assistant Administrator Gina McCarthy. Growth Energy's co-chairman, retired Army Gen. Wesley Clark, took the letter as "a strong signal that we are preparing to move to E15."

In March 2009, Growth Energy requested a waiver to allow for the use of up to 15 percent ethanol in gasoline. Under the Clean Air Act, USEPA was required to respond to the waiver request by December 1, 2009. The agency has been evaluating the group's request and has received a broad range of public comments as part of the administrative rulemaking process. Automakers, equipment manufacturers, petroleum refiners and blenders, and environment and public health groups have opposed raising the blend wall, calling for more testing.

The Uncertainties

The USEPA is basing its decision primarily on Clean Air Act

not water quality considerations. Hence, the letter makes no mention of petroleum equipment compatibility or potential problems associated with ethanol in the environment, given a release. It mentions addressing labeling issues "to ensure consumers utilize the proper gasoline for their vehicles and equipment (such as lawnmowers, boats, etc.) should the use of ethanol blends greater than 10 percent be ultimately approved." Vehicular labeling issues apply to new (2001 and newer model years) versus older vehicles (less likely to handle higher blends). With the potential for so much change, we need to be asking some crucial questions, such as...How will we store, meter, and dispense all the fuels the public wants? What are the prevention and cleanup implications for our tank programs? How will our regulations keep up with such changes? Stay tuned. ■